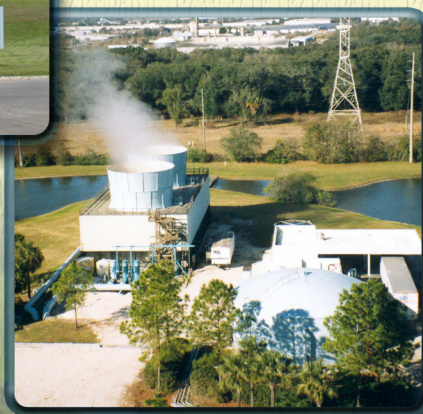




Application for Power Plant Site Certification

Hillsborough County Resource Recovery Facility Expansion

Volume I



Hillsborough County
Florida



1715 North Westshore Boulevard, Suite 875
Tampa, Florida 33607
tel: 813 281-2900
fax: 813 288-8787

November 18, 2005

Mr. Hamilton S. Oven, Jr., P.E.
Administrator, Office of Siting Coordination
Florida Department of Environmental Protection
2600 Blair Stone Road, MS 48
Tallahassee, Florida 32399

Subject: Hillsborough County Resource Recovery Facility Expansion
Application for Power Plant Site Certification

Dear Mr. Oven:

Enclosed, please find Hillsborough County's Application for Power Plant Site Certification (Application), which addresses the construction and operation of an additional municipal waste combustor at the County's existing Resource Recovery Facility (Facility). This application has been prepared to satisfy the requirements set forth in the Florida Electrical Power Plant Siting Act (PPSA) and the PPSA rules adopted by the Florida Department of Environmental Protection (FDEP) at Chapter 62-17, of the Florida Administrative Code.

The Hillsborough County Resource Recovery Facility is owned by Hillsborough County and operated by Covanta Hillsborough, Inc. The Facility has operated successfully since 1987, serving the waste disposal needs of unincorporated Hillsborough County. The Facility has operated at full capacity for several years, necessitating the diversion of municipal waste to the County's landfill. The expansion being applied for with this Application will allow the Facility to recover energy from an additional 600 tons of waste per day and will result in a beneficial environmental and economic impact on solid waste disposal in Hillsborough County.

As part of the Application process, the County has compiled the necessary information to allow the FDEP to evaluate the merits of expanding the Facility. Specifically:

- The air quality analysis demonstrates the expanded Facility's emissions will be indistinguishable from existing ambient conditions.
- The proposed emission limits, developed in accordance with a Best Available Control Technology (BACT) evaluation are more stringent than the USEPA's New Source Performance Standards for Municipal Waste Combustors.



Mr. Hamilton S. Over, Jr., P.E.

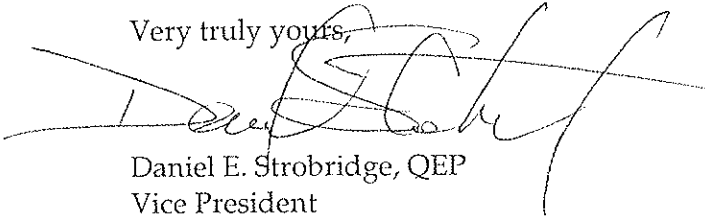
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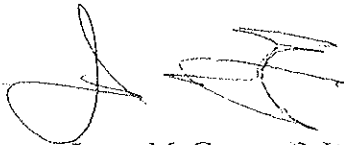
- An assessment of human health and ecological risks associated with the expansion demonstrates that the expanded Facility is not anticipated to have an adverse impact.
- The expansion of the Facility is consistent with the County's Comprehensive Growth Plan to reduce dependence on a landfill for solid waste disposal.

Enclosed herein is a check in the amount of \$125,000 for payment of the application fee. We look forward to working with you and your staff to answer any questions you may have about the project. If you should have any questions concerning the Application submittal or require additional information, please do not hesitate to contact us at (813) 281-2900.

Very truly yours,



Daniel E. Strobridge, QEP
Vice President
Camp Dresser & McKee Inc.



Jason M. Gorrie, P. E.
Sr. Project Manager
Camp Dresser & McKee Inc.

Enclosure

c: Thomas G. Smith, HCSWMD

Contents

Volume I - Application

Executive Summary

ES.1	Introduction	ES-1
ES.2	Background.....	ES-1
ES.3	Need for Facility Expansion	ES-2
ES.4	Site and Associated Facilities	ES-2
ES.5	Existing and Proposed Facility.....	ES-2
ES.6	Effects on Facility Construction and Operation	ES-3

Section 1 Need for Power and the Proposed Facility

Section 2 Site and Vicinity Characterization

2.1	Site and Associated Facilities Delineation	2-1
2.1.1	Site Delineation and Ownership.....	2-1
2.1.2	Existing and Proposed Site Uses	2-3
2.2	Sociopolitical Environment	2-10
2.2.1	Governmental Jurisdictions.....	2-10
2.2.2	Zoning and Land Use Plans	2-15
2.2.2.1	Land Use Plans.....	2-16
2.2.2.2	Consistency with the Comprehensive Plan	2-17
2.2.2.3	Zoning Regulations	2-19
2.2.3	Demography and Ongoing Land Use.....	2-22
2.2.3.1	Existing Populations.....	2-22
2.2.3.2	Existing Land Use	2-22
2.2.4	Easements, Title, Agency Works	2-26
2.2.5	Regional, Scenic, Cultural, and Natural Landmarks	2-26
2.2.6	Archaeological and Historic Sites.....	2-27
2.2.7	Socioeconomics and Public Service.....	2-28
2.2.7.1	Social and Economic Characteristics.....	2-28
2.2.7.2	Area Public Service and Utilities	2-36
2.3	Biophysical Environment.....	2-40
2.3.1	Geohydrology.....	2-40
2.3.1.1	Geologic Description of the Site-Area.....	2-40
2.3.1.2	Detailed Site Lithologic Description	2-48
2.3.1.3	Geologic Maps.....	2-50
2.3.1.4	Bearing Strength.....	2-53
2.3.2	Subsurface Hydrology	2-54
2.3.2.1	Subsurface Hydrologic Data for the Site	2-54
2.3.2.2	Karst Hydrogeology	2-63
2.3.3	Site Water Budget and Area Users.....	2-63

2.3.4	Surficial Hydrology	2-67
2.3.4.1	Hydrologic Characterization.....	2-67
2.3.4.2	Measurement Programs.....	2-69
2.3.5	Vegetation/Land Use.....	2-70
2.3.5.1	Pre-Existing Stresses.....	2-80
2.3.5.2	Measurement Programs.....	2-80
2.3.6	Noise	2-80

Section 3 The Plant and Directly Associated Facilities

3.1	Background.....	3-1
3.1.1	Purpose.....	3-1
3.1.2	History.....	3-1
3.1.3	Current Conditions.....	3-3
3.1.4	Expansion.....	3-4
3.2	Site Layout	3-4
3.2.1	Layout.....	3-4
3.2.2	External Appearance.....	3-5
3.3	Fuel.....	3-7
3.4	Air Emissions and Controls.....	3-8
3.4.1	Air Emissions Types and Sources	3-8
3.4.2	Air Emission Controls.....	3-8
3.4.3	Best Available Control Technology.....	3-8
3.4.4	Design Data for Control Equipment	3-10
3.4.5	Design Approach.....	3-10
3.5	Plant Water Use.....	3-11
3.5.1	Heat Dissipation System.....	3-12
3.5.1.1	System Design	3-12
3.5.1.2	Source of Cooling Water	3-13
3.5.1.3	Dilution System.....	3-13
3.5.1.4	Blowdown.....	3-13
3.5.1.5	Injection Wells	3-13
3.5.2	Domestic/Sanitary Wastewater	3-13
3.5.3	Potable Water Systems.....	3-14
3.5.4	Process Water Systems.....	3-14
3.6	Chemical and Biocide Waste	3-15
3.7	Solid and Hazardous Wastes	3-15
3.7.1	Wastes (Including Ash).....	3-15
3.7.2	Hazardous Wastes	3-15
3.8	On-Site Drainage System	3-16
3.8.1	Pre-Development Site Conditions	3-17
3.8.2	Post-Development Site Conditions	3-21
3.8.3	Basin Design	3-25
3.9	Materials Handling.....	3-27

Section 4	Effects of Site Preparation and Plant and Associated Facilities Construction	
4.1	Land Impact.....	4-1
4.1.1	General Construction Impacts	4-1
4.1.2	Roads	4-2
4.1.3	Flood Zones	4-2
4.1.4	Topography and Soils	4-2
4.2	Impact on Surface Water Bodies and Uses.....	4-3
4.2.1	Impact Assessment	4-3
4.2.2	Measuring and Monitoring Programs	4-3
4.3	Groundwater Impacts	4-3
4.3.1	Impact Assessment	4-3
4.4	Ecological Impacts	4-3
4.4.1	Impact Assessment	4-3
4.5	Impact on Human Populations.....	4-4
4.5.1	Sensitive Receptors	4-4
4.5.2	Workforce.....	4-5
4.5.3	Traffic Associated with Construction	4-7
4.6	Impact on Landmarks and Sensitive Areas.....	4-9
4.7	Impact on Archaeological and Historic Sites	4-9
4.8	Special Features.....	4-10
4.9	Summary of Impacts and Benefits from Construction	4-10
4.10	Variances	4-11
Section 5	Effects of Plant Operation	
5.1	Effects of the Operation on the Heat Dissipation System	5-1
5.1.1	Temperature Effects on Receiving Body of Water	5-1
5.1.2	Effects on Aquatic Life	5-1
5.1.3	Biological Effects of Modified Circulation	5-1
5.1.4	Effects of Offstream Cooling	5-1
5.1.5	Measurement Program	5-2
5.2	Effects of Chemical and Biocide Discharges	5-2
5.2.1	Industrial Wastewater Discharges	5-2
5.2.1.1	Impact of Blowdown and Waste Discharges to WWTP.....	5-2
5.2.1.2	Impact of WWTP Effluent on Facility and Other Reuse	5-3
5.2.2	Cooling Tower Blowdown	5-4
5.2.3	Measurement Program	5-4
5.3	Impacts on Water Supplies.....	5-4
5.3.1	Surface Water	5-4
5.3.2	Groundwater	5-4
5.3.3	Drinking Water	5-5
5.3.4	Leachate and Runoff.....	5-5
5.3.5	Measurement Program	5-6

5.4	Solid/Hazardous Waste Disposal Impacts	5-6
5.4.1	Solid Waste	5-6
5.4.2	Hazardous Waste.....	5-6
5.4.3	Ash Testing.....	5-7
5.5	Sanitary and Other Waste Discharges	5-7
5.6	Air Quality Impacts	5-7
5.6.1	Impact Assessment.....	5-7
5.6.2	Monitoring Program.....	5-7
5.7	Noise	5-8
5.8	Changes in Non-Aquatic Species Populations	5-8
5.8.1	Impacts	5-8
5.8.2	Monitoring.....	5-8
5.9	Other Plant Operation Effects	5-8
5.10	Archaeological Sites.....	5-8
5.11	Resources Committed	5-9
5.12	Variances	5-9
Section 6	Transmission Lines and Other Linear Facilities	
6.1	Transmission Lines	6-1
6.1.1	Electromagnetic Effects.....	6-2
6.2	Associated Linear Facilities	6-3
Section 7	Economic and Social Effects of Plant Construction and Operation	
7.1	Socio-Economic Benefits	7-1
7.2	Socio-Economic Costs.....	7-3
Section 8	Site and Plant Design Alternatives	
8.1	Alternative Sites	8-1
8.2	Proposed Site Design Alternatives.....	8-1

Tables

Table 2-1	Existing and Proposed Site Uses	2-10
Table 2-2	Hillsborough County Population 1980-2003	2-22
Table 2-3	Population within a Five-Mile Radius.....	2-28
Table 2-4	Labor Force Trends Hillsborough County 1984-2002	2-31
Table 2-5	Employment by Industry Hillsborough County	2-33
Table 2-6	Employment Projection Hillsborough County	2-34
Table 2-7	Population Counts by Income Range for Census Tracts Within a 5 Mile Radius	2-34
Table 2-8	Average Wages in Industry	2-35
Table 2-9	Building Permit Activity for Residential and Non-Residential	2-36
Table 2-10	Geohydrologic Framework of Floridan Aquifer System.....	2-41
Table 2-11	Site Boring Data from Williams and Associates Report (1983).....	2-51
Table 2-12	Site Boring Data from Test Lab, Inc. (1984).....	2-52
Table 2-13	Reported Values for Aquifer Characteristics.....	2-59
Table 2-14	Results of Selected Water Quality Parameters for Wells Near the Facility.....	2-62
Table 2-15	Hydrologic Data Representative for the Site Area	2-66
Table 2-16	Water Quality of Surface Waters in Vicinity of Site	2-69
Table 2-17	Wildlife Sighting Results.....	2-77
Table 2-18	Noise Baseline Data Summary	2-83
Table 3-1	Proposed Permit Limits for the Expanded Facility	3-9
Table 3-2	Water and Wastewater Usage for Current and Future Conditions	3-12
Table 3-3	Falkenburg Wastewater Treatment Plant Effluent Water Quality	3-14
Table 3-4	Drainage Areas and Retention Basins Sizes	3-1
Table 3-5	Pre-Development Drainage Areas	3-18
Table 3-6	Time of Concentration for Predevelopment Site Conditions.....	3-19
Table 3-7	Pre-Development Peak Discharge	3-20
Table 3-8	Runoff for Pre-Development Site Conditions	3-21
Table 3-9	Post-Development Drainage Areas	3-22
Table 3-10	Post-Development Peak Discharge.....	3-24
Table 3-11	Runoff for Post-Development Site Conditions.....	3-25
Table 3-12	Limiting Discharge Values for Each Drainage Area	3-26
Table 3-13	Basin Storage Volume Requirements	3-26
Table 5-1	Facility Wastewater Discharge Limits.....	5-3

Figures

Figure 2.1	Site Boundaries	2-5
Figure 2.2	Boundary Survey and Legal Description	2-6
Figure 2.3	Abutting and Adjacent Properties	2-7
Figure 2.4	Aerial Photograph of Site	2-8
Figure 2.5	Facility Layout	2-9
Figure 2.6	Flood Hazard Areas	2-12
Figure 2.7a	Governmental Jurisdictions Map	2-13
Figure 2.7b	Governmental Jurisdictions Map	2-14
Figure 2.8	Land Use Plan – 5-Mile Area	2-18
Figure 2.9	Generalized Zoning – 5-Mile Area	2-21
Figure 2.10	Existing Land Use – 5-Mile Area	2-24
Figure 2.11	Major Industrial and Commercial Activities Near the Site	2-25
Figure 2.12	2000 Census Tracts in Hillsborough County	2-29
Figure 2.13	2000 Census Tracts near the Site	2-30
Figure 2.14	Solid Waste Management Facilities in Hillsborough County	2-39
Figure 2.15	Soil Survey Data	2-42
Figure 2.16	Generalized Geologic Column	2-44
Figure 2.17	Locations of Soil Borings and Geologic Cross-Sections	2-45
Figure 2.18	Geologic Cross-Sections A-A'	2-46
Figure 2.19	Geologic Cross Sections B-B'	2-47
Figure 2.20	Potentiometric Surface of the Floridan Aquifer	2-56
Figure 2.21	Groundwater Levels in the Surficial Aquifer, May 1980	2-57
Figure 2.22	Areas of Inventory of Public and Private Water Wells	2-61
Figure 2.23	Sinkhole and Wellfield Distribution	2-65
Figure 2.24	Vegetation and Land Use Map	2-82
Figure 2.25	Noise Monitoring Locations	2-84
Figure 3.1	Rendering of Current Facility	3-6
Figure 3.2	Rendering of Expanded Facility	3-6
Figure 3.3	Post-Development Site Conditions	3-23
Figure 4.1	Estimated Work Force Requirements	4-6
Figure 4.2	Construction Related Traffic	4-7
Figure 5.1	Projected Waste Tonnages	5-6

Volume II – Appendices

- Appendix 1* Site and Adjacent Area Property Ownership
 - 1-1 Deed for Property and Survey of 353 Acre Tract
 - 1-2 List of Adjacent Property Owners
- Appendix 2* Zoning and Land Use Plan
 - 2-1 Standard Zoning Districts
 - 2-2 Land Use Element and Solid Waste Use Element
 - 2-3 Siting Board's Final Order
- Appendix 3* Materials Separation Plan
- Appendix 4* Requirements for New Waste-to-Energy Facility Capacity
- Appendix 5* State Permit Applications and Approvals
 - 5-1 Revised Stormwater Calculations
 - 5-2 Title V Air Operation Permit
- Appendix 6* Correspondence Related to Governmental Jurisdictions
- Appendix 7* Groundwater Well Inventory
- Appendix 8* Historic and Archeological Report
 - 8-1 Correspondence with Florida Department of State Division of Archives, History, and Records Management
 - 8-2 National Register Entries from Hillsborough County
 - 8-3 Archaeological and Historical Survey of the Site by J. Raymond Williams, Et Al
- Appendix 9* Surface and Groundwater Related Information
 - 9-1 Well Construction Inventory
 - 9-2 Consumptive Use Permits Inventory
 - 9-3 Surface Water Quality Sampling Lab Analysis
- Appendix 10* Soils and Related Geotechnical Information
 - 10-1 Summary of Important Soil Characteristics
 - 10-2 Estimated Soil Properties for Engineering
 - 10-3 Test Lab, Inc. Report
 - 10-4 Williams and Associates Inc. Report
- Appendix 11* Miscellaneous Reports
 - 11-1 Noise Technical Analysis
 - 11-2 Traffic Impact Analysis
 - 11-3 Ash Management Plan
- Appendix 12* Other Supplemental Information
 - 12-1 Ecology
 - 12-2 Growth Management Strategy Information
 - 12-3 Nitrogen Deposition to Tampa Bay
- Appendix 13* APC Technical Specifications (Attachments 1-5)
- Appendix 14* Human Health and Ecological Impact Analysis of the Hillsborough County Resource Recovery Facility Expansion

Volume III – Prevention of Significant Deterioration Air Permit Application

Section 1 Introduction and Overview

Section 2 Regulatory Review

2.1	Applicable Regulations	2-1
2.2	PSD Provisions	2-1
2.2.1	Source Applicability	2-3
2.2.2	Pollutant Applicability	2-3
2.3	Ambient Air Quality Standards	2-5
2.4	New Source Performance Standards	2-5
2.4.1	New Source Performance Standards for Large Municipal Solid Waste Combustors (Subpart Eb)	2-6
2.4.2	Incinerator NSPS (Subpart E)	2-11
2.4.3	Industrial-Commercial-Institutional Steam Generating Unit NSPS (Subpart Db)	2-11
2.4.4	Other NSPS Subparts	2-12
2.5	National Emission Standards for Hazardous Air Pollutants	2-12
2.5.1	Beryllium NESHAP	2-13
2.5.2	Mercury NESHAP	2-13
2.6	Maximum Achievable Control Technology (MACT) Requirements	2-13
2.7	Compliance Assurance Monitoring (CAM) Rule	2-13
2.8	Federal Aviation Administration Requirements for Objects Affecting Navigable Airspace	2-14
2.9	Florida Air Regulations	2-15
2.10	Florida Mercury Rule	2-18
2.11	Permits Requirements	2-18
2.11.1	Existing Permits	2-18
2.11.2	Proposed Permit Conditions	2-19
2.12	Conclusions	2-20

Section 3 Best Available Control Technology Evaluation (BACT)

3.1	Introduction	3-1
3.2	Description of BACT Review	3-2
3.3	Proposed Control Technologies	3-6
3.4	Materials Separation	3-6
3.5	BACT Review for Sulfur Dioxide, MWC Acid Gases, Fluorides and Sulfuric Acid Mist	3-9
3.5.1	Emission of Gaseous Sulfur Compounds and Acid Gases	3-9
3.5.2	Available Control Technologies	3-10
3.5.2.1	Wet Scrubbing Systems	3-10
3.5.2.2	Dry Scrubbers	3-13

	3.5.2.3	Dry Sorbent Injection (DSI)	3-15
	3.5.2.4	Innovative Acid Gas Control Processes.....	3-19
	3.5.3	Selection of BACT.....	3-19
3.6		BACT Review for Particulate Matter (PM ₁₀) and MWC Metals.....	3-20
	3.6.1	Emission of Particulate Matter	3-21
	3.6.2	Available Control Technologies	3-22
	3.6.3	Selection of BACT.....	3-23
3.7		BACT Review for Nitrogen Oxides Emissions	3-23
	3.7.1	Emission of Nitrogen Oxides.....	3-24
	3.7.2	Available Control Technologies	3-25
	3.7.2.1	Combustion Modifications	3-25
	3.7.2.2	Flue Gas Controls.....	3-31
	3.7.3	Ranking of Alternative Control Technologies.....	3-39
	3.7.4	Environmental Impact	3-40
	3.7.5	Economic Impact	3-41
	3.7.6	Energy Impact.....	3-45
	3.7.7	Selection of BACT.....	3-46
3.8		BACT Review for Carbon Monoxide	3-46
	3.8.1	Emission of Carbon Monoxide	3-49
	3.8.2	Selection of BACT.....	3-49
3.9		BACT Review for MWC Organics.....	3-50
	3.9.1	Emission of MWC Organics.....	3-50
	3.9.2	Selection of BACT.....	3-50
3.10		BACT Review for Mercury Emissions.....	3-51
	3.10.1	Emission of Mercury	3-51
	3.10.2	Available Control Technologies	3-51
	3.10.2.1	Activated Carbon Injection.....	3-51
	3.10.2.2	Web Scrubber Systems	3-52
	3.10.2.3	Carbon Filter Beds	3-53
	3.10.3	Ranking of Alternative Control Technologies.....	3-53
	3.10.4	Selection of BACT.....	3-54
3.11		Summary of BACT Determinations	3-54

Section 4 Emissions Estimates

4.1	Introduction	4-1
4.2	Pollutant Emission Estimates – New Municipal Waste Combustor Unit.....	4-1
	4.2.1	Particulate Matter and PM ₁₀ 4-2
	4.2.2	Municipal Waste Combustor Acid Gases
	4.2.2.1	Sulfur Dioxide
	4.2.2.2	Sulfuric Acid Mist.....
	4.2.3	Carbon Monoxide.....
	4.2.4	Nitrogen Oxides.....
	4.2.5	Municipal Waste Combustor Metals

4.2.6	Municipal Waste Combustor Organics	4-9
4.2.7	Volatile Organic Compounds	4-9
4.2.8	Ammonia	4-10
4.3	Pollutant Emission Estimates – Miscellaneous Sources	4-10
4.3.1	Lime Storage Silo	4-10
4.3.2	Activated Carbon Storage Silo	4-10
4.3.3	Cooling Tower Cell	4-11
4.3.4	Auxiliary Burners	4-11
Section 5	Ambient Conditions	
5.1	Terrain Description	5-1
5.2	Meteorology and Climate	5-1
5.3	Ambient Air Quality Standards/Attainment Status	5-1
5.4	Existing Air Quality	5-5
Section 6	Air Quality Modeling Analyses	
6.1	Overview	6-1
6.2	Model Selection and Options	6-1
6.2.1	Screening Analysis	6-2
6.2.2	Refined Air Quality Analyses	6-2
6.2.3	Class I Impact Analysis	6-3
6.2.4	Chemical Transformations	6-4
6.2.5	Averaging Periods	6-4
6.3	Facility Layout and Surrounding Terrain	6-5
6.4	Source Data	6-9
6.4.1	Good Engineering Practice (GEP) Stack Height Analysis and Building Downwash	6-12
6.5	Receptor Network	6-16
6.6	Meteorological Data	6-17
6.7	Screening Modeling Results	6-17
6.8	Refined and Class I Area Modeling Results	6-18
6.8.1	Significant Impact Levels and De Minimis Monitoring Levels	6-27
6.8.2	PSD Increment Analysis Results	6-29
6.8.3	National Ambient Air Quality Standards	6-30
6.8.4	Ambient Reference Concentrations	6-32
Section 7	Additional Impact Analysis	
7.1	Visibility	7-1
7.2	Minor Source Growth	7-4
7.2.1	Employment	7-5
7.3	Vegetation and Soils	7-5
7.3.1	Total Sulfur Deposition	7-8
7.3.2	Total Nitrogen Deposition	7-8

Section 8 References

Appendices

Appendix A Emission Calculation Tables

Appendix B Best Available Control Technology Analysis Supporting Documentation

Appendix C DEP Forms

Tables

2-1	Thresholds for Major Modifications to PSD Major Sources	2-2
2-2	PSD Pollutant Applicability HCRRF Unit 4	2-4
2-3	40 CFR 60 Subpart Eb Air Pollutant Emissions Standards for Unit 4.....	2-7
3-1	Comparison of Most Recent Municipal Waste Combustor Emission Limits and Control Technologies EPA RACT/BACT/LAER Clearinghouse	3-5
3-2	Summary of Hillsborough County Resource Recovery Facility New MWC Unit Best Available Control Technology Determination.....	3-7
3-3	Control Efficiencies of Sulfur Dioxide and Acid Gas Control Technologies	3-10
3-4	Alternative Control Methods for Nitrogen Oxides	3-27
3-5	Sample List of European Municipal Waste Combustion Facilities Utilizing SCR and Their Air Pollution Control Equipment Configuration.....	3-33
3-6	European Municipal Waste Combustion Facility with SCR Emissions Information Received During the BACT Preparation Process	3-34
3-7	Existing MWC Units NO _x Permit Limits and Equivalent Annual Average Emission Rates	3-36
3-8	SCR with FGR System for 600 TPD Municipal Waste Combustor – Capital and O&M Costs.....	3-47
3-9	SNCR with FGR for 600 TPD Municipal Waste Combustor – Capital and O&M Costs.....	3-48
3-10	Pollutants Applicable to PSD Review and Proposed Control Technology.....	3-54
4-1	Proposed Emissions Limits and Air Dispersion Modeling Emissions Rates.....	4-3
5-1	National and Florida Ambient Air Quality Standards	5-3
5-2	Attainment Status ¹ for Areas Including the Hillsborough County Solid Waste Recovery Facility	5-4
5-3	Locations of Ambient Pollutant Monitors and Relative Distance to Stack Location at the Hillsborough County Resource Recovery Facility	5-7
5-4	Pollutants Monitored at Hillsborough County Ambient Monitors (2002-2004) .	5-8
5-5	Ambient Monitored Concentrations at the Nearest Stations to the Hillsborough County Resource Recovery Facility	5-9
6-1	Municipal Waste Combustor Unit 4 Operating Windows and Stack Parameters.....	6-9
6-2	Municipal Waste Combustor Existing Units' Stack Parameters.....	6-12
6-3	BPIP Building Tiers and Heights	6-16
6-4	Municipal Waste Combustor Screening Modeling Results.....	6-19
6-5	Existing and New Sources Parameters.....	6-20
6-6	Unit 4 and Facility Normalized Modeled Concentrations	6-20
6-7	Existing Facility and Unit 4 Modeling Emissions Rates	6-27
6-8	Unit 4 Only Comparison of Unit 4 Only Maximum Impacts to SILs.....	6-28
6-9	Comparison of Unit 4 Maximum Impacts to De Minimis Monitoring Levels ..	6-29

6-10	Comparison of Unit 4 and Facility Maximum Impacts to PSD Class II Increments	6-30
6-11	Comparison of Maximum Class I Impacts to Significant Impact Levels and PSD Increments	6-31
6-12	Comparison of Unit 4 and Combined Facility Maximum Impacts to NAAQS.....	6-32
6-13	Comparison of Unit 4 and Facility Maximum Impacts to Ambient Reference Concentrations ¹	6-33
7-1	Class I Visibility Modeling Results.....	7-3
7-2	Class II Visibility Modeling Results.....	7-3
7-3	Population Change for Hillsborough County, 1980 to 2004	7-4
7-4	Comparison of Unit 4 and Hillsborough County Air Pollutant Emission Rates	7-5
7-5	Total Sulfur Deposition Results Class I – Chassahowitzka Wildlife Refuge, Annual Average S Deposition (kg/ha*yr)	7-9
7-6	Total Nitrogen Deposition Results Class I – Chassahowitzka Wildlife Refuge, Annual Average N Deposition (kg/ha*yr)	7-10

Figures

6-1	Locus Map	6-6
6-2	Site Plan Map.....	6-7
6-3	3-km Land Use Area.....	6-8
6-4	Hillsborough County Resource Recovery Facility Unit 4 Stoker Capacity Diagram.....	6-11
6-5	GEP Stack Height Analysis Building Layout	6-14
6-6	GEP Stack Height Analysis 3-D Building Layout	6-15
6-7	Unit 4 Maximum Annual Normalized Impacts	6-22
6-8	Unit 4 24-Hour High 2 nd High Normalized Impacts	6-23
6-9	Unit 4 8-Hour High 2 nd High Normalized Impacts	6-24
6-10	Unit 4 3-Hour High 2 nd High Normalized Impacts	6-25
6-11	1-Hour High 2 nd High Normalized Impacts	6-26
7-1	Hillsborough County Air Pollution Trends.....	7-7

Executive Summary for Hillsborough County's PPSA Application

ES.1 Introduction

This document summarizes the key facts presented in Hillsborough County's Application for Power Plant Site Certification ("Application"). In its Application, Hillsborough County ("County") is seeking authorization to construct and operate a new 600-tpd boiler that will increase the solid waste processing capacity of the Hillsborough County Resource Recovery Facility ("Facility"). The Application also seeks authorization to increase the Facility's steam electrical generating capacity from 39 megawatts ("MW") to 47 MW (net capacity). The County has prepared this Application to satisfy the requirements set forth in the Florida Electrical Power Plant Siting Act ("PPSA"), Sections 403.501-.518, Florida Statutes, and the PPSA rules adopted by the Florida Department of Environmental Protection ("FDEP") in Chapter 62-17, F.A.C.

ES.2 Background

In the early 1980's, the Board of County Commissioners of Hillsborough County decided that the County should use a resource recovery facility to (a) reduce the volume of the County's solid waste and (b) generate electricity from solid waste that would otherwise be discarded in a landfill. Accordingly, the County filed an application under the PPSA to construct and operate the County's Facility. The application was approved in 1984 and the Facility began operation in 1987.

The Facility is an essential component of the Comprehensive Master Plan ("Plan") for Hillsborough County and the Cities of Tampa, Temple Terrace and Plant City. The Plan provides for state-of-the-art technology and innovative approaches to recycling, waste reduction, and waste disposal. In accordance with the Plan, the County has developed: (a) an aggressive recycling program that significantly reduces the quantity of materials requiring disposal; (b) a waste-to-energy facility for waste reduction and energy recovery from those materials that are not recycled; and (c) a landfill for the disposal of ash and by-pass waste (i.e., materials that are not recycled or processed in the Facility). Hillsborough County and the three cities have used a cooperative, regional approach to solid waste management issues, while providing environmentally protective, cost-efficient programs for local residents. Hillsborough County is one of the counties in Florida that consistently complies with the State of Florida's recycling goal of 30%.

ES.3 Need for Facility Expansion

Despite the County's comprehensive recycling program, the amount of solid waste generated in the County has increased each year since the Facility began operation, primarily due to population growth. The amount of solid waste generated in the County now significantly exceeds the Facility's design capacity. Consequently, large

quantities of solid waste currently are being diverted from the Facility to the County landfill.

In 2005, the Board of County Commissioners decided to expand the Facility, consistent with the County's long-standing Plan, rather than dispose of ever-increasing amounts of solid waste in a landfill. The Board's decision was based on a thorough evaluation of the County's solid waste disposal options.

ES.4 The Site and Surrounding Areas

The Facility is located in an unincorporated area of Hillsborough County that is southeast of the City of Tampa, west of Interstate 75 ("I-75"), and north of the Crosstown Expressway. The Facility was built on a 50.4-acre site, which is in the southern portion of a 353-acre tract of land owned by Hillsborough County. The site is bounded: on the south by the Falkenburg Road Wastewater Treatment Facility and a railroad track that is owned by CSX Railroad; on the west by a 230 Kilovolt ("KV") transmission line corridor and easement owned by the Tampa Electric Company ("TECO"); on the north by vacant improved pasture land, the Falkenburg Road Jail, the Hillsborough County Department of Animal Services, and the Hillsborough County Sheriff's Office (District 2); and on the east by Falkenburg Road and vacant land. The nearest residential area is more than one mile away, on the opposite (east) side of I-75.

Before the existing Facility was approved under the PPSA, the County Commission amended the County's comprehensive land use plan and rezoned the site to allow the Facility to be built and operated on the site. The site is designated as "Public/Quasi-Public" in the comprehensive plan. The site is zoned as a "Planned Development - Industrial" area. The site and the Facility, including the proposed expansion of the Facility, are consistent and in compliance with the County's existing land use plans and zoning ordinances.

ES.5 The Existing Facility and the Proposed Project

The Facility uses "mass burn" technology for the combustion of non-hazardous, municipal solid waste. The Facility has three combustion/steam generation units, each with a nominal capacity of 400 tons per day ("tpd") and a continuous design rated capacity of 440 tpd when burning a reference waste with 4,500 Btu per pound. The three units have a combined nominal capacity of 1200 tpd and a combined design rated capacity of 1,320 tpd.

The Facility was originally designed and built to accommodate the addition of a fourth combustion unit, thus making the proposed expansion project relatively simple, without disrupting large areas of the site. The primary components of the proposed project will include: (a) the construction of a new 600 tpd combustion unit and the associated air pollution control system; (b) the installation of a new nominal 17 MW steam turbine generator; (c) the expansion of the ash handling and refuse

building; and (d) the addition of a new transformer yard, a new lime silo, and a new settling basin. When the expansion project is completed, the Facility will have four combustion units, which will be able to process approximately 1,800 tpd of solid waste and generate approximately 47 MW of electricity (net capacity).

The new combustion unit will be equipped with the same air pollution control systems that have worked well at the existing Facility. A fabric filter (baghouse) will be used to remove particulate matter from the new unit's airborne emissions. A spray dry absorber (scrubber) will control acid gases, a carbon injection system will control mercury, and an enhanced selective non-catalytic reduction system ("SNCR") will control nitrogen oxides ("NOx"). Continuous emissions monitoring systems ("CEMS") will be used to ensure that the Facility is operating in compliance with the applicable emissions limits at all times. The air pollution controls and monitoring systems at the Facility will comply with the U.S. Environmental Protection Agency's ("EPA") standards for municipal waste combustors, which are based on the use of Maximum Achievable Control Technology ("MACT").

ES.6 Effects of Facility Construction and Operation

The construction and operation of the Facility's fourth unit will have minimal impacts on the environment. Construction activities will only occur in disturbed upland areas that are part of or adjacent to the Facility's existing footprint. No construction will occur in a wetland, surface water, or sensitive habitat. Construction activities will not cause any adverse impacts on any cultural, historic, or archaeological resources.

The basic operation of the Facility will not change when the fourth unit is installed. The solid waste storage and handling areas in the Facility are enclosed and maintained under negative air pressure. Consequently, dust and odors outside of the Facility are minimized. Only municipal solid waste and similar materials will be used as fuel at the Facility. The Facility will not accept hazardous waste, biomedical waste, or other prohibited materials.

The Facility's water supply and management system will remain the same after the fourth unit becomes operational. The Facility will not discharge any industrial or domestic wastewater to any ground water or surface water body. All of the Facility's wastewater will continue to be sent by pipeline to the co-located Falkenburg Advanced Wastewater Treatment Plant (WWTP). Treated wastewater from the Falkenburg WWTP will be used to satisfy the Facility's need for cooling water. Potable water will continue to be provided to the Facility from an existing City of Tampa water supply pipeline. Stormwater will be treated and managed in the existing system of swales and detention/retention ponds on the site.

The Facility expansion will not require the construction of any new pipeline, water supply well, stormwater management facility, or electric transmission line.

The operation of the fourth unit will not have a significant impact on ambient air quality. The maximum impacts on air quality due to the operation of the fourth unit will be much less than the levels allowed under the federal and state ambient air quality standards (AAQS), Prevention of Significant Deterioration (PSD) increments, and other applicable regulations. The maximum impacts from the operation of all four units at the Facility also will be less than the AAQS, PSD increments, and other applicable standards.

ES.7 Benefits of the Project

The expansion of the Facility will provide significant benefits to the citizens and businesses of Hillsborough County. The Facility reduces the volume of municipal solid waste by approximately 90%, thus reducing the amount of landfill capacity needed for the disposal of solid waste. Expanding the Facility with a fourth unit will extend the useful life of the County's landfill and postpone the need to build a new landfill in Hillsborough County. By producing electricity, the Facility reduces the amount of electricity needed from a traditional power plant that burns fossil fuels. The Facility expansion will eliminate the need to use approximately 4 million barrels of oil and thus will save at least \$200 million in oil purchases over the next 20 years.

The construction and operation of the Facility will provide significant direct and indirect benefits to the citizens of Hillsborough County. Jobs will be created by the construction and operation of the fourth unit. The sale of energy will generate revenue for the County. The expansion project will provide an ecologically sound and economical method to dispose of solid waste. The County landfill's potential threat to groundwater will be reduced because the landfill will be used to dispose of the Facility's ash, rather than raw garbage. The Facility will recover and beneficially use the energy from the solid waste, which otherwise would be discarded and not utilized.

Section 1

Need for Power and the Proposed Facility

Hillsborough County, Florida is submitting this Application for Power Plant Site Certification (Application) seeking authorization for construction and operation of a new 600-tpd boiler at the Hillsborough County Resource Recovery Facility (Facility). The expansion will increase the solid waste processing capacity of the Facility from 1200 tpd to 1800 tpd. The Application also seeks authorization for an increase of the Facility's steam electrical generating capacity from 39 MW to 47 MW. Hillsborough County (County) has prepared this Application to satisfy the requirements set forth in the Florida Electrical Power Plant Siting Act (PPSA), Sections 403.501-518, Florida Statutes, and the PPSA rules adopted by the Florida Department of Environmental Protection (FDEP) in Chapter 62-17,F.A.C.

The primary objective of the proposed facility expansion is to dispose of solid waste generated within the unincorporated areas of the County. The County's decision to expand the Facility comes after considerable investigation by the Board of County Commissioners into alternative methods of resolving the growing solid waste disposal needs of the County, primarily due to high population growth in the County. The combustion of solid waste at the resource recovery facility represents the most feasible alternative to sanitary landfilling for the County. The generation of electricity provides a secondary benefit of expanding the resource recovery facility. Other benefits include economic benefits to the residents of the County, reduction of use of fossil fuels in traditional power plants, generation of jobs, revenues to County by sale of energy, increase in the useful life of the existing landfills, decreases the potential threat to groundwater from landfilling solid waste, etc.

Since 1984, the Florida Legislature has encouraged the use of resource recovery facilities as a means of managing the state's solid waste. In Section 377.709(1), Florida Statutes, the Legislature declared that "it is critical to encourage energy conservation in order to protect the health, prosperity, and general welfare of this State and its citizens." The Legislature further declared that the "combustion of refuse by solid waste facilities to supplement the electricity supply not only represents an effective conservation effort, but also represents an environmentally preferred alternative to conventional solid waste disposal in this state." The Legislature directed the Florida Public Service Commission ("PSC") "to establish a funding program to encourage the development by local governments of solid waste facilities that use solid waste as a primary source of fuel for the production of electricity."

The Legislature's support for resource recovery facilities continues to this day. In 2005, the Legislature encouraged local governments to consider the use of a resource recovery facility before expanding solids waste landfills. Chapter 2005-259 (H.B 77) requires utilities and cooperatives to offer a purchase contract to producers of renewable energy; provides for establishment of purchase and contract requirements and rules; revises waste-to-energy facility permitting requirements and encourages

certain permit applicants to consider construction of such facilities (Effective October 1, 2005).

In Section 403.519, Florida Statutes, the Legislature has authorized the Florida Public Service Commission with the responsibility of determining whether construction of a proposed electrical generating facility is necessary to meet the present or expected need for electricity in peninsular Florida. An affirmative determination of need must be issued by the Public Service Commission before an electrical power plant can be approved under the Florida Electrical Power Plant Siting Act ("Act"), Sections 403.501 - .518, Florida Statutes. Certification under the Act must be obtained for the construction of any facility that will use steam to generate 75 MW or more of electricity. Certification under the Act may be obtained for a smaller facility, at the option of the applicant, pursuant to Section 403.506(1), Florida Statutes.

In 1983, the County requested the Public Service Commission to issue an affirmative determination of need for the County's resource recovery facility for construction of the proposed electrical generating facility. The Public Service Commission concluded that the resource recovery facility would contribute to the reliability of the state's electrical supply and would be cost-effective. A copy of the Board's Final Order is included in Appendix 2.3.

The Facility has already been approved as an electrical generating facility by the federal government. On August 29, 1983, the County filed an application with the Federal Energy Regulatory Commission (FERC) for certification of its proposed resource recovery facility as a qualifying small power production facility pursuant to Section 201 of the Public Utility Regulatory Policies Act of 1978 (PURPA) and rules promulgated by FERC. Notice of the application was published in the Federal Register on September 20, 1983. On November 16, 1983, the FERC granted the County's application for certification of its resource recovery project as a qualifying small power production facility.

In 1984, the Governor and Cabinet, sitting as the Siting Board, approved the construction and operation of the Facility pursuant to the Act. The Facility was authorized to operate three boilers, each capable of processing a nominal 400 tons per day (tpd) of solid waste, with a total capacity of 1200 tpd. The Facility also was approved for an ultimate site capacity of 1600 tpd. Accordingly, the Facility was designed with space and equipment to eventually be expanded by an additional 400-tpd unit.

However, the County's population, and the quantity of municipal solid waste (MSW) generated in the County, has grown more rapidly than originally anticipated. As a result, the County has decided to increase the capacity of the existing facility by adding a new boiler with a nominal rated capacity of 600 tpd (based on MSW with a nominal higher heating value of 5,000 BTU/lb).

This application for certification under the Florida Electrical Power Plant Siting Act seeks authorization to construct and operate the new 600-tpd boiler, thus increasing the Facility's solid waste processing capacity from 1200 tpd to 1800 tpd. This application also seeks authorization to increase the facility's steam electrical generating capacity from 39 MW to 47 MW.

Although the County previously obtained a determination of need from the PSC for the existing facility, a PSC determination of need is not required for the County's expansion project. In 1994, the Florida Legislature created certain exemptions from the PSC process for resource recovery facilities. Section 377.709(6), Florida Statutes, now provides that a resource recovery facility "shall be exempt from the need determination process outlined in s. 403.519", Florida Statutes, if the resource recovery facility proposes an expansion that will increase the facility's steam electrical generating capacity by 50 MW or less. The PSC applied this statutory exemption in a case involving the expansion of Lee County's resource recovery facility with a new 600-tpd boiler, and issued a declaratory statement confirming that a PSC determination of need was not required for Lee County's project. Since the County's proposed 600-tpd expansion project will increase the Facility's steam electrical generating capacity by less than 50 MW, it is clear that a PSC determination of need is not required for the proposed expansion of the Facility.

Section 2

Site and Vicinity Characterization

2.1 Site and Associated Facilities Delineation

2.1.1 Site Delineation and Ownership

This section briefly describes the dimensions, location and uses of the County's existing Facility site at 350 N. Falkenburg Road in Brandon, Florida. Proposed modifications to the Facility and their locations are described. The site dimensions have not changed since the original certification application in 1983.



Exhibit 1
Existing Facility

The existing Facility (see Exhibits 1, 2, and 3) is located southeast of the City of Tampa, west of Interstate 75 (I-75), and north of the Crosstown Expressway, in an unincorporated area of Hillsborough County. The Facility was built on a 50.4-acre site located in the southern portion of a 353-acre tract of land that is situated in Section 18, Township 29 and Range 20. The site was purchased by Hillsborough County from Seaboard System Railroad, Inc., on June 1, 1984.

The site is bounded on the south by a railroad track that is owned by CSX Railroad; on the west by a 230 Kilovolt (KV) transmission line corridor and easement owned by the Tampa Electric Company (TECO), and lands owned by Tampa Bay Water; on the north by vacant improved pasture land, the Falkenburg Road Jail, Hillsborough County Department of Animal Services, and Hillsborough County Sheriff's Office (District 2); and on the east by Falkenburg Road and

some vacant land. **Figure 2-1** shows the delineation of the site boundaries and identifies some of the key features of the area surrounding the site. The boundary survey and the legal description for the 50.4-acre Facility site is shown in **Figure 2-2**. The boundary survey and deed for the entire 353-acre tract is included in **Appendix 1-1**.

Abutting and adjacent properties are delineated on **Figure 2-3**. All of the land abutting the site to the south is owned by CSX Railroad and used for a railroad track. North and east of the site is land owned by Hillsborough County. A 225-foot portion of the eastern boundary of the site abuts the Falkenburg Road right-of-way. Abutting the site to the west is a 200-foot wide Tampa Electric Company easement that is used for electrical transmission lines.



Exhibit 2
Facility Property

Appendix 1-2 contains a complete list of property owners within 150 feet of the site, subdivisions within 250 feet of the site, and the County's property assessment map. The nearest private homes are located east of Falkenburg Road along Woodberry Road.



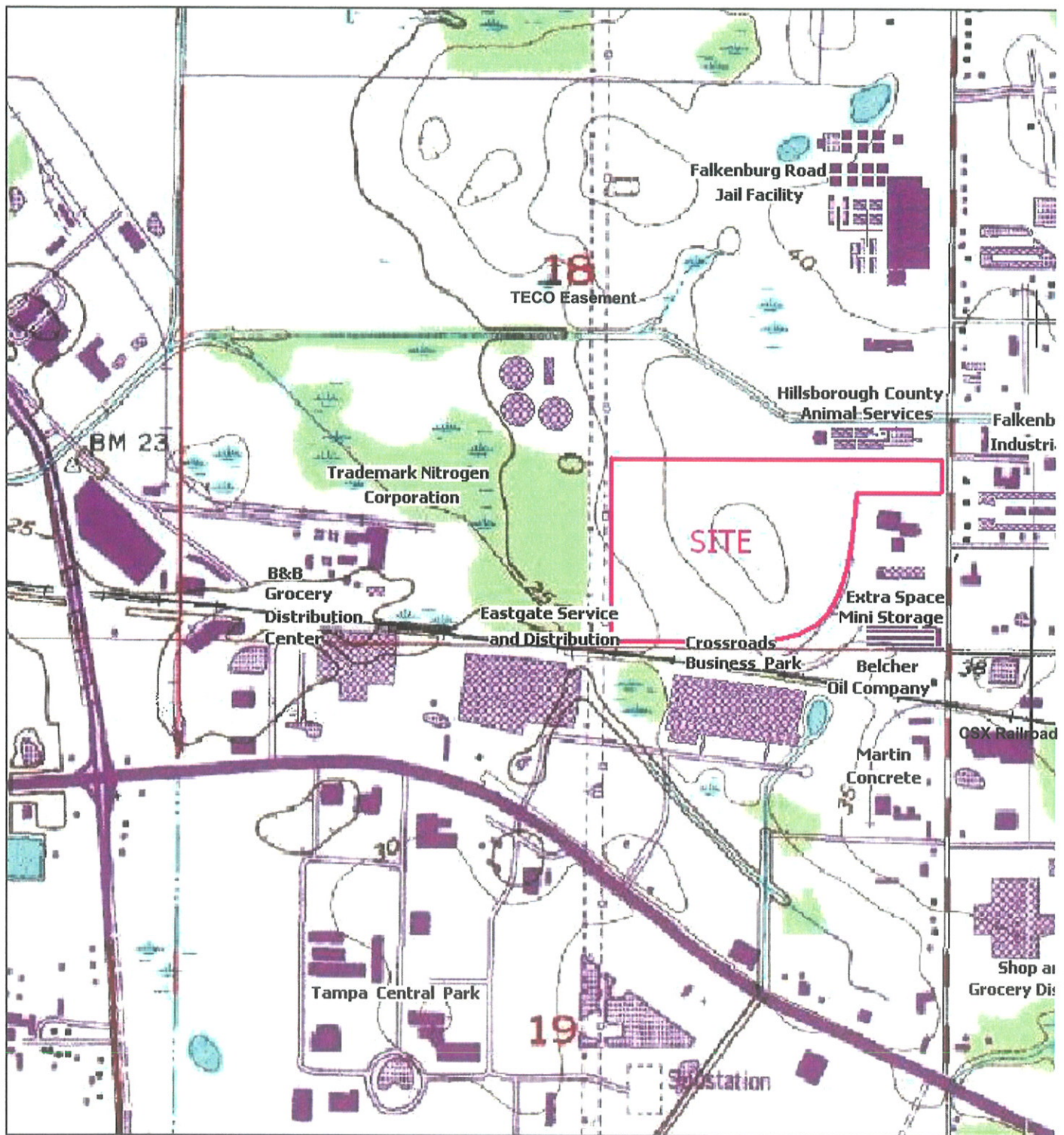
Exhibit 3
North Wall of Facility / Location of Expansion

2.1.2 Existing and Proposed Site Uses

Figure 2-4 shows an aerial photograph of the Facility site and the surrounding area. The existing land uses for the site are a solid waste energy recovery facility, a water treatment facility and unimproved pasture land. Less than half of the 50.4-acre site is actually developed with buildings or other improvements. Access to the site is from Falkenburg Road. The majority of the developed portion of the site is setback from Falkenburg Road, on the western side of the parcel. The existing buildings are buffered to the east and west by a retention pond and some landscaping. The wastewater treatment facility is located on the southern portion of the parcel, bordered by the railroad corridor.

Figure 2-5 presents the Facility layout. This site plan shows the Facility has been situated in the northwestern portion of the site to allow good traffic circulation within the site and to provide open space between the Facility and Falkenburg Road. It presents the layout and location of the Facility and the associated structures that were constructed on the site. The site plan is based on the Solid Waste Energy Recovery Facility Application for Power Plant Site Certification that was prepared by Camp, Dresser and McKee (dated August, 1984) and approved by the Siting Board. The ultimate layout for the site after the Facility expansion is essentially the same as presented in the original site plan, which included plans for expansion. The site plan for the expansion project is described in Section 3 of this application.

At present, approximately 3.5 acres or about 7 percent of the site is occupied by the Facility and related structures. The proposed expansion project will increase the size of the resource



Hillsborough County
Energy Recovery Project

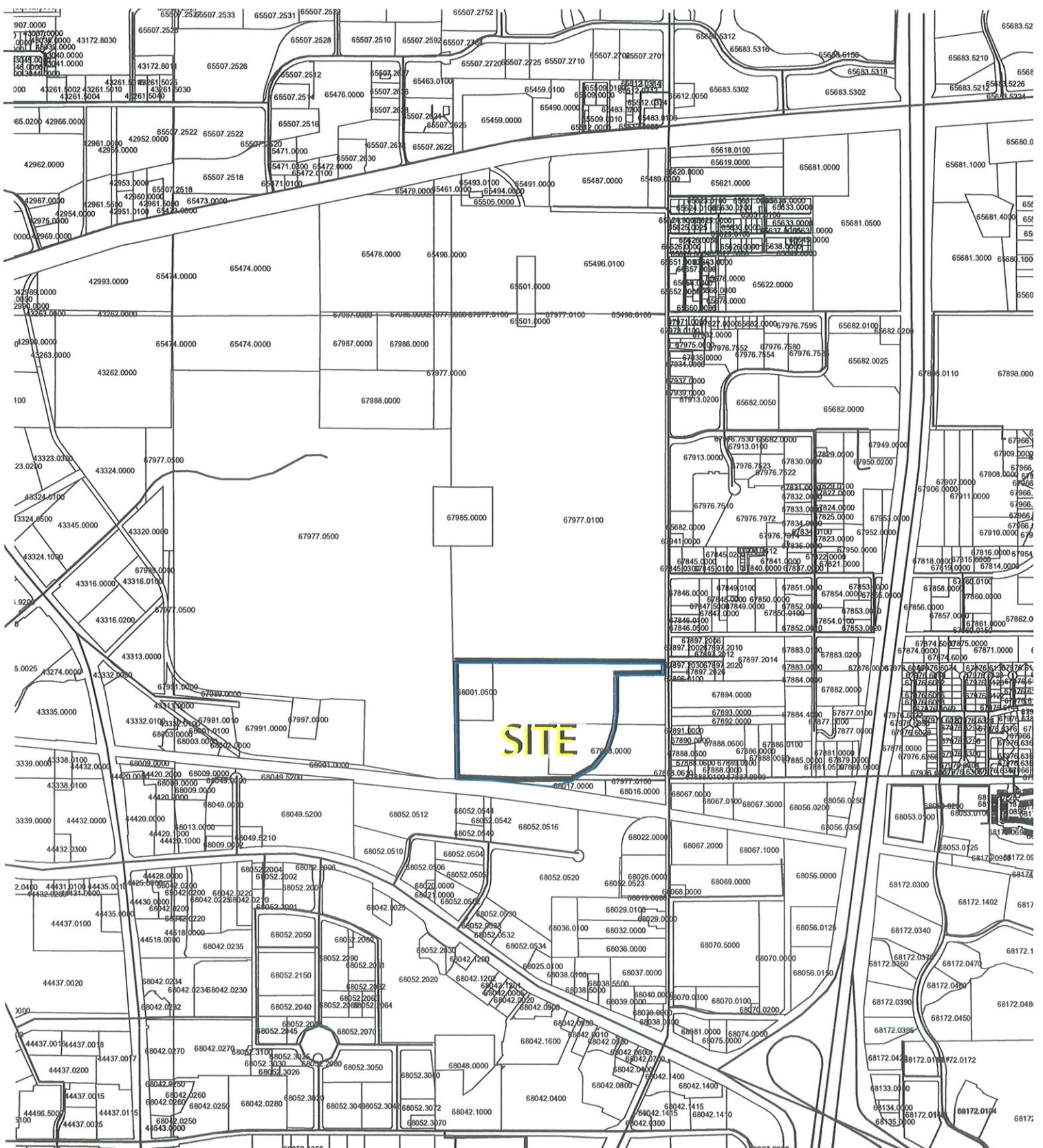
Scale
NTS

Figure 2.1
Site Boundaries



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT





Hillsborough County Energy Recovery Project



Figure 2.3
Abutting & Adjacent
Properties

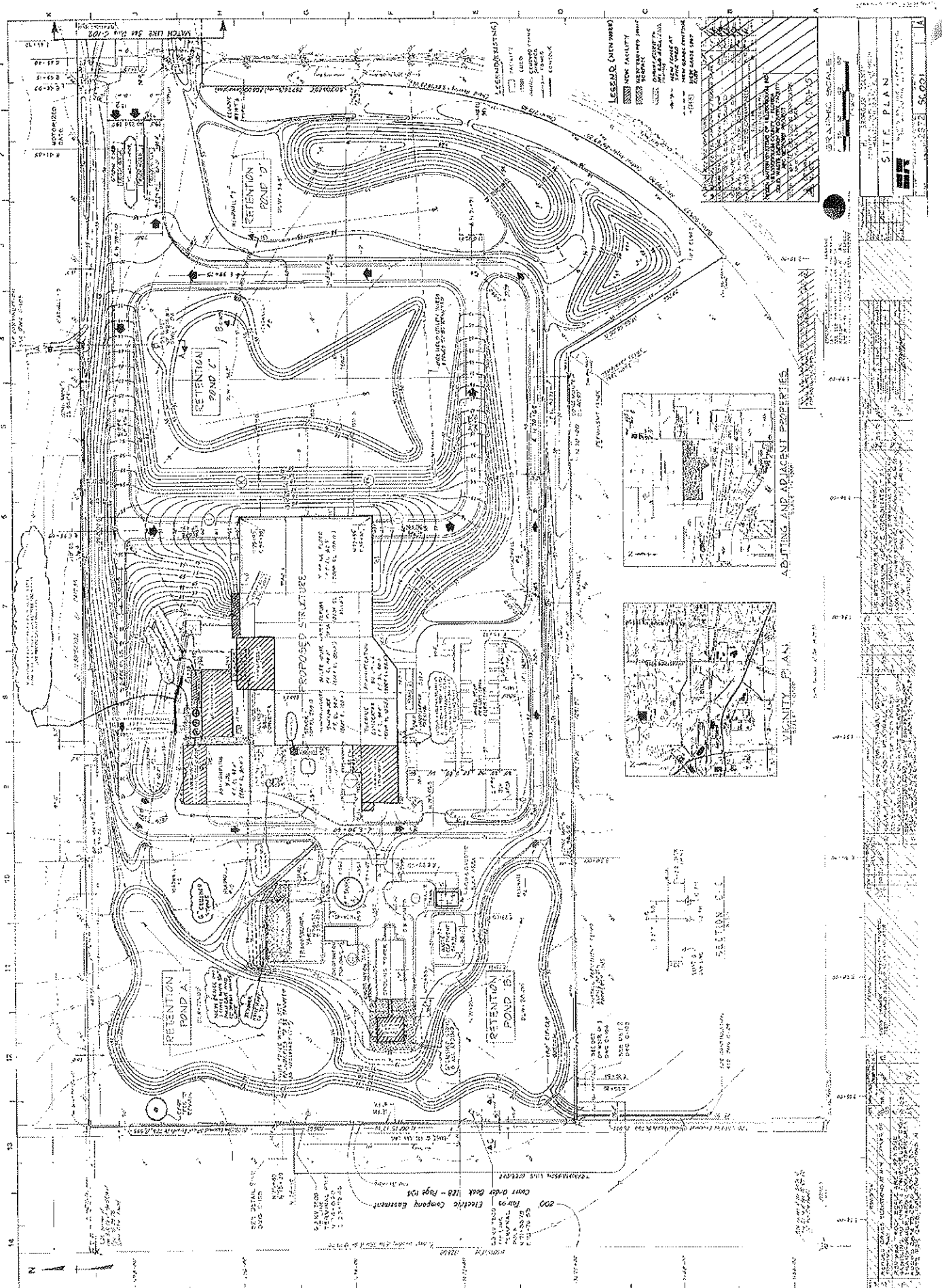


Hillsborough County Energy
Recovery Project



Figure 2.4
Aerial Photograph of Site

Aerial Taken (11/2003)



recovery structures by only 0.3 acres. About 2.3 acres or 4.6 percent of the site is and will be used for the wastewater treatment plant structures. About 7.8 acres or 15.5 percent of the site is and will continue to be used for roadways and parking. After the proposed expansion project is completed, approximately 60 percent of the site will continue to be used for open space, buffering, and landscaping. A complete summary of existing and proposed land uses, as well as the acreage devoted to those uses, is presented in **Table 2-1**.

Table 2-1 Existing and Proposed Site Uses									
	Existing Use				Proposed Use				
	Resource Recovery Facility		Wastewater Treatment Plant		Resource Recovery Facility		Total Proposed Use		
	Acres	% of Site	Acres	% of Site	Acres	% of Site	Acres	% of Site	Change in Acreage
Structures	3.5	6.9	2.3	4.6	3.8	7.5	6.1	12.1	+0.3
Roadways & Parking	6.1	12.1	1.7	3.4	6.1	12.1	7.8	15.5	None
Open Areas & Landscaping	20.6	40.9	9.7	19.2	20.3	40.3	30.0	59.5	-0.3
Retention Basins	6.2	12.3	0.3	0.6	6.2	12.3	6.5	12.9	None
Total Area	36.4	72.2	14.0	27.8	36.4	72.2	50.4	100.0	None

No portion of the site is located in the 100-year flood zone as defined by the Federal Emergency Management Agency (FEMA). The 100-year flood zone in the vicinity of the site is shown in **Figure 2-6**.

2.2 Sociopolitical Environment

This section provides a brief discussion of the governmental entities, demographics, planning issues, and other factors that are present within a five-mile radius of the Facility as shown in **Figures 2-7a and 2-7b**.

2.2.1 Governmental Jurisdictions

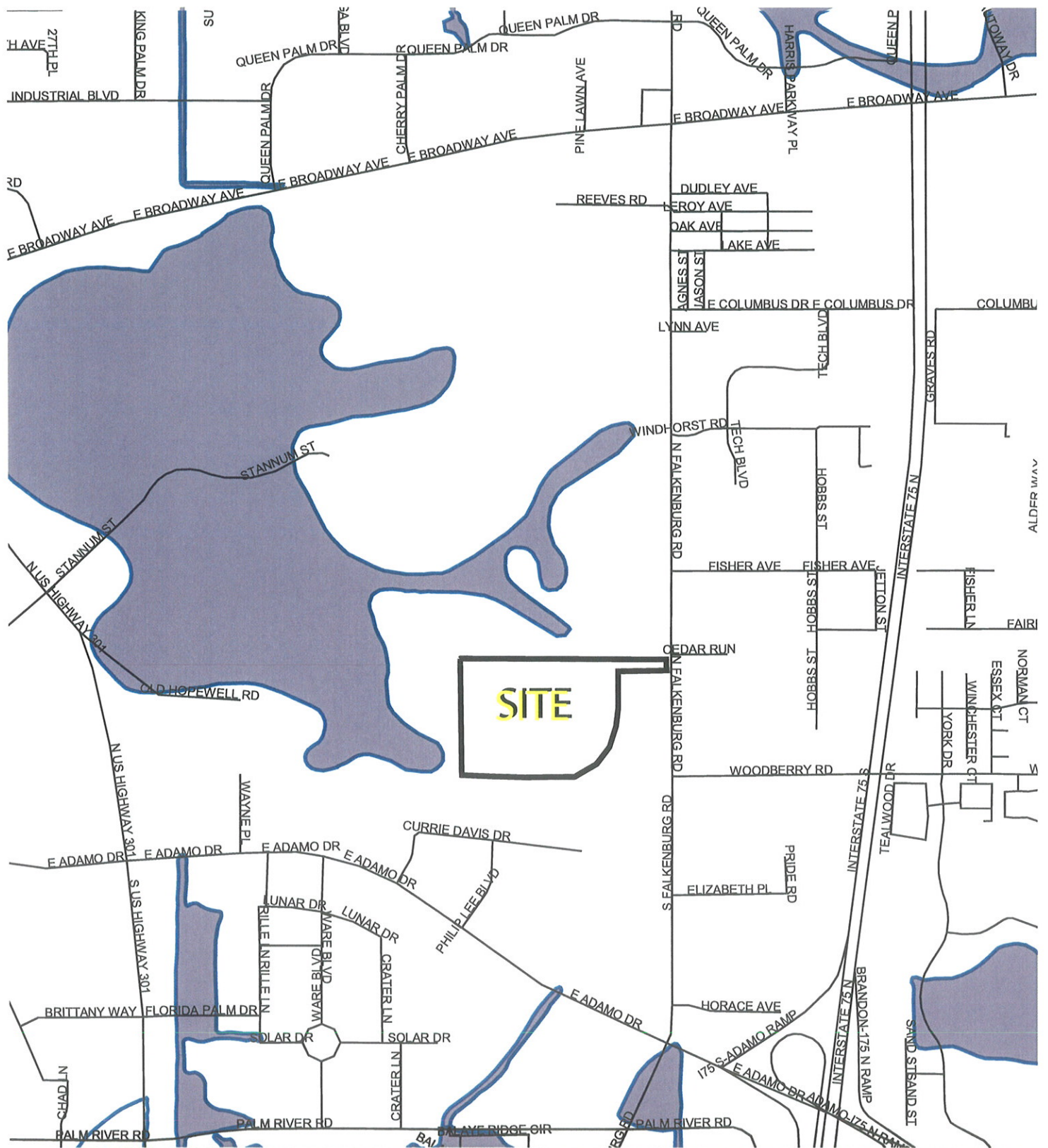
Most of the area within a five-mile radius of the Facility is within the unincorporated portion of Hillsborough County. As shown on **Figure 2-7b**, portions of the City of Tampa and the City of Temple Terrace are within five miles of the site. The City of Tampa extends to the Tampa By-

Pass Canal, which is approximately 1.7 miles west of the site. Temple Terrace is approximately five miles north of the site, and north of Interstate 4 (I-4).

The following areas of interest are located within five-miles of the site:

- County Parks
- State Fairgrounds
- Seminole Indian Reservation

These sites are shown on **Figures 2-7a** and **2-7b**.



Hillsborough County
Energy Recovery Project

Scale

0 1500'

Figure 2.6
Flood Hazard Areas

Based on 1992 FIRM Panel
Updates

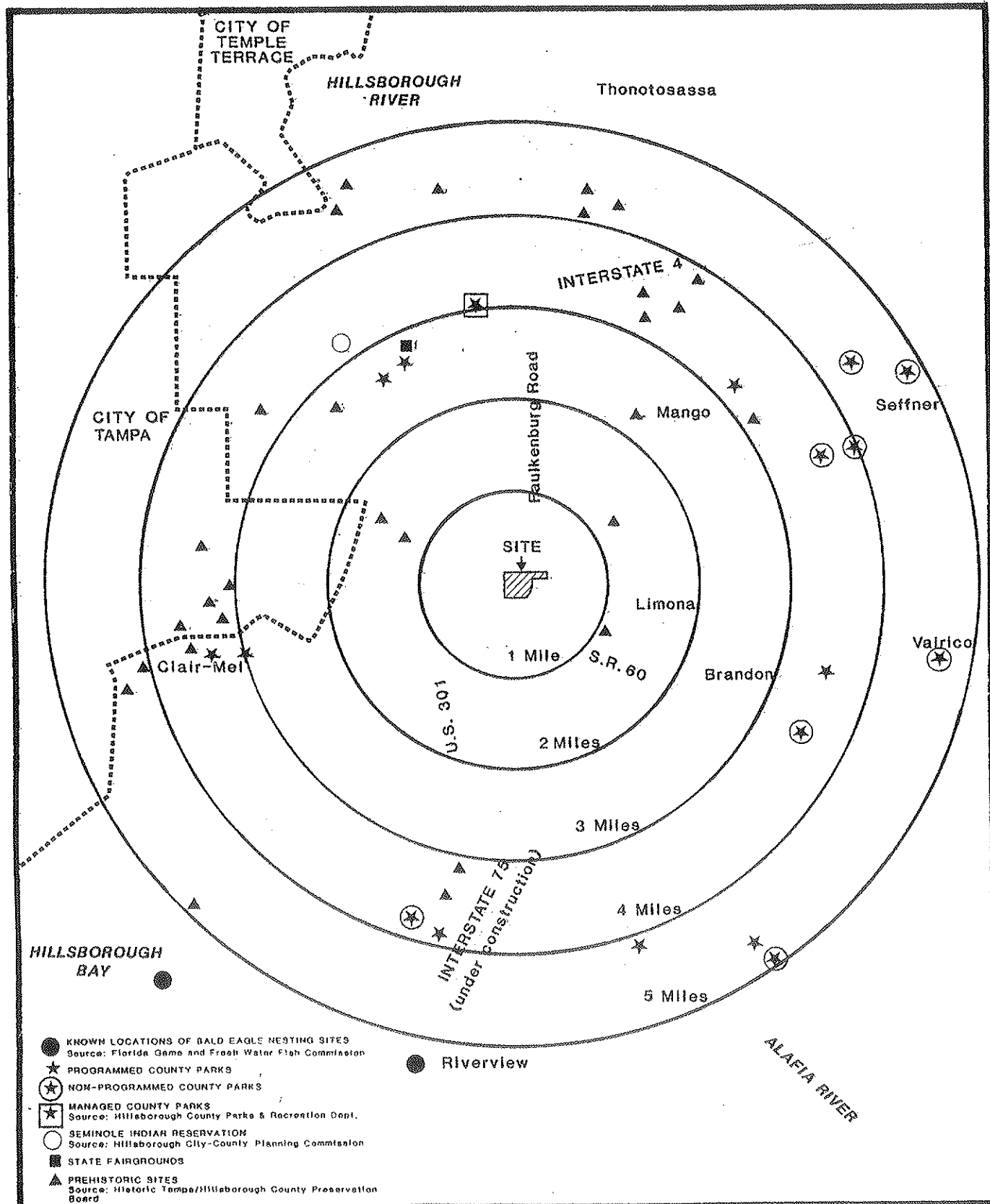
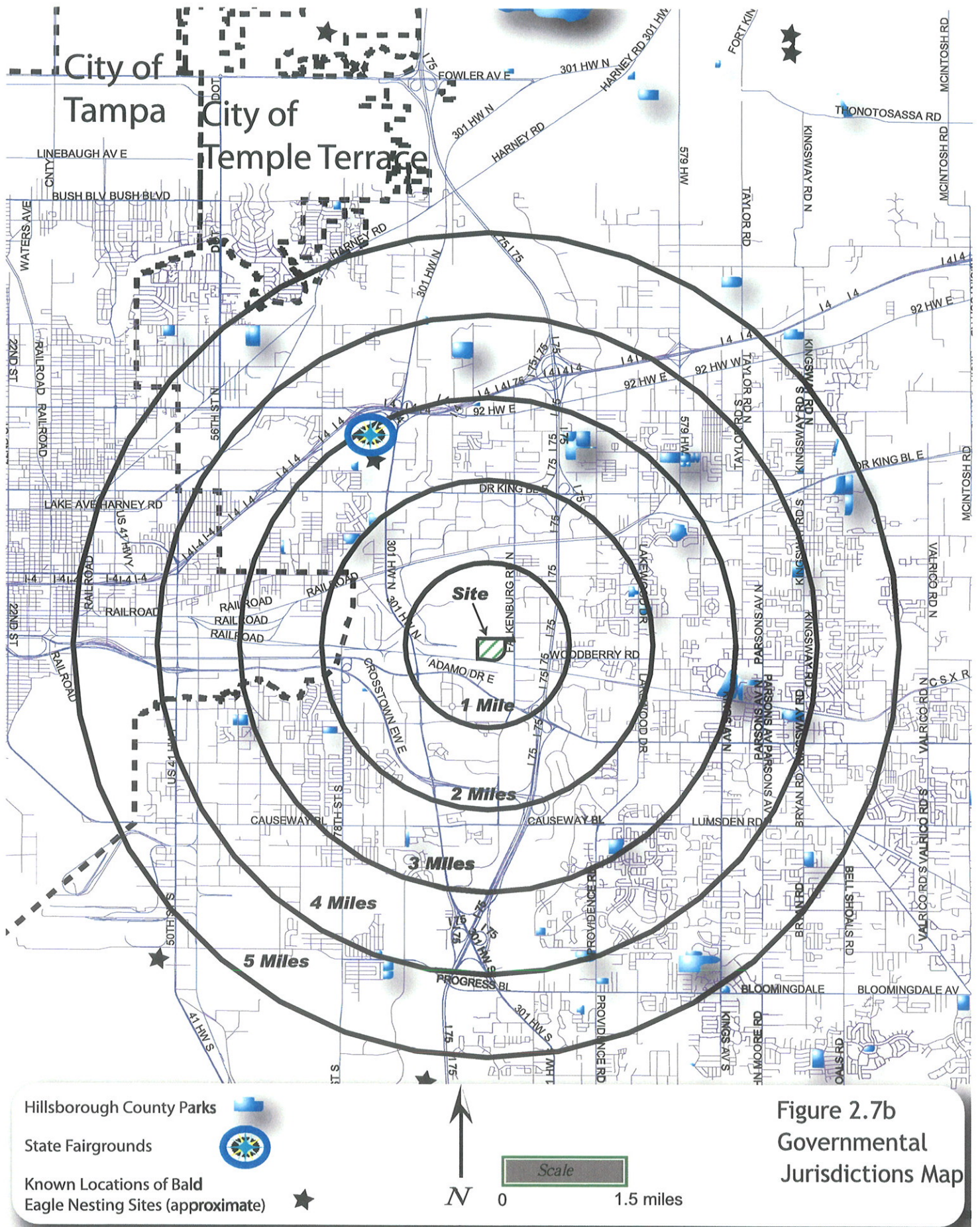


Figure 2.7a
Governmental Jurisdictions Map



Other than County parks, the State Fairgrounds and the Seminole Indian Reservation, there are no federal, state, regional or local areas of interest, as identified in Section 2.2.1 of the Florida Department of Environmental Protection's Instruction Guide for Certification Applications, within five miles of the site. Specifically, there are no national parks, forests, seashores, wildlife refuges, wilderness areas, memorials and monuments or other properties listed in the National Register of Historic Places, or as National Landmarks, marine sanctuaries, estuarine sanctuaries, Roadless Area Review and Evaluation areas, game management areas, areas of critical state concern, conservation and recreation lands, state archeological landmarks or landmark zones, aquatic preserves, Outstanding Florida Waters, special management areas established by law, or military landholdings within five miles of the site.

Nationally registered historic landmarks in the Hillsborough County area are presented as supplemental information in **Appendix 8-2**. As stated previously, according to the Historic Tampa/Hillsborough County Preservation Board, none of the National Register entries are located within five miles of the site.

2.2.2 Zoning and Land Use Plans

In 1984, the Board of County Commissioners of Hillsborough County changed the zoning and land use designations of the site to allow the construction and operation of the Facility. Specifically, the site was rezoned in 1984 as Planned Development Industrial (PD-I), and the land use designation under the County's comprehensive plan was changed to Public/Semi-Public. After the County filed its application for approval of the Facility under the Florida Electrical Power Plant Siting Act, the Siting Board found that the site is consistent and in compliance with existing land use plans and zoning ordinances. The proposed expansion of the Facility is also consistent and in compliance with the existing land use plans and zoning ordinances, as described below. The Siting Board's final order is contained in **Appendix 2-3**.

Under the Comprehensive Planning Act of 1975, Hillsborough County adopted the Horizon 2000 Comprehensive Plan (Plan). The Plan established a comprehensive growth management plan for Hillsborough County. The Land Use Element of the Plan established land use categories, which served as a guide for coordinating the development of both privately owned lands and public facilities.

The County was obligated to adopt a Comprehensive Plan, including a Land Use Element, to comply with the state's land use regulations and Part II, Chapter 163, Florida Statutes. The County's Plan and Future Land Use Element comply with the applicable state requirements; are consistent with the State Comprehensive Plan, and the Comprehensive Regional Policy Plan; and are subject to the state's implementing regulations.

The current Hillsborough Comprehensive Plan was adopted by the Hillsborough County Board of County Commissioners on December 3, 1998 (Ordinance 98-56) with an effective date of March 1, 1999. The Future Land Use Element for unincorporated Hillsborough County is projected to the year 2015. The County's Planning Commission is already working on an update in conjunction with the required Evaluation and Appraisal Report (EAR), which is due

in 2005. This EAR update will make projections out to the year 2025. For the purposes of this application, projections from the County's 2015 plan will be used.

Under the current land use regulations, the site of the Facility has been classified as Public/Quasi-Public (P/QP). Typical uses under this classification are major existing and programmed government-owned facilities, and other public uses. This category also accommodates quasi-public uses such as private establishments generally available to the public for use. These include churches, hospitals, schools, clubs, major (regional, district or community) recreation services and related uses, tourist attractions, and utility and transportation facilities.

In 1984, the 50.4-acre site of the Facility, as well as the rest of the 353-acre parcel purchased by the County, was rezoned as Planned Development Industrial (PD-I) to accommodate a multi-purpose, public use development consisting of a resource recovery facility and a subregional wastewater treatment plant.

The zoning district for the Facility is still a Planned Development Industrial (PD-I; PD 83-274). This zoning was originally approved on May 29, 1984. The PD zoning places conditions on the site and the facilities on the site. The last modification to the PD occurred in July 2004. This modification only modified access and internal parking requirements, mainly for the benefit of the animal services facility that is located at the entrance to the Facility site. The modification received final approval on July 27, 2004.

2.2.2.1 Land Use Plans

The Hillsborough Comprehensive Plan (December 1998) has the following elements:

- Future Land Use Element*
- Transportation Element as amended on October 27, 1994 (Ord 94-10), effective date January 16, 1995, and June 19, 1996 (Ord 96-10), effective date July 13, 1996
- Housing Element*
- Economically Disadvantaged Groups Element*
- Recreation and Open Space Element*
- Conservation and Aquifer Recharge Element*
- Coastal Management Element*
- Potable Water Element*
- Sanitary Sewerage Element*
- Stormwater Management Element*

- Solid Waste Element*
- Capital Improvements Element*
- Intergovernmental Coordination Element*
- Legal Status of the Comprehensive Plan

*Elements as amended on December 3, 1998 (Ordinance #98-56).

Figure 2-8 shows the land use categories for the five-mile area around the site. The site is currently designated for Public/Quasi-Public (P/QP) uses. Section VI of the Hillsborough Comprehensive Plan lists these typical uses for this category:

“major existing and programmed government-owned facilities, and other public uses. This category also accommodates quasi-public uses such as private establishments generally available to the public for use; for example, churches, hospitals, schools, clubs, major (regional, district or community) recreation services and related uses, tourist attractions, and utility and transportation facilities.”

By designating the land use of the site as Public/Quasi-Public, the County's Comprehensive Plan Map identifies the site as the location of a major public use and an existing government-owned facility. The proposed expansion of the Facility, like the operation of the existing Facility, is consistent and in compliance with the Public/Quasi-Public designation under the County's Comprehensive Plan.

The area surrounding this site has land uses of Public/Quasi-Public to the north, Urban Mixed Uses (UMU-20) to the west and east of the project site and Community Mixed Use (CMU -12) to the north of the project site. The UMU-20 land use category is mainly for uses such as higher density residential uses, regional scale commercial uses, business park, research park and other mixed uses. The CMU-12 land use category permits higher density residential, community scale retail commercial uses, research corporate park uses and other mixed uses. Within a one-mile radius, residential development is rather limited and the existing development patterns are more concentrated with light industrial, commercial and retail uses. On the eastern side of Falkenburg Road and moving further away from the project site, residential development intensifies with mainly single family development. East of I-75, land uses include residential (RES-6) which permits densities up to 6 dwelling units per acre.

2.2.2.2 Consistency with the Comprehensive Plan

As noted previously, Hillsborough County changed the land use designation of the site from Light Industrial (LI) to Public/Semi-Public (P) by adopting Ordinance #84-5 on February 27, 1984. The adoption of that ordinance occurred after receiving testimony and documents at an advertised formal public hearing (February 27, 1984) and after receiving a favorable recommendation from the Hillsborough County City-County Planning Commission (HCCCPC resolution adopted on June 27, 1983).

With the adoption of the current Hillsborough County Comprehensive Plan 2015, the land use for the project site was changed to Public/Quasi Public (P/QP) (Ordinance 98-56). During the adoption process of the Comprehensive Plan, all Semi-Public sites were changed to Quasi-Public sites.

The Future Land Use Element of the County's Comprehensive Plan outlines goals, objectives and policies, which will guide the future land uses for public and private development within the unincorporated parts of Hillsborough County. The site is located within the Urban Service Area (USA) where the County has planned a substantial amount of urban infrastructure. The Land Use Element and the Solid Waste Element applicable sections are listed in **Appendix 2-2**.

Local Land Use Compatibility

The entire area surrounding the site has been designated UMU-20 and CMU-12. Both of these land uses permit higher density residential, research parks and commercial and retail in various intensities (See **Figure 2-8**). In general, there is little residential land use within a one-mile radius of the Facility. Residential development surrounds the Facility beyond the two-mile radius, especially towards the Brandon and Gibsonton area, as well as west towards the City of Tampa. The density ranges from Residential-1 to Residential-12, which permits densities from one dwelling unit per acre up to 12 dwelling units/acre, respectively. Within five miles are various land use classifications permitting commercial and retail uses as well as office complexes. The following is a general listing of land uses within the five-mile radius: low, medium and high density residential, commercial, office, mixed uses, Developments of Regional Impact for office parks, Public/Quasi-Public, light industrial, and heavy industrial. Land uses within the city limits of Tampa include medium to high density residential, heavy industrial, Public/Quasi Public, and light industrial. **Section 2.2.3** describes the current land uses around the site.

As previously noted, the Facility was built and began commercial operations approximately 20 years ago. Many of the current land uses near the Facility were built after it was in operation. The encroachment of these new land uses into the area, and the Facility's track record of successful and compatible operations, demonstrate that the Facility has little or no adverse impact on surrounding land uses. The Facility's impacts will not materially change as a result of the proposed expansion project. Consequently, the proposed expansion project, like the existing Facility, will be compatible with the surrounding land uses.

2.2.2.3 Zoning Regulations

The Hillsborough County Zoning Regulations were adopted by the Board of County Commissioners on December 6, 1976 and subsequently amended. These zoning regulations established districts that regulated land uses within the unincorporated areas of Hillsborough County and regulated land uses and developments within those districts. The Hillsborough Land Development Code was adopted in 1996. It replaced the zoning ordinance in effect at that time.

Figure 2-9 shows the generalized zoning designations for the five-mile radius area around the site. Generally, the greatest amount of residentially-zoned land within the five-mile radius

area is within the City of Tampa, west of the site. Other large residential areas exist in Brandon, east of the site. North and south of the site, there is significantly less residential development. Zoning districts surrounding the existing site include Planned Developments either for mixed uses or industrial, manufacturing, interstate planned development, agriculture, low to medium residential and commercial.

The site is currently zoned Planned Development Industrial (PD-I). The current zoning district is in compliance with the Land Development Code and the Comprehensive Code, and compatible with the surrounding land use of P/QP. The proposed expansion project is consistent and in compliance with the Planned Development Industrial zoning for the site.

2.2.3 Demography and Ongoing Land Use

2.2.3.1 Existing Populations

The populations of the cities within Hillsborough County from 1980 to 2003 are shown in Table 2-2.

Table 2-2 Hillsborough County Population 1980 – 2003					
Year	Tampa	Plant City	Temple Terrace	Unincorporated County	Total Hillsborough County Population
1980 1970-1980	271,523	17,064	11,097	347,201	646,960
1990 1980-1990	280,015	22,754	16,444	514,841	834,054
2000 1990-2000	303,447	29,915	20,918	644,668	998,948
2003 2000-2003	321,490	31,930	21,790	708,310	1,083,520

2.2.3.2 Existing Land Use

The following matrix shows land uses within one mile of the site:

Existing Land Use Matrix		
Vantage Business Center 301, Center Pointe Business Park, Florida Expo Park; warehouses and office complex, CMU-12 land use;	Sabel Industrial park, Railroad – CSX, Hillsborough Warehouse, Sheriff District 2 office, Falkenburg Jail, Animal Services, P/QP, CMU-12 land uses;	Citigroup Center, Hillsborough County Community College, retail and commercial businesses, Fire station, UMU-20, CMU-12 land uses;
Hopewell Industrial Center, Tampa East, Vacant lands, Bypass canal, Conley RV center, Verizon offices, Transmission line, UMU-20, LI-P, P/QP land uses	Site , P/QP land use	Commercial businesses, retail, small to medium size warehouses, Falkenburg Industrial Park, Tax Collector, Pinebrooke Business Park, UMU-20, RES-6 land uses;

Existing Land Use Matrix (Continued)		
Silo Bend Industrial park, Hawthorne Place Apts, Tampa Traingle Business Park, Palm River Business Park, Car dealerships, retail and commercial businesses, restaurants, UMU-20, HI, and LI-P land uses;	Selmon Expressway, Courtney Palms Apts, Interstate Park of Commerce, Fire station, RR-CSX, Salvation Army, Central Park Industrial Park, Crossroads Business Park, Wastewater Treatment plant, Retail, Hackney Distribution Center; P/QP, UMU-20, RMU-35 land uses	Commercial Businesses, Brandon Town Center, Regency Square Shopping Center, Lake Kathy, I-75, Retail, Hillsboro Memorial Gardens Cemetery, Hotel, restaurants; UMU-20, RES-6 land uses;

Existing adjacent land uses include vacant agricultural land, commercial, light and heavy industrial uses, and residential. The existing land use using Level II categories of the Florida Land Use and Cover Classification System (FLUCCS) for an area extending five miles from the Facility is shown in **Figure 2-10**. Major industrial and commercial activities near the site are shown in **Figure 2-11**.

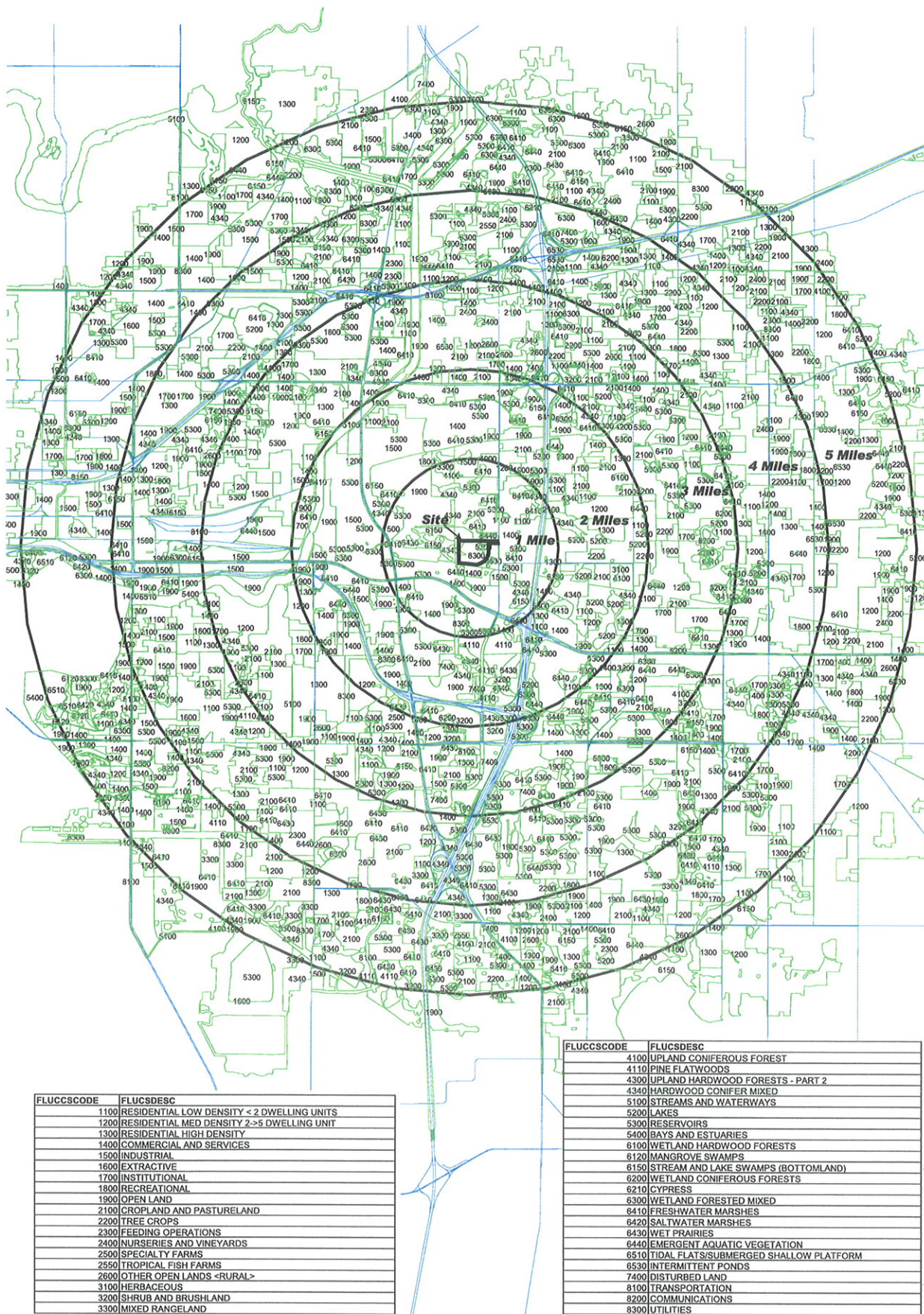
The predominant existing land use at the site is utilities (FLUCCS - 830). The majority of the site is occupied by the Facility (FLUCCS - 830), Wastewater Treatment Plant (FLUCCS - 834), and surrounding support areas. Other portions of the project site include retention ponds (FLUCCS - 530) and ditches (FLUCCS - 510). In addition, there are several small grassy areas (FLUCCS - 210) that occur in between the utility components and parking lots but are cleared and maintained for landscape aesthetics.

Land directly north of the site is owned by Hillsborough County and currently used for the County jail, animal services, and the sheriff's office. There are some vacant parts of the site. Further north of the site, along Broadway Avenue, there are light and heavy industrial uses, warehouses and small office complexes (Sabal Park, Cross Pointe).

Directly adjacent to the site, on the west, is an undeveloped wooded area and the TECO easement. Currently, there are several parcels to the west of the project site that are still undeveloped.

Immediately south of the site is the wastewater treatment plant, located on property owned by Hillsborough County. South of this, between CSX Railroad and State Road 60 (SR-60), is a commercial and industrial park development and several small businesses.

South of SR-60 is the commercial and office development identified as Tampa Central Park and the Crosstown Center.



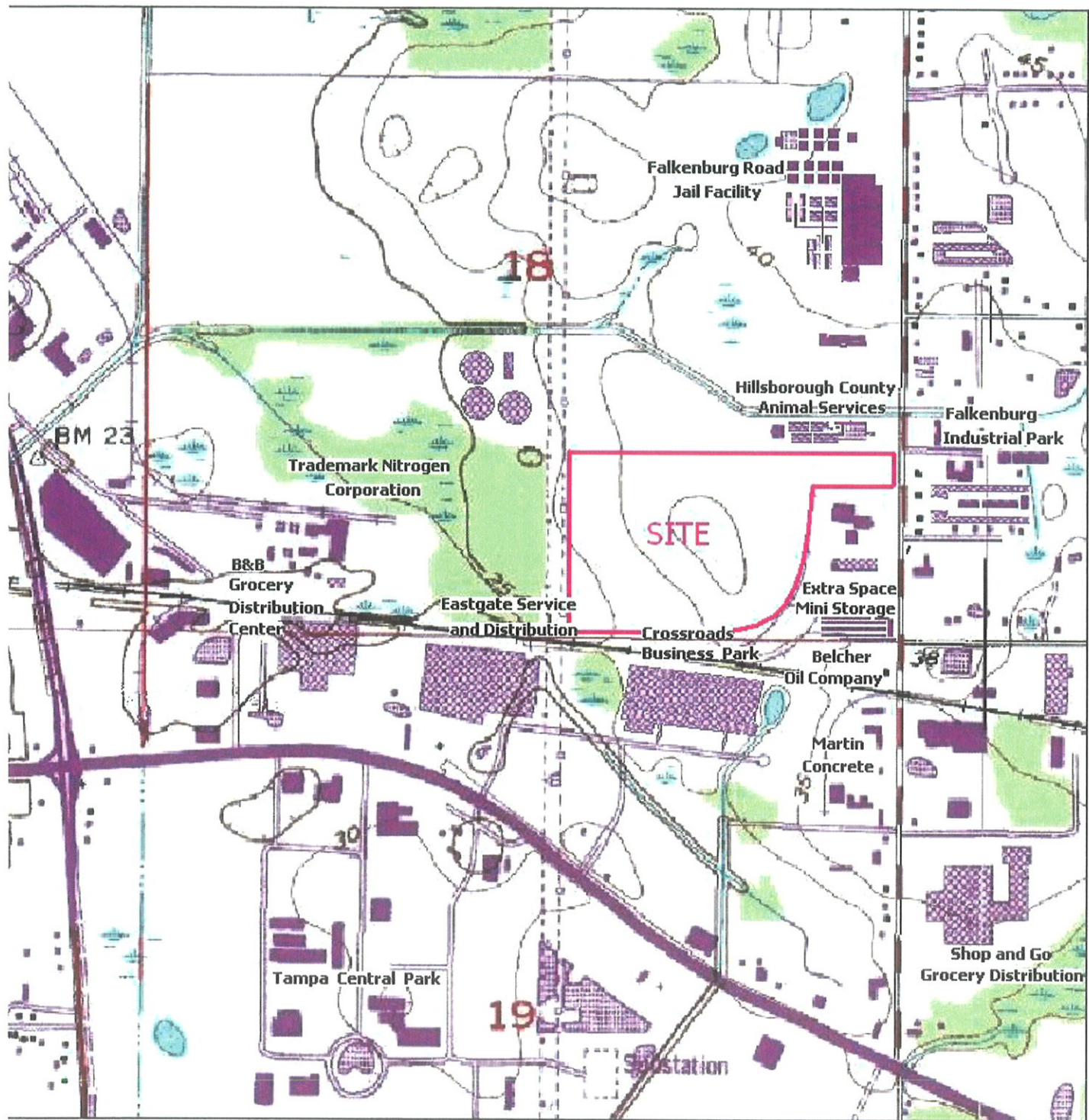
Hillsborough County Energy
Recovery Project

Scale 1 mile

N

Figure 2.10

Existing Land Use
5-Mile Area



Hillsborough County
Energy Recovery Project



Figure 2.11
Major Industrial And
Commercial Activities
Near The Site

Southeast of the site, west of Falkenburg Road and north of SR-60, is an industrial/commercial area comprised of various businesses and small warehouses complexes (CTI, Eastshore Center, Trennex).

Various other warehouses and office complexes are on the eastern side of Falkenburg Road (Automotive Store, CCN, Pinebrooke Business Park, Tax Collector and several small private businesses). There are a few residential dwelling units at the corner of Falkenburg Road and Columbus Drive, which are bordered to the north by more businesses and some vacant lands. Northeast of the project site, is a fire station, Sabal Park and Citigroup Center. Both of these are large office complexes.

The nearest established neighborhood, Woodberry Estates, is east of Interstate 75 along Woodberry Road about 2600 feet east of the site's closest boundary and approximately 4200 feet east of where the Facility is located on this site. The area to the east towards Brandon has developed mostly with residential uses and commercial uses along the main arterials like SR-60, south along Falkenburg Road, and along the I-75 Corridor.

Within the five-mile radius are several sites that are owned by the local government, Hillsborough County, on which a jail, a sheriff complex, animal services, and two fire stations are located. The Hillsborough school district has several schools located within this range as well as a campus for the Community College, located approximately one mile to the northeast of the subject site. There are also several US Post Office locations within the five-mile radius.

2.2.4 Easements, Title, Agency Works

Expansion of the Facility will not require additional easements or titles from government agencies. Power generated by the Facility will continue to be transmitted to Florida Power and Light's Buckingham Substation within the transmission line corridor on the site. Water and wastewater lines are within existing County rights-of-way.

2.2.5 Regional, Scenic, Cultural, and Natural Landmarks

Based on the research performed in conjunction with **Section 2.2.1 "Governmental Jurisdictions,"** the following areas were found to exist within five miles of the site:

- County Parks
- State Fairgrounds
- Seminole Indian Reservation

None of these areas of cultural interest would be affected by the proposed plant or its emissions.

Information provided in "The Cultural Resources of the Unincorporated Portions of Hillsborough County: An Inventory of the Built Environment," by the Historic Tampa/Hillsborough County Preservation Board is provided in **Section 2.2.1.**

2.2.6 Archaeological and Historic Sites

The site does not have any archaeologically or historically significant sites or areas considered to be potentially significant archaeologically or historically as identified by the Department of State, Division of Archives, History, and Records Management (DAHRM).

In 1984, the Florida Department of State's Bureau of Historic Preservation, Division of Archives, History and Records Management, informed the County that no significant cultural resources would be affected by the construction of the County's Facility. Copies of correspondence from the Florida Division of Archives, History, and Records Management pertaining to the County's project are presented in **Appendix 8-1**.

During the original site selection activities for the Facility, the DAHRM was contacted to determine the historic/archaeological significance of the property. According to DAHRM, the Florida Master Site File indicated no known sites on the property. However, since sites were known to exist in similar geographical and environmental areas nearby, a survey was recommended by the State Historic Preservation Officer (SHPO).

In addition, during the original site selection process, Hillsborough County retained the services of Dr. J. Raymond Williams of the University of South Florida, Department of Anthropology to do a walkover reconnaissance survey and subsurface testing. The report, "An Archaeological and Historical Survey of the Falkenburg Road Resource Recovery Facility Tract, Hillsborough County, Florida," was prepared in May 1983 by Williams, Newman, Estabrook, and Johnson and is included in **Appendix 8-3**.

The results of this archeological and historical survey indicated that the project will have no impact on any cultural resources, prehistoric or historic. A current consultation with Staff Archaeologist Lisa N. Lamb of Pan-American Consulting, Inc. of Tampa, Florida, indicated that it is highly unlikely that any evidence changed within the bounds of the property tract after the original survey was conducted and thus no new study or review was justified.

The archaeological and historical survey has been reviewed by the DAHRM. In correspondence dated June 21, 1983, to Hillsborough County, the DAHRM noted that "...the proposed project is unlikely to affect any significant archaeological or historic resources, and may proceed without further involvement with this agency." A copy of this correspondence is also included in **Appendix 8-1**.

No impacts of significant archeological or historic sites are expected as a result of construction activities associated with expansion of the Facility because the expansion is occurring on the existing Facility site footprint. In the unlikely event that a potential archeological site should be unearthed during expansion construction, officials of the State Division of Historical Resources will be contacted to determine its significance.

2.2.7 Socioeconomics and Public Service

2.2.7.1 Social and Economic Characteristics

Current and Projected Population

The study area is mainly within the Brandon area of Hillsborough County. **Table 2-3** details the census population counts for those census tracts partially or wholly within five miles of the site. The census tract (122.05) which contains the site had a 2000 population of 7,067. The 2000 census population of those tracts partially or wholly within five miles of the site was 157,572. As shown on **Figure 2-12**, the total area within those census tracts partially within the five-mile area is considerably larger than the five-mile radius area itself. **Figure 2-13** shows the 2000 census tracts near the site, including those within the City of Tampa.

Table 2-3 Population Within a 5 Mile Radius							
Age Under 5	Age 5 – 17	Age 18 – 21	Age 22 – 29	Age 30 – 39	Age 40 – 49	Age 50 – 64	Age 65 Up
11,273	31,833	8,183	18,307	26,876	24,034	22,986	13,669

Source: Census 2000

Civilian Labor Force

The civilian labor force in Hillsborough County as a whole has increased by about 21 percent from 1990 to 2000. The annual average labor force of 466,230 in the year 1990 increased to 564,858 in the year 2000. This represents 98,628 new workers in the labor force. During the same period, employment increased by 106,443 or about 24 percent from 443,789 employed residents in the year 1990 to 550,232 in the year 2000. This resulted in a net reduction of the unemployment rate, from 4.8 percent in 1990 to 2.6 percent in 2000. Unemployment rates during the 10-year time period varied from less than 3 percent to over 7 percent. Labor force statistics are shown in **Table 2-4**.

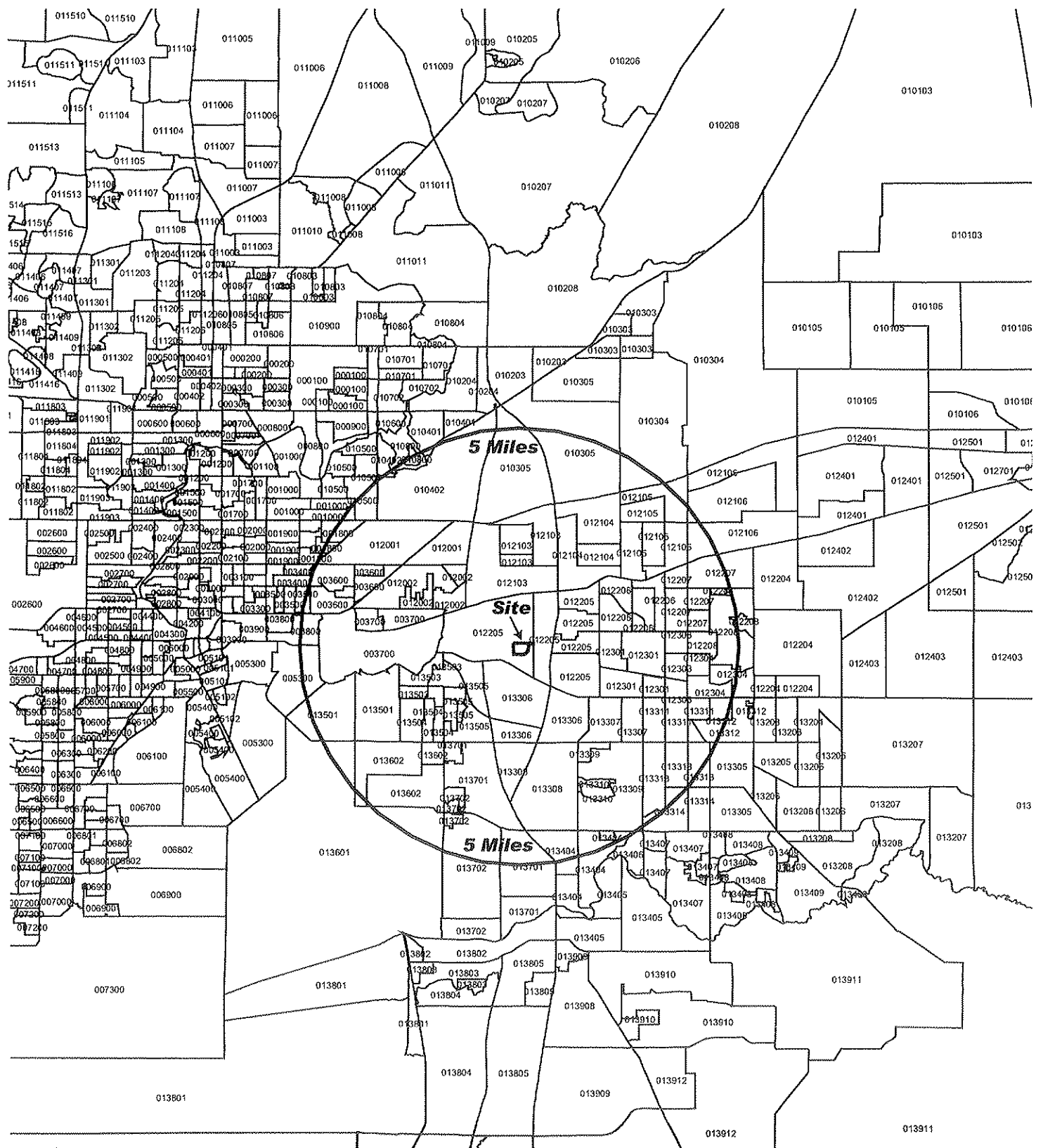


Figure 2.12

2000 Census Tracts
in Hillsborough County

Table 2-4 Labor Force Trends Hillsborough County 1984 – 2002				
Year	Annual Average Labor Force	Employed Residents	Unemployed Residents	Unemployment Rate
1990	466,230	443,789	22,441	4.8%
1991	451,299	423,330	27,969	6.2%
1992	463,017	429,982	33,035	7.1%
1993	465,143	435,167	29,976	6.4%
1994	487,826	461,488	26,338	5.4%
1995	489,853	468,599	21,254	4.3%
1996	494,975	476,009	18,966	3.8%
1997	512,104	494,954	17,150	3.3%
1998	530,529	515,830	14,699	2.8%
1999	557,628	542,471	14,158	2.7%
2000	564,858	550,232	14,626	2.6%

Source: Florida Department of Labor and Employment Security, 2003

Major Employers in Hillsborough County

The ten largest employers in Hillsborough County and the number of people employed at each is presented below.

Verizon Florida
Business Line: Telecommunications
Number of Employees.....10,000

Bank of America
Business Line: Financial Services
Number of Employees.....6,762

St Joseph's Hospital
Business Line: Healthcare
Number of Employees.....4,504

TECO Energy
Business Line: Utility
Number of Employees.....4,000

Citigroup
Business Line: Financial Services
Number of Employees.....3,000

Caspers Company
Business Line: Food
Number of Employees.....2,850

Capital One
Business Line: Financial Services
Number of Employees.....2,800

Chase Manhattan Bank
Business Line: Financial Services
Number of Employees.....2,750

University Community Hospital
Business Line: Healthcare
Number of Employees.....2,586

Busch Gardens
Business Line: Entertainment
Number of Employees.....2,500

Source: Enterprise Florida Hillsborough County

Employment by Industrial Sector

In terms of actual numbers of persons employed within a given industrial sector, professional and businesses services and other services provided the most jobs in 2002 for the employees in Hillsborough County. Agriculture and mining provided the smallest number of jobs for

individuals living within this area. Table 2-5 presents a breakdown of employment figures by largest industries in the Tampa Bay Region.

Table 2-5 Employment by Industry Hillsborough County	
Construction & Real Estate	6.9%
Education Services	6.8%
Finance & Insurance	7.2%
Government (including military)	4.5%
Healthcare & Social Assistance	9.0%
Information	3.8%
Agriculture, Natural Resources & Mining	2.0%
Manufacturing	5.2%
Other Services	23.1%
Professional & Business Services	22.8%
Transportation / Warehousing / Wholesale Trade	8.7%
Total	601,777

Source: Enterprise Florida 2002

Source of Income

Throughout the three subareas of the City of Tampa, Temple Terrace, and Unincorporated Hillsborough County, the primary source of income for households is wage or salary. More than 45% of people are employed within the professional and business and other services categories.

Baseline Employment Projection

Baseline employment projections for the years 1999 and 2015 are shown in Table 2-6. Approximately 48 percent of the projected employment for Hillsborough County is within the regional services category.

Table 2-6 Employment Projection Hillsborough County		
	1999	2015
Industrial	138,012	181,060
Regional Commercial	47,926	68,128
Local Commercial	76,232	106,222
Regional Service	313,464	437,192
Local Service	76,629	104,208
Total	652,263	896,810

Source: Hillsborough County MPO 2015 LRTP

General Income Characteristics

According to Census 2000 data, the Temple Terrace subarea, with a median income of \$44,508, has the largest proportion of upper income households. In contrast, the City of Tampa subarea has a median income of \$34,415. The statistics for the unincorporated Hillsborough County subarea are closer to those for Temple Terrace with a median income of \$40,663. Plant City has a median income of \$37,584. Table 2-7 provides the median incomes for the census tracts within the five-mile radius.

Table 2-7 Population Counts by Income Range for Census Tracts Within 5 Mile Radius					
Less 10k	4,317	35k-39k	3,829	100k-124k	2,421
10k-14k	3,463	40-44k	3,688	125k-149k	965
15k-19k	3,376	45k-49k	3,545	150k-199k	525
20k-24k	3,887	50k-59k	5,922	200k-More	505
25k-29k	4,055	60k-74k	6,705	ABOVE_BELOW	152,969
30k-34k	4,251	75k-99k	5,876	BELOW_POV	17,353
				ABOVE_POV	135,616

Employment by Occupation

Table 2-8 shows a breakdown of employment and wages for the Tampa Bay Region by industry for the year 2002. Highest salaries were within the information, transportation, and finance categories.

Table 2-8 Average Wages in Industry	
All Industries	\$33,970
Construction & Real Estate	\$36,120
Education Services	\$30,945
Finance & Insurance	\$46,317
Government (including military)	\$37,948
Healthcare & Social Assistance	\$37,644
Information	\$53,302
Agriculture, Natural Resources & Mining	\$14,315
Manufacturing	\$36,792
Other Services	\$23,192
Professional & Business Services	\$33,520
Transportation / Warehousing / Wholesale Trade	\$42,595

Source: Enterprise Florida 2002

Housing

Over the last 20 years, housing units have increased significantly. Increases within the unincorporated area have been higher than within the City of Tampa or Temple Terrace. The Brandon, Valrico, and Riverview areas have experienced a higher increase in building activity than other areas within Hillsborough County. Housing unit statistics are presented in **Table 2-9**.

The unincorporated Hillsborough County portion of the five-mile area has the greatest population of owner-occupied housing units (77 percent) while the City of Tampa has the lowest (63 percent). Tampa also has the lowest proportion of occupied housing units (60 percent) with Temple Terrace having the greatest (94 percent).

Building Activity

Single-family units represented the largest proportion of building activity for the last 4 years. The number of permits in the southern part of Hillsborough County increased more than in

other parts of the County. In the Brandon, Riverview, and Balm/Wimauma area, single and multi-family permits increased at a higher percentage than other areas.

Table 2-9 Building Permit Activity for Residential and Non-Residential		
Year	Residential (Units)	Non-Residential (Millions of Dollars)
2000	12,034	\$316.7
2001	11,370	\$493.4
2002	12,502	\$272.5
2003	15,579	\$328
2004 1st quarter	2,610	\$73.5

Source: Planning Commission Hillsborough County

2.2.7.2 Area Public Service and Utilities

Education

Schools within the five-mile area of the site include:

Elementary Schools	Middle Schools	High Schools
Limona Elementary	McLane Middle School	Brandon High
Yates Elementary	Mann Middle School	Armwood High
Clairmel Elementary	Dowdell Middle School	
Palm River Elementary	Jenkins Middle School	
Seffner Elementary	Burnett Middle School	
Brooker Elementary		
Kingswood Elementary		
Bing Elementary		
Kingswood Elementary		
Lopez Elementary		

Private: Brandon Academy

None of the schools are within one mile of the site.

Transportation

The site is located off of Falkenburg Road, approximately one-half mile west of Interstate 75 in Hillsborough County. The site is approximately one-half mile north of SR-60 (Adamo Drive), and 1.5 miles south of SR 574 (MLK Boulevard).

A traffic analysis was conducted to assess the impact on the surrounding roadways. The traffic analysis demonstrated that none of the surrounding roadways or intersections will be adversely affected by the construction of the expansion or the operation of the Facility after the expansion. The traffic analysis is included in **Appendix 11-2**.

Fire Fighting Facilities

The site is located within the Brandon Fire District. The nearest station is Brandon Fire Station #2 at 10050 Palm River Road. There is another fire station off Falkenburg Road, north of the Broadway Ave intersection.

Police Protection

The site is located within Patrol District Area 2, Brandon Proper. The office location for this district is at 2310 Falkenburg Road, just north of the project site. Part of the five-mile radius is located within District 4, which has offices in Ruskin and patrols the area south of Brandon Boulevard.

Recreation Facilities

Major recreational areas (state parks and County parks) are addressed in **Section 2.2.1 "Governmental Jurisdictions."** Camp Florida is located southwest of Lakewood Drive about 1.5 miles east of the Facility location. Limona Park is located off Lakewood Drive about 1.5 miles west of the site. There is also a YMCA within the area and various other small community parks.

Electricity and Gas

There is a 200 foot wide TECO easement with three 230 kV lines directly adjacent to the site. The County is currently negotiating a Small Power Production Agreement with TECO. A gas pipeline owned by Houston Texas Gas and Oil is directly to the west of the site.

Water Supply Facilities

The existing potable water service to the site is a twelve (12) inch City of Tampa water main that runs along Falkenburg Road. The existing main provides water at a static pressure of 40-45 psi.

Wastewater Treatment Facilities

The Northwest Brandon Subregional Wastewater Treatment Plant (WWTP) is co-located with the Facility on the Falkenburg Road site. It is the responsibility of the Contractor (currently Covanta) to discharge wastewater to the County's adjacent wastewater treatment plant in accordance with County pretreatment standards.

Solid Waste Disposal

The project site currently accepts about 1,200 tons per day of solid waste from Hillsborough County transfer stations and private contractors. The closest landfill is approximately 20 miles to the south at the Southeast County Landfill. For the year 2000, Hillsborough County, including the three cities, generated approximately 807,693 tons of solid waste. Due to the projected population increase, the total solid waste generated in the County is expected to increase to an estimated 884,692 tons in the year 2015. **Figure 2-14** shows the solid waste management facilities in Hillsborough County.

2.3 Biophysical Environment

The proposed Facility expansion is located southeast of the City of Tampa, west of I-75, and north of SR-60 along the South Falkenburg Road in unincorporated Hillsborough County. The site is within the jurisdiction of the Southwest Florida Water Management District (SWFWMD). The project location is shown in **Figure 2-1**.

The Facility does not use groundwater or surface water in any of its operations. Water currently used at the Facility in its operation is provided to the plant from the Hillsborough County wastewater system in the form of reclaimed water. The source of additional water required for the Facility expansion will also be reclaimed water from the Hillsborough County wastewater treatment plants. Therefore, a Water Use Permit for the expansion project is not required from the SWFWMD.

2.3.1 Geohydrology

The following sub-sections describe the major geologic aspects of the site and associated Facility areas. This includes a description of the geotechnical studies designed to determine the suitability of the site for its intended purposes. These studies were undertaken to determine the structural and environmental suitability of the site. The study description includes identification and justification of the sampling pattern, sampling method, and analytical techniques. Most of these studies were performed before the existing Facility was built.

Currently, the Facility does not have holding or cooling ponds, ash ponds, FDG sludge or coal piles, or any other similar potential contamination sources. The County does not intend to construct any of the fore-mentioned elements at the Facility in the future. Therefore, data concerning site-specific aquifer characteristics, which relate to potential pollutant transport, have not been included.

2.3.1.1 Geologic Description of the Site-Area

The geological formation at the study area consists of sedimentary deposits several hundred feet in thickness. These deposits form the aquifers (water-bearing formations) and confining units in the study area. The principal potable water-bearing units in the study area are the surficial aquifer system (SAS) and the Upper Floridan Aquifer (UFA). These aquifers, in some areas, are separated by a discontinuous intermediate confining unit of the Floridan Aquifer system. Where the intermediate confining unit is missing, the UFA and SAS are hydraulically connected. A middle confining unit separates the UFA from the Lower Floridan Aquifer (LFA). A lower confining unit separates the LFA from the formations below it. The LFA generally contains no potable saline water, which is not suitable for industrial or agricultural use. A generalized geohydrologic section of the Floridan aquifer system is presented in **Table 2-10**.

Table 2-10 Geohydrologic Framework of Floridan Aquifer System					
System	Series	Stratigraphic Unit	General Lithology	Major Lithologic Unit	Hydrogeologic Unit
Quaternary	Holocene and Pleistocene	Surficial sand, terrace sand, phosphorite	Predominantly fine sand; interbedded clay marl, shell, and phosphorite.	Sand	SURFICIAL AQUIFER SYSTEM
Tertiary	Pliocene	Undifferentiated deposits	Clayey and pebbly sand; clay, marl, shell, phosphatic.	Clastic	Confining unit
	Miocene	Hawthorn Formation	Dolomite, sand, clay, and limestone; silty, phosphatic.	Carbonate and clastic	Aquifer
		Tampa Limestone	Limestone, sandy, phosphatic, fossiliferous; sand and clay in lower part in some areas.		Confining unit
	Oligocene	Suwannee Limestone	Limestone, sandy limestone, fossiliferous.	Carbonate	FLORIDAN AQUIFER SYSTEM
	Eocene	Ocala Limestone	Limestone, chalky, foraminiferal, dolomitic near bottom.		Upper Floridan aquifer
		Avon Park Formation	Limestone and hard brown dolomite; intergranular evaporite in lower part in some areas.		Middle confining unit
		Oldsmar Formation	Dolomite and limestone with intergranular gypsum in most areas.		Lower Floridan aquifer
	Paleocene	Cedar Keys Formation	Dolomite and limestone with beds of anhydrite.	Carbonate with evaporites	Sub-Floridan confining unit

[Modified from Ryder, 1985; and Lopez and Fretwell, 1992]

The United States Department of Agriculture (USDA) Soil Conservation Service (SCS) "Hillsborough County Soil Survey" defines three major surficial soil types on the site: Rc (Rutledge fine sand), Lh (Leon fine sand), and Lk (Leon fine sand, light colored surface). The SCS soils classifications onsite and adjacent to the site are shown on **Figure 2-15**. A "Summary of Important Characteristics" of the soils from the Hillsborough County Soil Survey (September 1958) and the "Estimated Soil Properties for Engineering" taken from the Hillsborough Soil and Water Conservation District Soil Survey Supplement (June 1981) are included in **Appendix 10**.

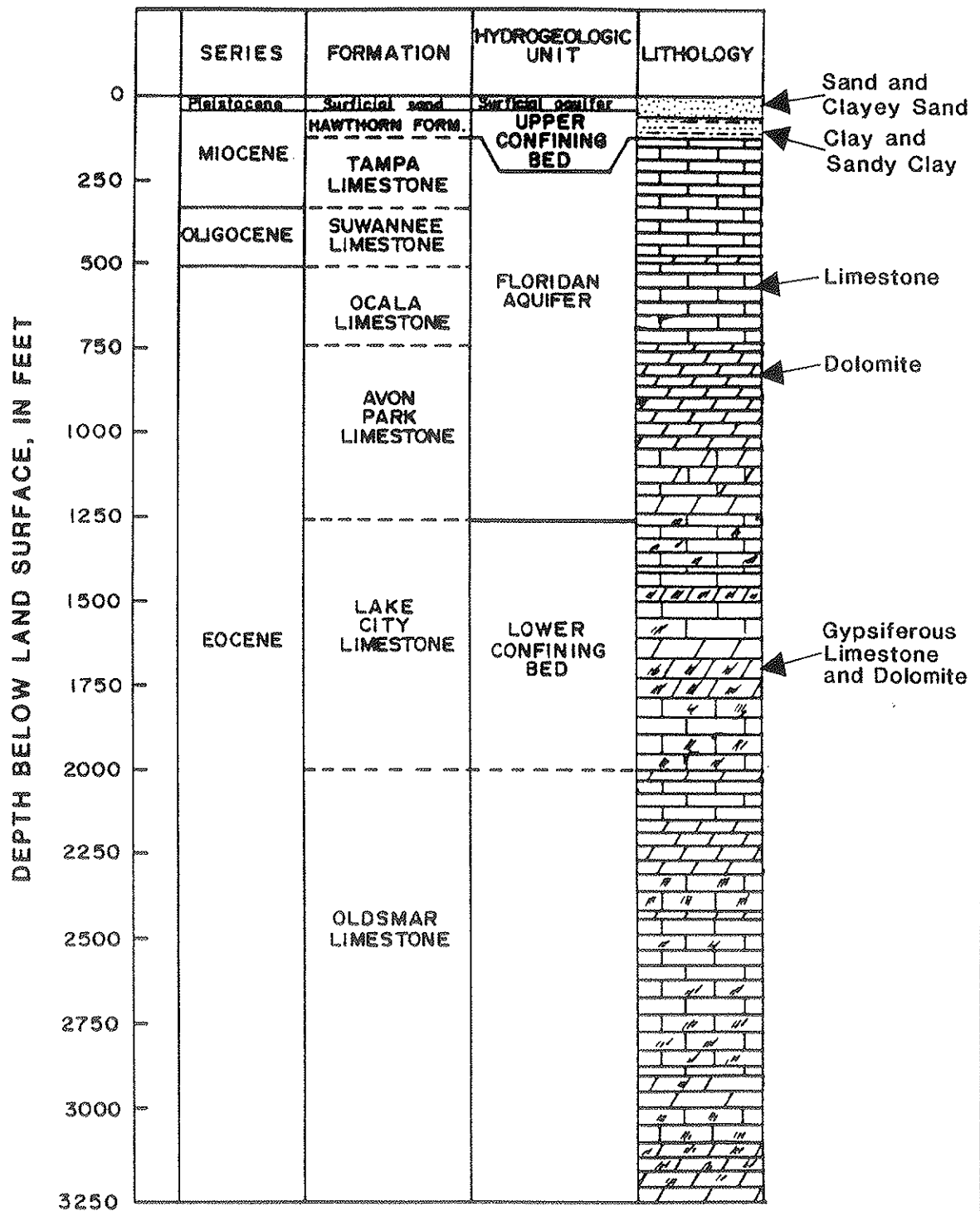
In general, the Rutledge fine sand reflects areas with a seasonal high water table and nearly level, or slightly depressed, relief. Ponding can occur with this soil type. The Leon fine sand also represents areas with high water table and a 0% to 2% slope. The Lh and Lk soils have relatively slow surface runoff and medium to rapid internal drainage if drainage improvements lower the natural high water table.

Table 2-10 presents the study area stratigraphy. The shallow and intermediate depth geologic units expected to be beneath the study area range in age from Recent to Eocene, and include (youngest to oldest): surficial (unconsolidated sands), the Hawthorn Formation, the Tampa Limestone, the Suwannee Limestone, the Ocala Limestone, the Avon Park Limestone, the Lake City Limestone, and the Oldsmar Limestone. The latter two formations contain salt water and are not known to be used for potable water supply. While detailed information is not available for extreme depths, the shallow and intermediate formations are well documented using the loggings from a large number of wells throughout central Hillsborough County. **Figure 2-16** presents a generalized geologic column of soil to a depth of 3,250 feet. **Figures 2-17, 2-18, and 2-19** present the soil boring locations and geological cross-sections taken on the Facility site.

The study area is located within the Coastal Lowlands Physiographic Division of Florida. The Coastal Lowlands consist primarily of marine terraces, which are below 100 feet in altitude. The study area elevation ranges from 28-41 feet above Mean Sea Level (MSL) with a topographic high in the east central portion of the site, gently sloping to lower elevations in the southwest.

The uppermost geological deposit, the Hawthorn Formation, includes all deposits of Miocene age, which are younger than the Tampa Limestone. The Hawthorn Formation in this area consists predominantly of green to blue sandy clay and clayey sand. The top of the Hawthorn Formation is generally encountered between 10 and 20 feet deep below ground surface in the area.

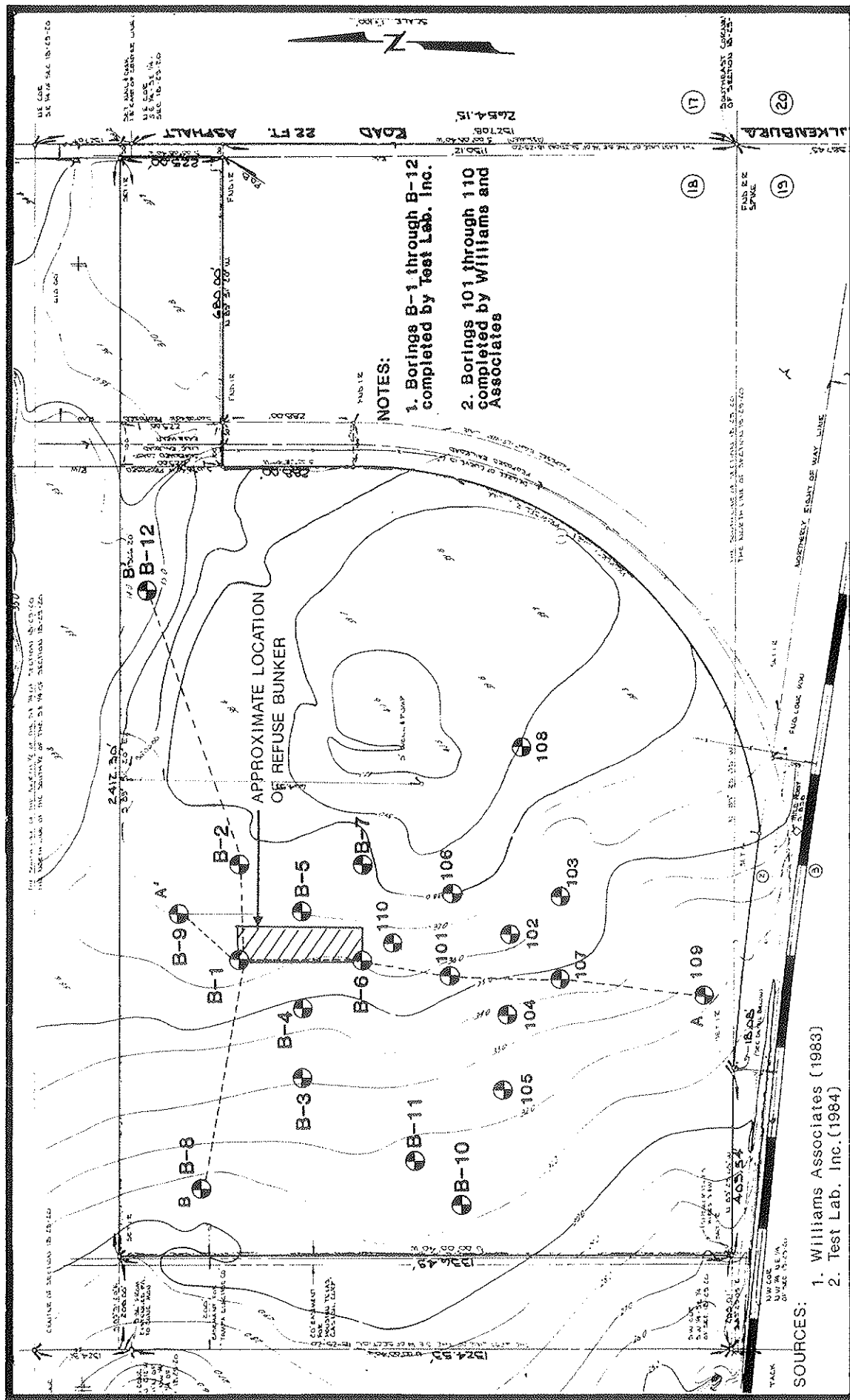
Beneath the Hawthorn Formation in the Hillsborough County area lies the Tampa Limestone. The Tampa Limestone is commonly a hard dense grey, white, or tan sandy limestone, which is generally fossiliferous while some parts are crystalline and dolomitic.



Source: Hickey (1981)

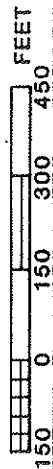
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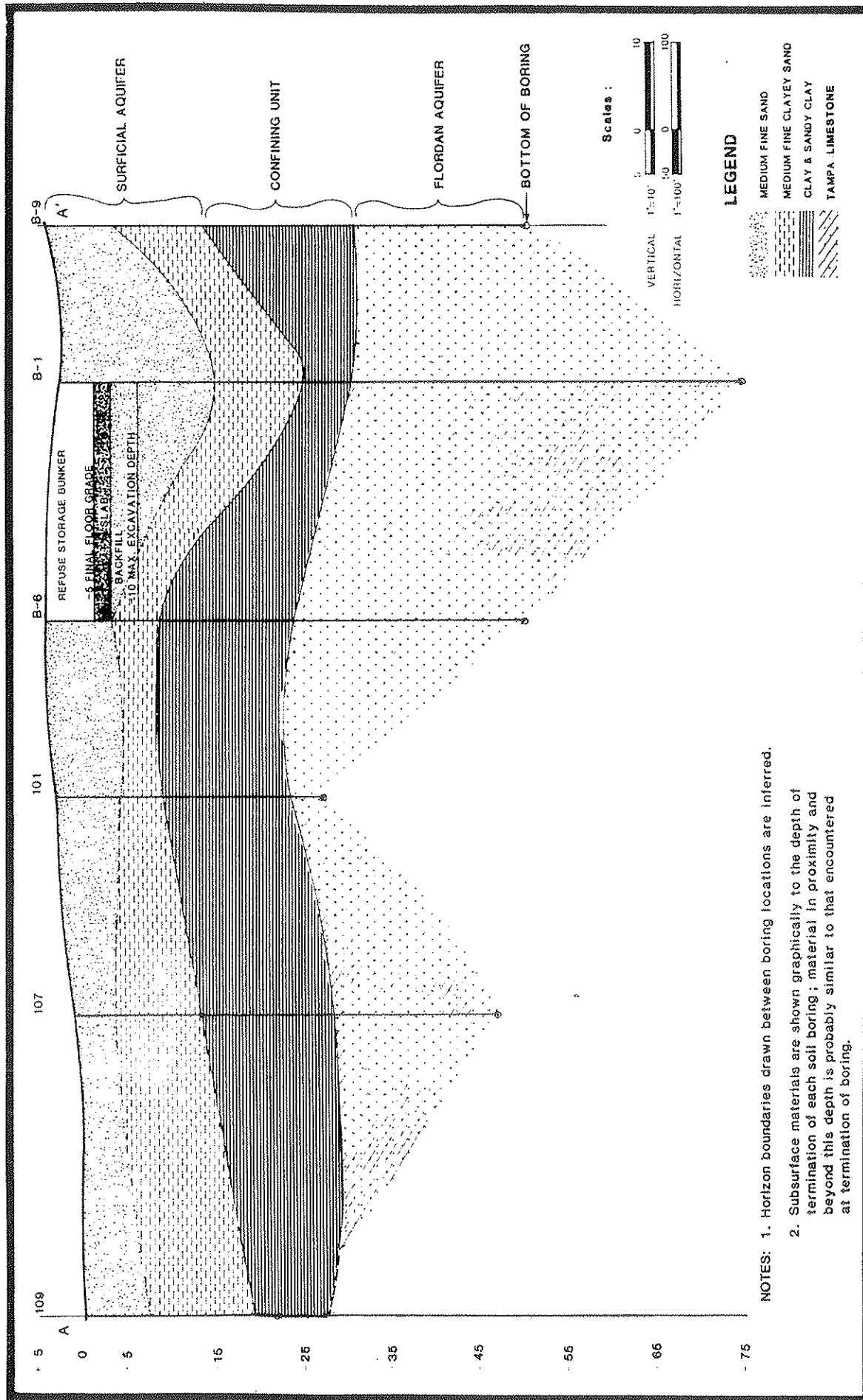
FIGURE 2.16
GENERALIZED GEOLOGIC COLUMN



**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

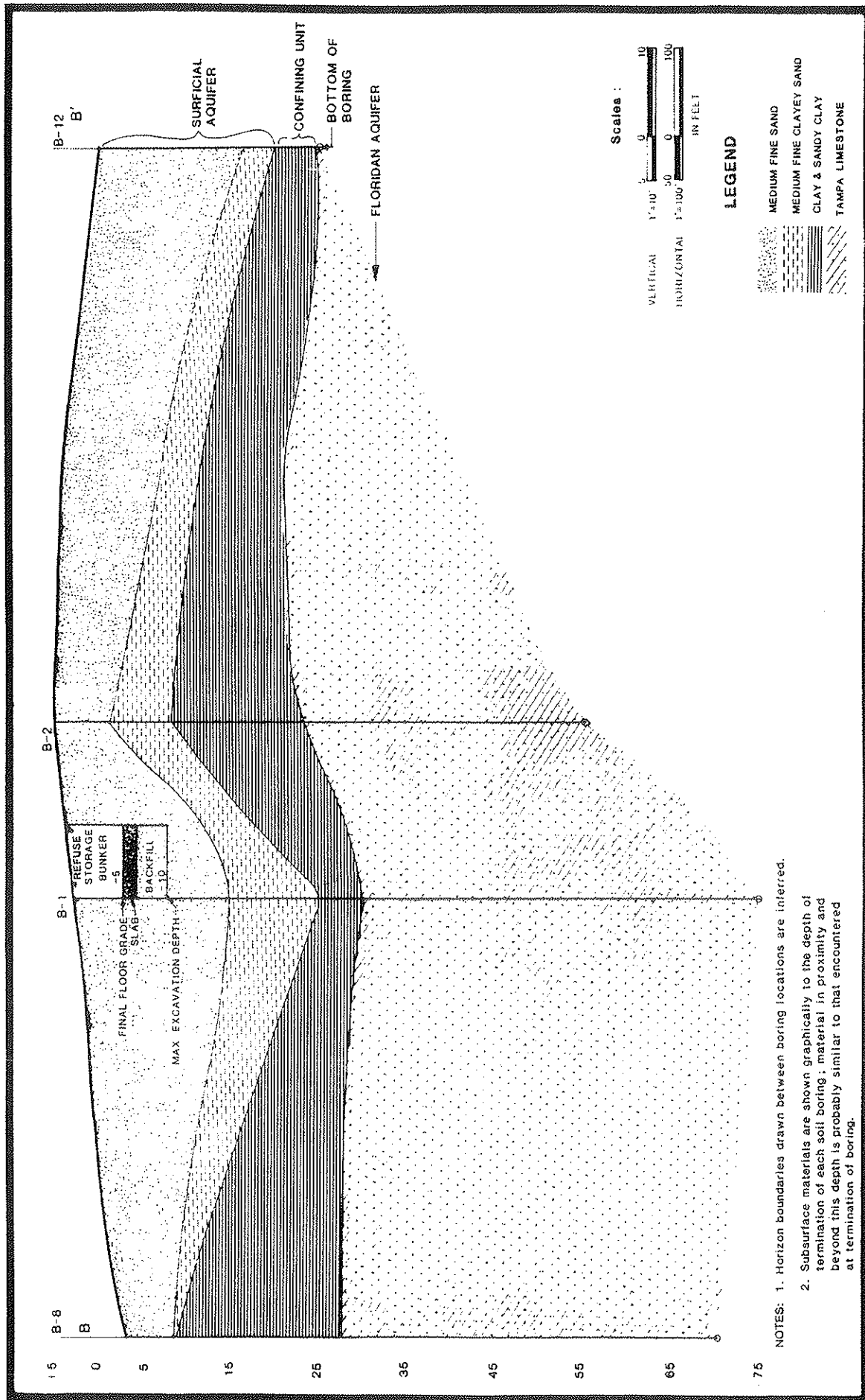
**FIGURE 2.17
LOCATIONS OF SOIL BORINGS
AND GEOLOGIC CROSS-SECTIONS**





HILLSBOROUGH COUNTY
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FIGURE 2.18
GEOLOGIC CROSS-SECTIONS A-A'



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 2.19
GEOLOGIC CROSS-SECTIONS B-B'

The top of this formation ranges in depth from about 250 feet below sea level in the southern part of Hillsborough County. It is estimated that the depth to this formation in the vicinity of the site is in the general range of 25 to 45 feet below ground level.

The Suwannee Limestone includes all deposits of Oligocene age. The upper part of the Suwannee is generally a cream-white to tan, soft to hard, granular, porous limestone with some beds of crystalline and dolomitic limestone. The lower part of the Suwannee is generally tan to gray, is more crystalline and/or dolomitic, contains fewer fossils, and is generally harder.

The Ocala Formation is of Eocene age and consists of a highly fossiliferous, soft, chalky, cream, tan, and grayish-tan limestone in the upper portion. The lower part is similar to the upper part except that it contains beds of brown to tan hard crystalline dolomite and dolomitic limestone.

The Avon Park Limestone, generally found at depths in excess of 600 feet, is of Eocene age. Lithologically, it ranges from white to tan coquinoïd or granular soft limestone to dark brown, hard, crystalline dolomite. Most of this formation is dolomitized to some degree and is very fossiliferous, containing bryozoans, coral, echinoids, mollusks, and foraminifera. It is generally more than 200 feet thick in Hillsborough County.

2.3.1.2 Detailed Site Lithologic Description

Information contained in this section has been developed primarily from exploratory borings installed on site and its immediate vicinity, as part of the site selection and geotechnical investigation efforts of Hillsborough County's resource recovery program. Generally, the exploratory borings were installed to determine a continuous lithologic description from land surface through the top of the rock.

As part of the County's Facility siting during the early 1980s, a number of geotechnical studies were performed by the County. These studies included the following:

- "Report of Preliminary Subsurface Exploration, Proposed Solid Waste Management Recovery Facility, Hillsborough County, Florida," prepared by Williams and Associates, Inc., dated 1 November 1982.
- "Report of a Preliminary Subsurface Exploration, Proposed Solid Waste Energy Recovery Facility, Falkenburg Road Site, and Hillsborough County, Florida," prepared by Williams and Associates, Inc., dated 29 March 1983, revised 12 December 1983.
- "Report of Preliminary Geotechnical Study, Resource Recovery Facility, Falkenburg Road Site, Hillsborough County, Florida," prepared by Test Lab Inc., dated 20 April 1984.

These reports were presented to the Florida Department of Environmental Protection (FDEP) along with the original permit application for the Facility. The Williams and Associates (1983) and the Test Lab (1984) reports contain detailed site lithologic descriptions and soil boring logs, which have been summarized in this section. These two complete geotechnical reports are contained in **Appendix 10** to this application. The 1982 Williams and Associates report

examined four preliminary sites, one of which is located several hundred feet north of the present site, and is therefore not included in the application appendices.

The March 29, 1983 report prepared by Williams & Associates, Inc. entitled, "Report of a Preliminary Subsurface Exploration Proposed Solid Waste Energy Recovery Facility Falkenburg Road Site, Hillsborough County, Florida," is included in **Appendix 10-4**. This report details both field and laboratory testing which was performed with the intent of developing preliminary or conceptual soil-related criteria for foundation design. The report includes descriptions of sampling design methodology, field and laboratory procedures, and a report of results for soil borings, utilizing undisturbed samples, NX corings, grain size analysis, moisture content, and consolidation tests. Test results are summarized in **Section 2.3.1.4**. Ten soil test borings were made at the site at the locations shown on **Figure 2-17**. These borings were made at locations recommended by Williams and Associates.

The Test Lab Inc. (1984) report details field and laboratory testing that was performed to determine the general nature of the subsurface conditions at the Facility site and the types of foundation systems that might be used to support the Facilities.

As part of this effort, twelve soil test borings were made at the site at the locations shown on **Figure 2-17**. These borings were made at locations recommended by Test Lab Inc. These locations were staked in the field by County personnel, who also determined the ground surface elevation at each location.

The exploratory borings were made with a truck-mounted CME-55 drilling rig. Conventional rotary drilling procedures were utilized along with a bentonite drilling fluid to stabilize the bore holes. Standard penetration tests were made and split-barrel soil samples were obtained at 2.5-foot intervals to a depth of 10 feet and at 5-foot intervals thereafter. The subsurface data obtained from the field exploration program are presented on the logs, which accompany the Test Lab report in **Appendix 10-3**. Cross sections developed from these logs are shown in **Figures 2-18 and 2-19**.

Laboratory test programs, limited to determining soil index properties, were undertaken by both Williams and Associates (1983) and Test Lab Inc. (1984) to better ascertain the physical characteristics of the various soil strata found at the site. The results of these tests, which include grain size analyses and determination of Atterberg limits, are found in the respective reports in **Appendix 10**, and are summarized in **Section 2.3.1.4**.

The field exploration program of Test Lab Inc. revealed generally similar subsurface conditions existing in the various areas investigated on the site. These subsurface conditions were similar to those found in the southern portion of the tract soil/rock strata as indicated in the soil borings.

- **Stratum No. 1:** This is a moderately thick cohesionless surface stratum which consists of very loose to loose gray and brown medium fine sand and slightly clayey sand containing numerous dark brownish black, slightly clayey organic stained zones. This surface stratum varies from 5 feet to 22 feet in thickness, but is typically 10 feet thick.
- **Stratum No. 2:** This is a moderately thin semi-cohesive stratum which consists of generally firm brown, grayish brown and light tannish gray, clayey medium-fine sand with some slightly clayey lenses. This stratum varies in thickness from 0-15 feet, but is typically 5 feet thick.
- **Stratum No.3:** This is a thick complex stratum of interbedded semicohesive and cohesive soils. Typically, the upper part of this stratum is a firm light green clay, which transgresses with depth to more granular semi-cohesive soils – that is, greenish gray and tan fine sandy clay, and clayey fine sand, which contain some zones with cemented sand fragments. This stratum is typically about 20 feet thick.
- **Stratum No. 4:** This stratum, which is the Tampa Formation, is the limestone bedrock. The nature of this stratum is quite variable, typically being a hard light tannish white calcareous sandy clay containing rock fragments, hard limestone lenses, some weathered zones, and occasional green and gray sandy clay lenses. Generally, the upper part of the stratum is poorly indurated and softer, probably the result of weathering. At depth, this stratum tends to be somewhat harder and more competent, but frequently contains softer zones. This stratum was encountered at depths of 24 to 47 feet.

2.3.1.3 Geologic Maps

The information presented herein was prepared in 1983 to support the original permit application for this Facility. The successful implementation of the originally proposed Facility at this location is a testimony to the integrity of the tests performed and their results as presented in this section.

Tables 2-11 and 2-12 show the depth and thickness of the clay-confining unit and the top of the Tampa Limestone, as encountered by Williams and Associates (1983) and Test Lab Inc. (1984) during test hole construction on and around the site. It is significant to note that the clay-confining unit, which separates the surficial aquifer from the Floridan aquifer, is continuous throughout the site and at least five feet thick at all boring locations. Although the planned Facility will not produce water-borne contaminants, this confining unit is highlighted because of its low permeability and adsorptive capacity. This subsurface feature would attenuate contaminants, if any, from leachate or runoff.

Table 2-11 Site Boring Data from Williams and Associates Report (1983)			
Boring No.	Depth to Clay Unit (ft)	Thickness of Clay Unit (ft)	Depth to Limestone (ft)
101	13.5	15.0	28.5
102	13.5	20.0	33.5
103	13.5	15.0	28.5
104	9.5	19.0	28.5
105	13.5	13.5	27.0
106	18.5	20.0	38.5
107	13.5	15.0	28.5
108	13.5	≥8.0 ¹	-
109	9.5	≥3.0 ¹	-
110	18.5	15.0	33.5

Source: CDM after Williams and Associates (1983)

¹Borings terminated at -21.5 feet

Table 2-12 Site Boring Data from Test Lab, Inc (1984)			
Boring No.	Depth to Clay Unit (ft)	Thickness of Clay Unit (ft)	Depth to Limestone (ft)
B-1	17.5	15	32.5
B-2	17.5	10	27.5
B-3	12.0	10	27.0 ¹
B-4	12.0	15	32.0 ¹
B-5	17.0	5.0	37.0 ³
B-6	12.0	15.0	27.0
B-7	27.0	5.0	47.0 ²
B-8	5.0	19.0	24.0
B-9	17.0	17.5 ³	34.5
B-10	17.5	6.5 ⁴	-
B-11	17.5	8.0 ⁴	-
B-12	19.5	5.5 ⁴	-

Source: CDM after Test Lab Inc. (1984)

¹Weathered limestone overlain by 5.0 feet of very loose green clayey fine sand.

²Weathered limestone overlain by 15.0 feet of clayey fine sand.

³Includes 5.0 feet of loose light greenish tan clayey fine sand.

⁴Boring terminated -25.0

From the standpoint of potential impact from the Facility to subsurface geologic features, the geology of the site may be generalized as follows:

1. **Surficial Sands:** These deposits may be subject to the greatest disturbance during construction, and would be most susceptible to environmental impact from surface or near surface disturbance.
2. **Clay Confining Unit:** These deposits of very low permeability material separate the limestone bedrock from the overlying undifferentiated sands. Because of the low permeability and high adsorptive capacity of this material, this "confining" layer could act as a barrier to vertical mixing of groundwater between the surficial and the Floridan

aquifers. It provides a hydraulic barrier, which inhibits the vertical movement of water to the more environmentally sensitive underlying limestone formations.

3. Limestone Bedrock: The limestone bedrock which underlies the unconsolidated surficial deposits constitutes the major water supply source for much of the region and is, therefore, the most sensitive geologic feature.

2.3.1.4 Bearing Strength

As discussed before, two site-specific preliminary geotechnical studies were completed by Williams and Associates, Inc. and Test Lab Inc. to determine general foundation suitability characteristics. The first report (see **Appendix 10-4**), completed in March 1983 by Williams and Associates, Inc. evaluated an area located within the present site boundaries but situated more southerly on the site relative to the proposed location of the Facility.

The second preliminary geotechnical report was prepared by Test Lab Inc. in April 1984 and is presented in **Appendix 10-3**. The Test Lab Inc. report evaluated an area on the site, which includes the location of structures and facilities. This section provides a summary of findings and preliminary evaluations of subsurface conditions from a foundation suitability perspective and recommendations as reported by Test Lab Inc. and Williams and Associates Inc.

The Test Lab Inc. (1984) report identified certain subsurface conditions at the site, which will require specific site preparation and subsurface foundation design. However, these subsurface conditions, as listed below, are considered typical of those normally encountered in the area:

- Cohesionless surface soils with generally loose consistency
- Weak and potentially compressive nature of the soft and loose zones within the deeper underlying semicohesive and cohesive soils
- Poorly indurated or highly weathered zones within the limestone bedrock.

The Test Lab, Inc. report emphasized that these generally typical and normally encountered conditions were quite similar to those revealed by the earlier Williams and Associates (1983) report, and that no "unusual or significantly different conditions" were found. Both reports offered general design considerations for dealing with this type of subsurface condition.

The Williams and Associates (1983) report stated that for relatively light loads (i.e., "column loads less than 20 kips"), post-construction settlement due to consolidation will likely be less than 1 inch, and therefore that shallow foundation support for lightly loaded components is therefore quite feasible. Soil bearing pressures of up to 3,000 pounds per square foot (total load) are available for design of the more lightly loaded components. According to Williams and Associates, minimum footing widths of not less than 18 inches for continuous footings and 24 inches for isolated column footings should be specified even though maximum allowable bearing pressures may not be developed. These minimum dimensions are considered necessary to provide confinement, which cohesionless bearing soils require to develop adequate shear strength.

For heavily loaded components of the Facility, individual pile compressive capacities of up to 60 tons were estimated. The Williams and Associates report recommends that minimum pile sections consist of 12-inch x 12 inch precast, prestressed concrete pile, and a closed-end concrete-filled pipe pile with a minimum diameter of 10 inches. The report also made other preliminary recommendations related to pile driving.

In general, the subsurface data identified in the original siting analysis indicate that any potentially limiting conditions can be overcome by appropriate site preparation and foundation design, such as the use of piles or other appropriate procedure. Such specific site preparation and subsurface/foundation designs and procedures will be established during the final design of the Facility expansion project.

2.3.2 Subsurface Hydrology

The physical, chemical, and hydrological characteristics of subsurface waters that have the potential to be affected by the construction or operation of the proposed Facility and associated components are described in this section. Localized and temporary disturbance of the surficial aquifer is expected to occur during the Facility's construction. However, the long-term operation of the Facility is not expected to have an effect on subsurface waters. The wastewater effluent from the Facility is pretreated and discharged into the sanitary sewer system. Therefore, the operation of the Facility is not expected to affect the subsurface waters.

2.3.2.1 Subsurface Hydrologic Data for the Site

The hydrologic system in the southern two-thirds of west-central Florida differs from that in the north (Sinclair, et al., 1985). Differences are based on degree of confinement of the hydrologic systems. As discussed in **Section 2.3.1.1**, the surficial aquifer and the Upper Floridan aquifer contain potable water. The water table in the surficial aquifer generally occurs within 1-3 feet below ground surface. During the original soil investigation, which included installation of soil borings by Williams and Associates, the water table was observed to occur generally within one foot of the surface across much of the site, and some areas were noted to have standing water at the surface. Field investigations in August 1983 (wet season) by Williams and Associates indicated that surface water was observed only in the vicinity of the southwest corner of the site, which coincides with the topographic low area of the site. The subsequent field investigations completed in April 1984 (dry season) by Test Lab, Inc. noted that water table elevations were within 2 to 3 feet of the ground surface in the northern part of the site. In general, the water table parallels topography with an average seasonal fluctuation of five feet or less.

The Upper Floridan aquifer within the site area is generally separated from the surficial aquifer by a confining layer. **Figure 2-20** is a portion of a regional water contour map showing the potentiometric surface of the Floridan aquifer. The surficial aquifer is comprised of marine and aeolian sands of Pleistocene age, and ranges from 15 to 25 feet in thickness in Hillsborough County. The aquifer is recharged directly through rainfall, and supplies small, low yield domestic wells. The general groundwater flow direction for the surficial aquifer within the Facility area is from northeast to southwest direction. **Figure 2-21** shows the groundwater levels for the surficial aquifer for the project area.

In most areas of Hillsborough County, the surficial aquifer is underlain by clay that acts as a leaky confining unit, which separates the surficial aquifer from the underlying Floridan aquifer. In the northern portion of the County, the clay is absent and the surficial aquifer and the Floridan aquifer are in direct connection.

The Floridan aquifer, consisting of limestone and dolomite beds, has an average thickness in the region of up to 1,000 feet. The potentiometric surface of the Floridan aquifer was not measured during test drilling on site.

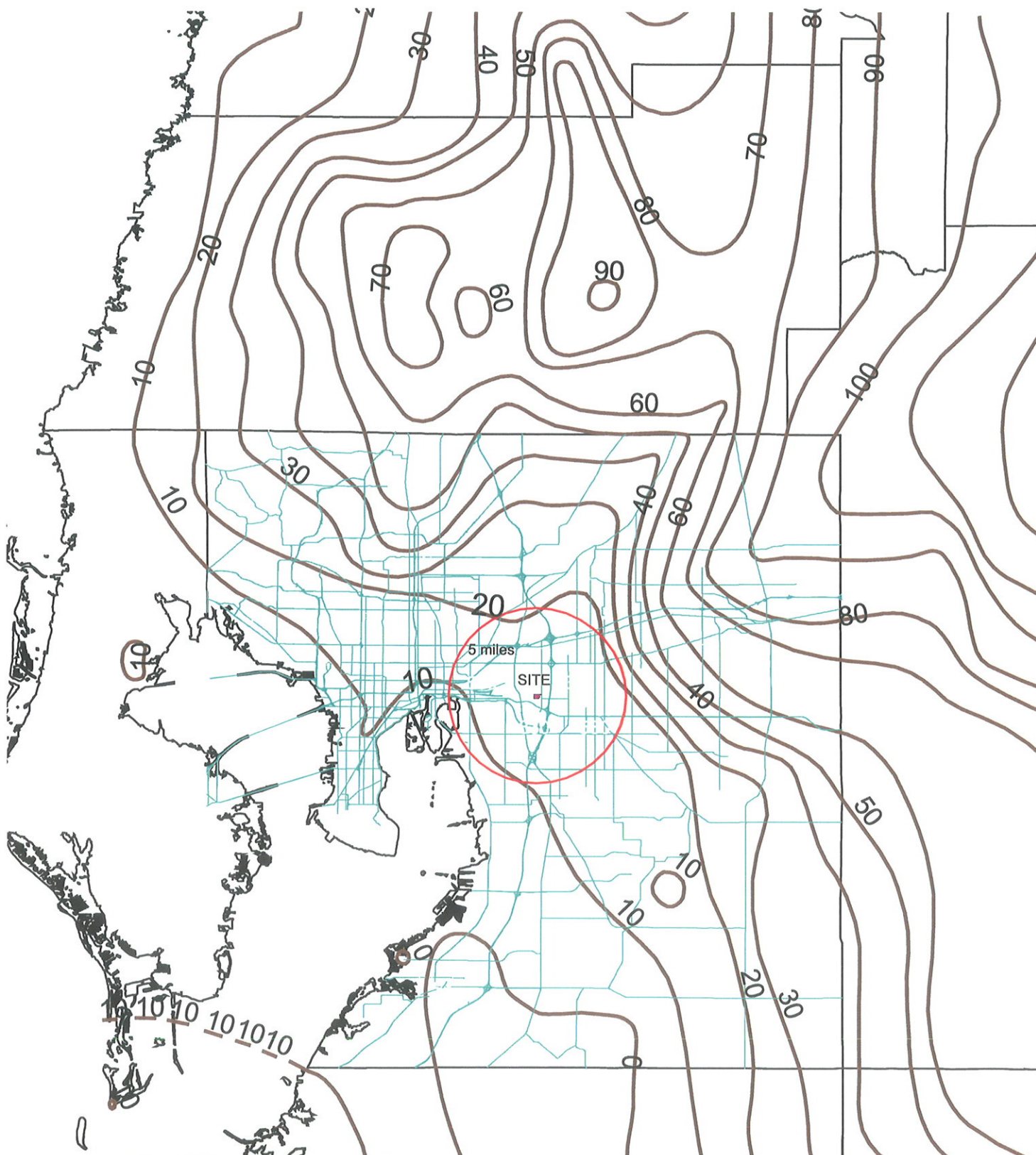
Based upon data provided in the Test Lab Inc. geotechnical report, the following sequence of subsurface deposits, in descending order, comprise the groundwater matrix at the Falkenburg Road site (summarized in **Section 2.3.1.2**):

- Fine Sand
- Clayey Sand
- Clay
- Calcareous Cemented Marl and Limestone

As previously discussed, variations occur in these lithologies and in the elevation of top and bottom of each of these units across the site. Geologic cross sections of the site are presented in **Figures 2-18 and 2-19**.

The first two strata appear to represent two subunits of the surficial aquifer as described by Sinclair, et al. (1985). These units probably do not represent a significant aquifer with respect to total water withdrawal. The units generally do not have sufficient hydraulic conductivity or thickness to be used as a supply for all but small domestic wells.

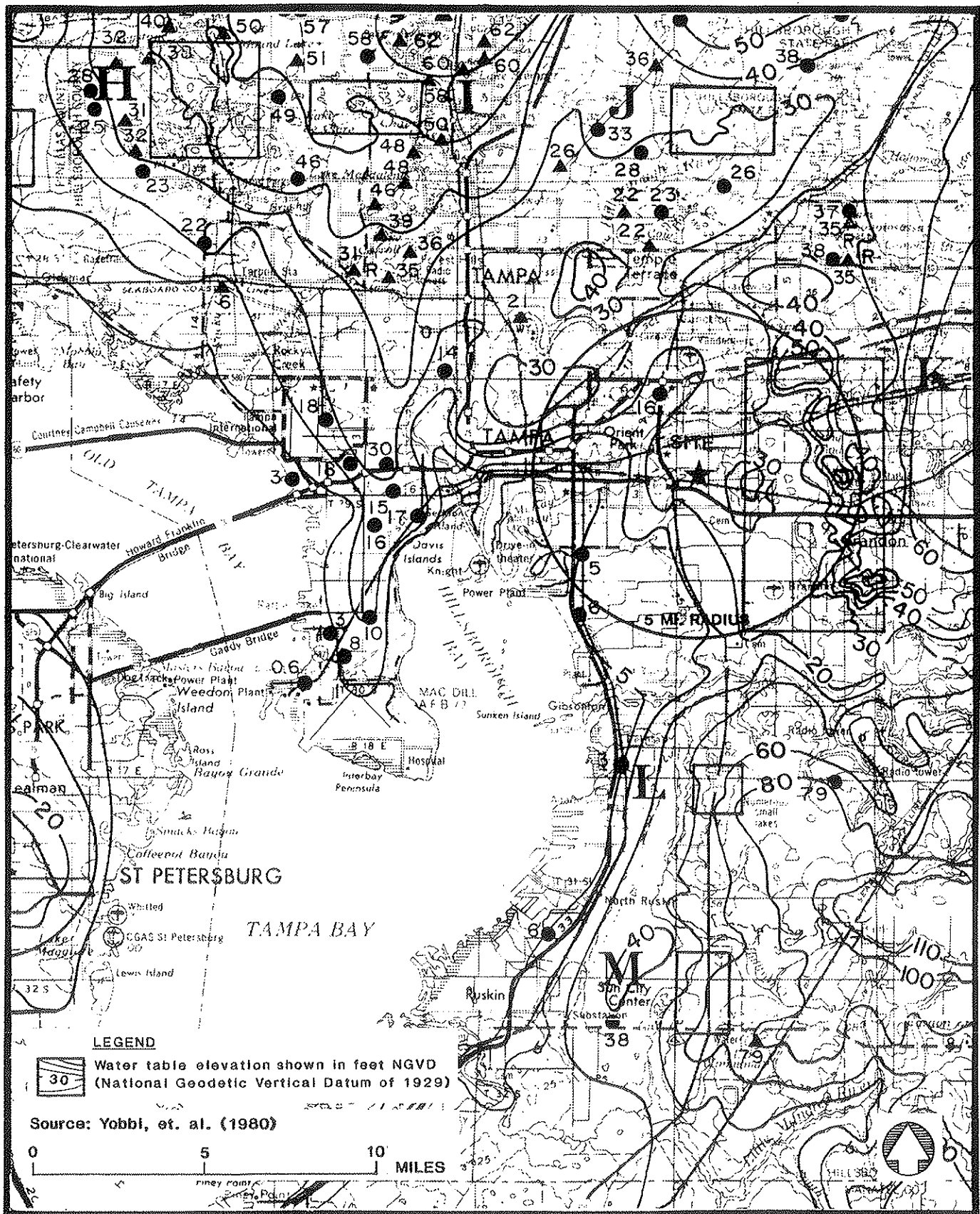
The third stratum, comprised predominantly of clay but grading to clayey sand, represents the confining unit for the limestone of the Floridan aquifer, which lies below. Groundwater above this confining unit is under unconfined or water-table conditions, and groundwater in the Floridan aquifer below is in a confined state. The confining unit appears to be continuous across the site, based upon results of test borings.



Hillsborough County Energy
Recovery Project



Figure 2.20
Potentiometric Surface
of the Floridan Aquifer
May 2003



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 2.21
GROUND-WATER LEVELS IN
THE SURFICIAL AQUIFER, MAY 1980

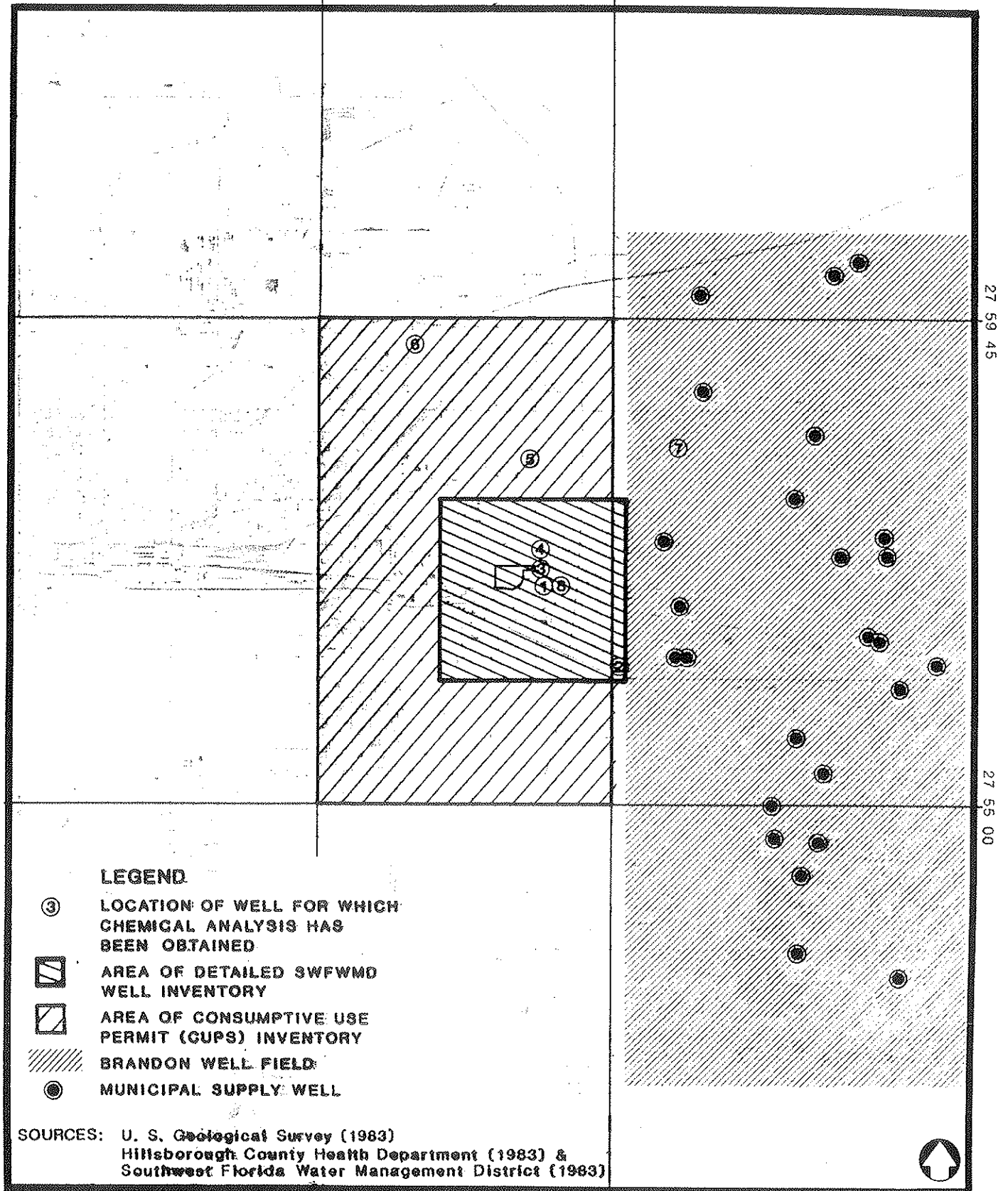
Based upon published data, recharge rates to the surficial deposits have been estimated by CDM to vary from 0.4 to 2.5 inches per month, depending upon wet or dry season. SWFWMD (Aquifer Characteristics within the SWFWMD, 2000) reported the transmissivity of the Floridan aquifer near the site to be between 51,500 gpd/ft (Index #168) to 4,260,000 gpd/ft (Index #171) with a storage coefficient of about 3.0×10^{-4} to 4.5×10^{-2} . The regional gradient of the potentiometric surface of the Floridan aquifer is southwestward, from the topographically high area in the northeast, toward the Gulf of Mexico (Sinclair, 1977; Yobbi 1980; Yobbi 1983, Barr and Schiner, 1983, Swancar and Hutchinson, 1992). **Table 2-13** provides a summary of reported published values for various aquifer characteristics including thickness, transmissivity and storage (storativity).

Table 2-13
Reported Values for Aquifer Characteristics

References	Area	Aquifer	Thickness (ft)	Aquifer Transmissivity (gpd/ft)	Storage Coefficient	Confining Unit Permeability or Leakage (gfd/ft ³)	Hydraulic Conductivity (ft/d)
Fernandez (1982)	Pinellas County	Surficial	-	-	-	-	2.1
		Confining	-	-	-	-	50 ft/yr (in confining unit)
Geraghty & Miller (1982)	Tampa Bypass Canal	Upper Floridan	-	400,000	5×10^{-4}	1×10^{-3}	
Geraghty & Miller (1982a)	East Central Regional Well Field	900' depth Floridan	-	200,300-267,300	7×10^{-5} to 1.2×10^{-3}	2.2×10^{-3} to 9.8×10^{-4}	
Hickey (1981)	Tampa Bay	Surficial	30	448	-	-	20
		Upper Confining Bed	70	0.42	-	-	8×10^{-4}
		Upper Floridan	180	225	-	-	167
		Middle Floridan	400	300 to 3000	-	-	0.1 to 1
		Lower Floridan	530	7,493,000	-	-	1.890
Stewart et al (1978)	Temple Terrace	Upper Floridan	-	972,400	3×10^{-4}	-	5.2×10^{-5} to 2.6
Sinclair (1977)	Northwest Hillsborough County (Section 21)	Surficial	40	2020-3216	0.20×10^{-3}	-	-
Stewart (1968)	Northwest Hillsborough County	Floridan	1,000	550,000	1.0×10^{-4}	5.35×10^{-5}	-

Fernandez (1983) has reported that the rate of horizontal movement of groundwater in the surficial aquifer for an area within Pinellas County to be about 1.2 feet/year, and has reported a rate of downward vertical migration through the confining bed to be on the order of .005 feet/year. Theoretically, a slug of groundwater could move through a ten-foot thickness of the confining unit at the site in approximately 2000 years, assuming no alternation of hydraulic properties.

The Hillsborough County Health Department has provided the results of chemical analyses of water samples taken from selected community and non-community public water systems, which utilize groundwater from surficial aquifer wells in the vicinity of the Falkenburg Road site. The locations of the wells from which sample analyses were obtained are shown in **Figure 2-22**, with results of selected parameters shown relative to various regulated levels in **Table 2-14**. From these results it can be concluded that the groundwater contained in the surficial deposits in the vicinity of the site is of generally good quality, with most wells examined showing most water quality parameters as being well within established state and federal primary and secondary drinking water standards.



27 59 45

27 55 00



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 2.22
AREAS OF INVENTORY OF PUBLIC & PRIVATE WATER WELLS

1 0 1 2 MILES

Table 2-14 Results of Selected Water Quality Parameters for Wells Near the Facility									
Parameter	Well Location								
	MCL	1	2	3	4	5	6	7	8
Total Dissolved Solids	500*	150	165	177	180	226	260	230	464
Chlorides as Cl	250**	3	12	8.4	8.6	11.3	14.8	16	60
Sulfate as SO ₄	250**	1.0	10.0	7.7	13.1	3.9	34.0	22.1	17.0
Fluoride	1.4-2.4*	0.22	0.15	0.28	0.909	0.23	0.14	0.19	0.36
pH	Minimum 6.5+	7.2	7.6	7.9	7.9	7.4	7.4	7.6	7.3
Iron as Fe	0.3**	0.08	0.05	0.05	<0.0 2	0.17	<0.02	0.02	0.84
Copper as Cu	1.0*	0.1	<0.1	-	<0.1	<0.1	<0a.0 1	BDL	<0.005
Color (Reported in Standard Unit)	15**	5	0	10	1	12	2	0	25
Color (Reported as Threshold Odor Number)	3**	2	-	none	1	1	4	-	1
H ₂ S (Hydrogen Sulfide)	.002†	0.49	<0.05	none	0.06	0.20	0.80	-	<0.04
Sodium as Na	160*†	9.5	-	9.3	-	-	-	6.2	12.0
Nitrate as N	10*	-	-	0.38 (as NO)	2.7	0.39	8.7	0.3	0.05

Source: CDM from Hillsborough County Health Department Records

*National and State Primary Maximum Contaminant Level (MCL)

**National and State Secondary MCL

†State of Florida MCL

Notes:

- 1 All wells finished in surficial aquifer.
2. Well locations shown in **Figure 2-22**

2.3.2.2 Karst Hydrogeology

Karst geology occurs as manifestation of chemical diagenesis. The term diagenesis refers to any chemical change that occurs in a sediment following deposition (Domenico and Schwartz, 1990). A landscape that exhibits irregularities in surface form caused by rock dissolution is known as a karst landscape. Karst landscape is usually formed on limestone. However, the karst features are obvious where the limestone is exposed. Where karst processes affect rocks that are covered by relatively insoluble deposits, the presence of buried karst features forms a distinctive type of terrain known as mantled karst (USGS, 1999). Key characteristics of karst topography are its predominantly vertical and subsurface drainage, relative lack of surficial drainage systems, and the development of circular depressions and sinks. The terrain of the site area would be classified as buried karst, as the limestone base is generally covered with an overburden of approximately 30 feet.

The topography of the site area is predominantly karst-controlled. The site lies near the edge of an area that Hall and Metcalf (1979) have termed the Brandon Karst Area. This is an area of about 40 square miles, which is centered around the communities of Brandon, Seffner, Valrico, and Mango. **Figure 2-23** shows the location of major sinkholes with respect to the site location.

During the original phase of the project, analysis of high-resolution color aerial photography indicated the presence of a circular terrain feature on the site, which may have been karst-related. This area was subsequently examined which revealed the pattern to be a "grass pond." Geotechnical reports prepared for Hillsborough County in 1983 and 1984 concluded that there was no evidence of any advanced solution activity beneath the site.

Following preliminary siting and site studies, the only real means of insuring substructural integrity is to take test borings at the location of every important column or load-bearing member on site in order to assure the immediate absence of voids, which may be indicators of advanced solution activity. This will be done prior to the final foundation design. If such voids are determined to be present, there are numerous design factors, which may be considered in order to overcome any potential site limitations.

2.3.3 Site Water Budget and Area Users

Table 2-15 presents a compilation of hydrologic data representative of the site area and includes information on rainfall and temperature, evapotranspiration, evaporation, runoff, and groundwater recharge, as required by Section 2.3.3 of the DEP Instruction Guide for Certification Applications.

The monthly evapotranspiration potential was calculated using the Blaney-Criddle formula, which describes a linear relation between evapotranspiration potential and

mean air temperature. The proportionality factor is the product of a crop/location coefficient and a day length factor (see Chaw, 1964):

$$U = k \sum_{i=1}^m pt = kF$$

where

$$F = \sum_{i=1}^m pt$$

m = months

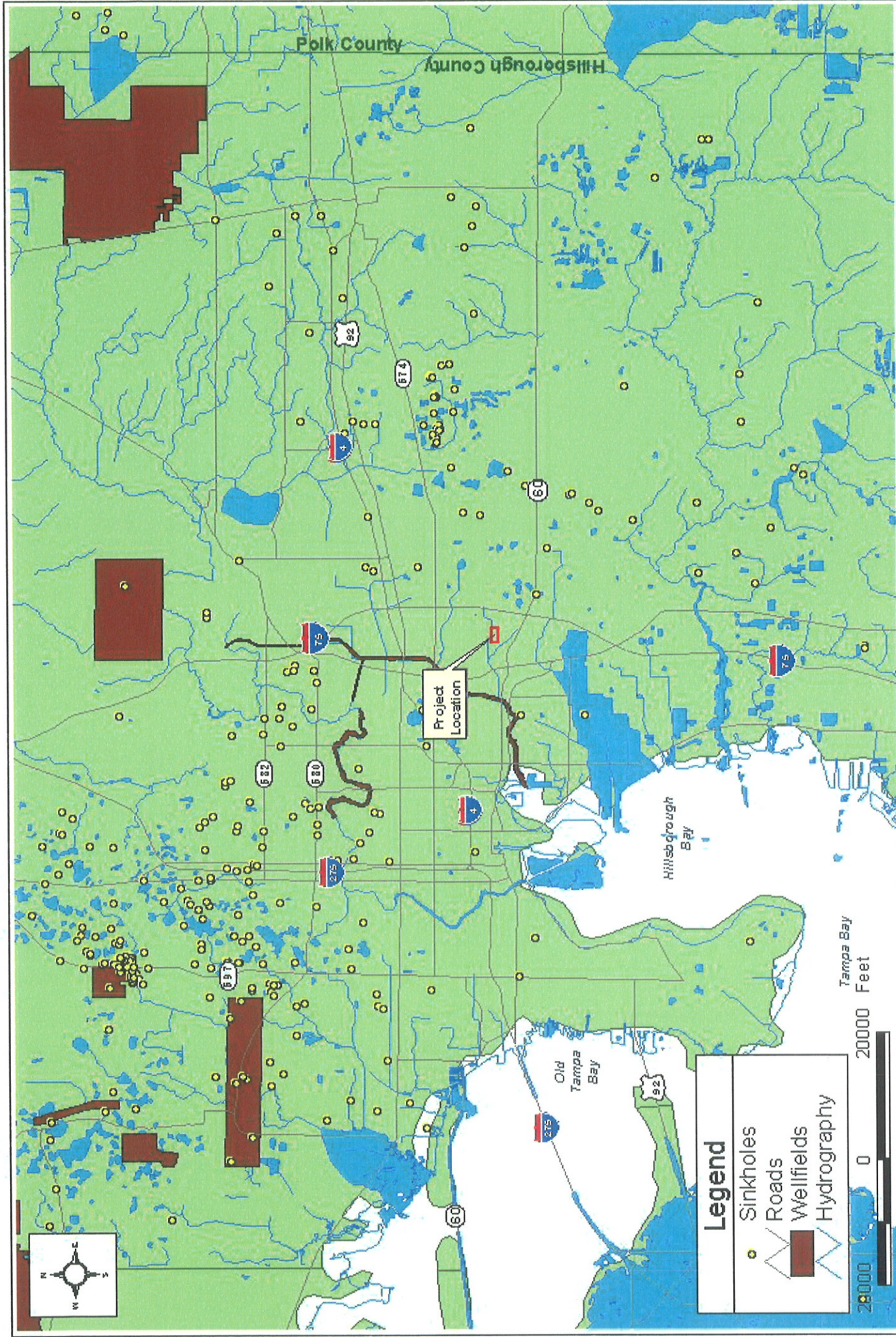
p = percent of daytime hours of the year, occurring during the period, divided by 100 (See **Table 11-4**, Chaw(1964))

t = mean monthly temperature in °F

U = evapotranspiration or consumptive for a given period in inches

For this analysis, the crop was considered to be pasture grass with a coefficient of 0.75. There are no surface water bodies (except retention ponds) on the site so there is no evaporation from a free surface.

Table 2-15 indicates that under average conditions, site runoff will occur most frequently during the rainy summer months of July and August. Depending on localized drainage conditions, runoff may occur at others times as well. This is particularly true during tropical storms or hurricanes.



Sinkhole and Wellfield Distribution
Hillsborough County Energy Recovery Project

Table 2-15

Hydrologic Data Representative for the Site Area

Parameter Description	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient Air Temperature	°F	61.0	63.0	66.5	72.0	77.5	81.5	82.5	82.5	81.0	75.0	67.5	62.0
Ambient Air Relative Humidity	%	71.5%	72.0%	71.5%	69.5%	68.5%	69.5%	72.0%	74.5%	75.0%	74.5%	72.0%	67.5%
Ambient Air Water Vapor Pressure	mm Hg	9.8	10.6	11.9	13.9	16.4	19.0	20.3	21.1	20.2	16.5	12.4	9.6
Barometric Pressure	mb	1,017	1,016	1,015	1,014	1,012	1,013	1,014	1,014	1,013	1,014	1,015	1,017
	mm Hg	782	781	780	780	778	779	780	780	779	779	781	782
Wind Speed	mph	6.8	6.9	7.3	7.5	7.0	6.2	5.8	4.8	4.8	5.7	6.3	6.5
Wind Speed Function	--	102.4	102.8	106.8	108.9	103.8	96.9	93.1	86.1	86.1	92.3	97.3	99.6
Cloud Cover	%	53%	47%	48%	47%	46%	58%	63%	61%	60%	47%	46%	52%
Solar Radiation - shortwave at surface	BTU/ft ² /day	1,210	1,447	1,754	1,994	2,205	2,124	1,976	1,828	1,672	1,480	1,317	1,110
Net Shortwave Solar Radiation	BTU/ft ² /day	1,174	1,403	1,701	1,934	2,139	2,060	1,917	1,773	1,622	1,436	1,278	1,077
Net Longwave Atmospheric Radiation	BTU/ft ² /day	2,321	2,363	2,477	2,650	2,844	3,074	3,169	3,179	3,111	2,796	2,506	2,327
Average Rainfall	inches/day	0.071	0.102	0.099	0.053	0.083	0.195	0.227	0.254	0.209	0.068	0.053	0.080
Monthly % of Daylight Hours	%	7.4	7.07	8.37	8.67	9.46	9.39	9.58	9.17	8.32	8.02	7.28	7.27
Monthly Evaporation Potential	inches	3.38	3.13	4.08	4.62	5.46	5.7	5.89	5.64	5.05	4.51	3.6	3.38
Mean Monthly Percipitation	inches	2.1314	2.86119	3.08289	1.59667	2.57889	5.84822	7.02644	7.87511	6.27133	2.09341	1.58455	2.4725
Groundwater Recharge	in/month	0	0	0	0	0	0.61	1.86	0	0	0	0	0

Source: TIA Station (1960-2003)

Major water uses in the area are divided into domestic, industrial, irrigation, and public supply. SWFWMD has provided a well construction permit listing for all wells greater than 2-inches in diameter within Sections 17, 18, 19 and 20 in Township 29S Range 20E. This listing has been included in **Appendix 9-1**. In addition, SWFWMD has provided a list of Water Use Permits (WUP) – (issued for wells greater than five inches in diameter) which have been issued for the latitude/longitude boundaries defined by 27°59'45", 27°55'00", 82°22'30", 82°18'45". This inventory is included in **Appendix 9-2**. There are no consumptive use wells at the Facility.

Under the SWFWMD rules for Water Use Permits, a permit for the use of groundwater is required if:

- 1) The withdrawal during any single day is to exceed one million gallons or if the average annual daily withdrawal exceeds 100,000 gallons per day on an annual basis; and
- 2) If the withdrawal is from a well having an inside diameter of six inches or more.

A significant area related to Hillsborough County's water supply is the location of the Brandon well field, shown on **Figure 2.22**. This well field, a significant portion of which is located within five miles of the site, covers an area of 2.5 miles by 9 miles. Within this area are 25 municipal supply wells, which pumped between 5.8 and 11.8 mgd in 1981 and 1982, respectively. **Figure 2.22** also shows the location of these wells within the well field, the nearest of which is about 1.5 miles east of the Faulkenburg Road site.

The Hillsborough County Health Department was contacted for chemical analysis of water from the nearby wells. A summary of chemical analytical data is presented in **Table 2-14**. The locations of the wells are shown on **Figure 2.22**. These analyses indicated that the water quality parameters analyzed generally meet the national primary and secondary drinking water standards from these wells.

2.3.4 Surficial Hydrology

2.3.4.1 Hydrologic Characterization

During the original permitting process, it was noted that the Facility could potentially affect two ditches, which approach the site's northern and southwestern borders. Little information was available on the physical, chemical, or hydrological characteristics of the two ditches, especially on a seasonal basis. To provide baseline information on the chemical characteristics, both the ditches were field sampled on October 31, 1983.

The unnamed ditch to the north of the site drains a mixed light industrial-residential area to the west of the site. Station 1 is located on this ditch. Station 2 was located on a second unnamed ditch, which drains a wetlands area to the southeast of the site. Stations 3 and 4 were located downstream of Stations 1 and 2, respectively, before the confluence of the two ditches. Prior to stations 3 and 4, both ditches pass

through a wetland area. Station 5 was located downstream of the merged ditches, just prior to the Tampa Bay Bypass Canal.

Results of chemical analyses are presented in **Table 2-16**. Compared to water quality of the Tampa Bypass Canal (the receiving waters into which the ditches ultimately discharge) at the S-160 Station (USGS, 1981), water quality in both ditches was determined to be generally degraded. Levels of nitrogen compounds (nitrate, ammonia) were shown to be generally higher in the ditches than in the canal, with the exception of nitrite-nitrogen. High turbidity and suspended solids levels were seen in the ditch bordering the northern boundary of the site (Stations 1 and 4). These high levels are thought to be the result of some temporary discharge upstream and would possibly not be found in further sampling. Conditions at Station 2 are of particular interest because site discharges are proposed to occur in the vicinity of this station. Water quality at this station is generally the best of the stations sampled. Surprisingly, however, the lowest dissolved oxygen level was recorded at this station was 2.6 mg/l. This concentration, if persistent, would prohibit establishment of a healthy biological population. As discussed in subsequent sections (Ecology, **Section 2.3.5**) benthic organisms found at this station do not indicate that lowered DO is a continual occurrence.

No information is available on seasonal variations in flow in either ditch. Based on the dimensions of these ditches, maximum flow which could be handled at Station 2, is approximately 65 cubic feet per second (cfs).

Table 2-16 Water Quality of Surface Waters in Vicinity of Site¹ (mg/1 unless otherwise noted)					
Station	1	2	3	4	5
Parameter					
Temperature (°C)	24	22.5	22	22	24
pH (units)	7.35	6.9	7.2	7.9	7.4
Dissolved Oxygen	10.1	2.6	4.80	6.40	8.35
Turbidity (NTU)	196	4.9	31	126	39
Total Alkalinity, CaCO ₃	29	151	92	33	129
Ammonia Nitrogen	0.08	0.31	0.29	0.43	0.16
Total Kjeldahl Nitrogen	1.1	0.77	1.2	1.4	1.2
Nitrate Nitrogen	.010	0.03	0.28	0.07	2.2
Nitrite Nitrogen	<0.01	<0.01	<0.01	<0.01	0.04
Total Phosphate (T-P ₀₄)	0.58	0.15	2.0	0.38	0.50
Total Suspended Solids	27	9.0	60	61	26
Total Hardness, CaCO ₃	111	238	182	85.6	227

¹Samples collected October 31, 1983

2.3.4.2 Measurement Programs

As described in a previous section, the baseline water quality at the ditches was performed during the first phase of the permitting process for the facility. In order to characterize the chemical condition of the two ditches in the vicinity of the site, a limited sampling program was conducted on October 31, 1983. Grab samples were collected at each station in appropriately washed containers. Samples for dissolved oxygen (Winkler technique), ammonia, total Kjeldahl nitrogen, and total phosphate were preserved as specified in "Methods for Chemical Analysis of Water and Wastes" (EPA-600/4-79-020). All samples were immediately placed on ice for transport to the laboratory. Temperature and pH were measured according to methods specified in either "Standard Methods for Examination of Water and Wastewater" (APHA, 1982) or "Methods for Chemical Analysis of Water and Wastes" (EPA 600/4-79-020).

2.3.5 Vegetation/Land Use

In the initial permitting process, the land use and vegetative cover types were described at the Facility site before construction. Since the original data was compiled over 20 years ago, this data has been updated. The community types have been classified to Levels III and IV of the Florida Land Use and Cover Forms Classification System (FLUCFCS).

The vegetation/land use types for the 50.4-acre project site include Brazilian pepper (4220), conveyance ditches (5100), retention ponds (5300), and utilities (8300). In October 2004, the site was inspected by a biologist familiar with Florida flora and fauna in order to ascertain the type and extent of vegetation and to determine whether any jurisdictional wetlands exist onsite.

The methodology used to determine the extent of a wetland is found in Florida Administrative Code 62-340 (F.A.C.), which is entitled "Delineation of the Landward Extent of Wetlands and Surface Waters." Concisely, wetlands are identified using any two of three criteria found in Section 62-340 (F.A.C.). Those criteria are: (1) wetland plants, (2) hydric soils, in which the list of hydric soils is provided by the Natural Resources Conservation Service, and, (3) evidence of hydrology (either inundation or saturation of soils for a specific time period).

The site inspection revealed no natural wetlands located within the 50.4-acre site. Two jurisdictional upland-cut conveyance ditches exist along the northern and eastern boundary, both of which are highly disturbed and contain predominantly nuisance species, however, the vegetation meets the criteria set forth in the above-mentioned wetland delineation rules. Vegetation within the ditches includes Carolina willow (*Salix caroliniana*), Brazilian pepper (*Schinus terrebinthifolius*), primrose willow (*Ludwigia peruviana*), beggartick (*Bidens pilosa*), Britton's wild petunia (*Ruellia brittoniana*), saltbush (*Baccharis halimifolia*), blackberry (*Rubus spp.*), and creeping ox-eye (*Wedelia trilobata*). These conveyance ditches connect the retention ponds with outflow ditches offsite.

The retention ponds (5300) onsite are composed of a mowed, maintained bank of Bahia grass (*Paspalum notatum*) and coinwort (*Hydrocotyle spp.*) and do not provide much habitat or cover. Other vegetation along the banks of the ponds include alligator weed (*Alternanthera philoxeroides*), torpedo grass (*Panicum repens*), spikerush (*Eleocharis spp.*), buttonweed (*Diodia virginiana*), flatsedge (*Cyperus spp.*), and water hyssop (*Bacopa caroliniana*). There are also areas of mowed and maintained grass interspersed between the parking areas and the retention ponds of the Facility. These areas are dominated by Bahia grass and are periodically improved with brush control and fertilizer application.

The adjacent land use to the north of the site has been converted to various other municipal (Hillsborough County) land use and services including municipal jails (1760), animal shelters (2530) and public works staging areas (1750). However, a

portion of this adjacent northern parcel remains primarily improved pasture (2100). Vegetation includes dog fennel (*Eupatorium capillifolium*), Bahia grass, smutgrass (*Sporobolus* spp.), ragweed (*Ambrosia artemisiifolia*), beggartick, and caesarweed (*Urena lobata*). This pasture area is no longer used for cattle grazing although horses have been seen grazing within the past year. Within the improved pasture area are upland-cut ditches (5100), stormwater ponds (5300), stream and lake swamp wetlands (6150), freshwater marshes (6430), and emergent aquatic wetlands (6440) interspersed. Although most of this northern adjacent parcel is open pasture, there are also scattered small – to medium-sized trees which consists predominantly of slash pine (*Pinus ellottii*), live oak (*Quercus virginiana*), and cabbage palm (*Sabal palmetto*). These areas have been disturbed due to historical agricultural activities and contain a large number of exotic and nuisance trees and shrubs such as monkeypod (*Pithecellobium dulce*), Brazilian pepper, lead tree (*Leucaena leucocephala*), and cogongrass (*Imperata cylindrica*).

A large conveyance ditch (5100) also occurs along the northern boundary of the project site and into the improved pasture area. The ditch was inundated at the time of inspection and had an estimated average depth of two inches. The vegetation consists of many nuisance species and no wildlife species were observed in the conveyance ditch. The ditch had an estimated width of four to six feet. Vegetation included Carolina willow, primrose willow, wax myrtle, smartweed (*Polygonum* spp.), elephant ear (*Colocasia esculenta*), hemp vine (*Mikania* spp.), beggartick, rattlebox (*Sesbania* spp.), common ragweed, Britton's wild petunia (*Ruellia brittoniana*), saltbush (*Baccharis halimifolia*), and blackberry (*Rubus* spp.).

The adjacent land use to the south of the site includes the CSX railroad line (8100), a drainage ditch (5100) with spoil banks, and a Brazilian pepper area (4220). Vegetation along this small area included Brazilian pepper and cogongrass (*Imperata cylindrica*). Communities of these small, shrub-like trees are often established along burrow-pits, levees, dikes, and in old disturbed fields.

The adjacent land use to the east of the site includes an abandoned light industrial building (1550), a wetland mitigation area (6410), and an intermittent pond (6530). The mitigation area is planted with native herbaceous species including sand cordgrass (*Spartina bakeri*), pickerelweed (*Pontedaria cordata*) and arrowhead (*Sagittaria lancifolia*). This wetland is in excellent condition. It has been maintained and monitored for a period of time to meet success criteria for an environmental resource permit not associated with this project or site. Also adjacent to this mitigation area is an area classified as intermittent pond (6530). Vegetation within this intermittent pond includes smutgrass, water primrose (*Ludwigia octovalvis*), rattlebox, and saltbush.

The adjacent land use to the west of the project site is improved pasture (2100) within a TECO easement (8300). Vegetation includes dog fennel (*Eupatorium capillifolium*), Bahia grass (*Paspalum notatum*), smutgrass (*Sporobolus* spp.), common

ragweed (*Ambrosia artemisiifolia*), beggartick (*Bidens pilosa*), and caesarweed (*Urena lobata*) which commonly comprise pasture vegetation.

Along the west line of the S.E. ¼ of Section 18, Township 29 South, Range 20 East, adjacent to the TECO easement and the project site are hardwood – conifer mixed woodlands (4340) which are dominated by live oak (*Quercus virginiana*), slash pine (*Pinus ellottii*), and wax-myrtle (*Myrica cerifera*). Within this hardwood forest is a bottomland or lake swamp wetland (6150) containing laurel oak (*Quercus laurifolia*), water oak (*Quercus nigra*), primrose willow (*Ludwigia peruviana*), smartweed (*Polygonum* spp.), and blackberry (*Rubus* spp). This forested area historically has remained a natural undeveloped area with impacts from cattle grazing. The established canopy provides shading that reduces the invasion of exotic and nuisance species. There will be no anticipated impacts within this area from the proposed Facility expansion.

A land use/vegetation map at a scale of 1:1500 (1"=1500') is provided in **Figure 2-24**, based upon the Level III and IV Classifications of the Florida Land Use and Cover Classification System. This class of data was obtained from medium and low altitude aerial photography supplemented by ground level confirmation of observed data. Global Information Systems Software (GIS) was used to delineate land use on the Facility site and surrounding areas.

According to the U.S. Department of Interior, Fish and Wildlife Service (USFWS), National Wetland Inventory (NWI), there are two wetlands, which exist within the 50.4-acre project site (NWI Brandon, Florida, Quadrangle, 1992). These appear in the south-central portion of the Facility site within the area of the Wastewater Treatment Plant. These small wetland areas no longer exist within the Facility site and were converted to utilities (8300) land uses within the past 30 years. A portion of a NWI-mapped wetland also appears along the northern property boundary. Most of this wetland area still exists on the adjacent parcel to the north; however, the onsite portion has since been converted to part of the Facility access road.

Wetlands were also described using the USFWS "Classification of Wetlands and Deepwater Habitats of the United States" (1979). It is highly probable that considerable onsite activity has extensively modified the conditions that existed when the original aerial photographs were interpreted. Indeed, ground level analysis did not reveal the presence of the wetland areas indicated on the USFWS and GIS maps.

A list of wetland vegetative indicator species for various wetland communities in Southwest Florida, including Hillsborough County, is found in **Appendix 12-1 – Ecology**. This list was taken from the Florida Department of Environmental Protection's website at: <http://www.dep.state.fl.us/water/wetlands/delineation>. Due to the disturbed nature of the site and the dominant vegetation in the adjacent

property currently Brazilian pepper, the area provides little vegetative biodiversity or native plant communities.



Hillsborough County Energy
Recovery Project



Figure 2.24
Vegetation &
Land Use Map

Aerial Taken (11/2003)

Ecology

"Important" species of plants and animals include (1) species listed as endangered or threatened by the USFWS, (2) species listed by the Florida Game and Fresh Water Fish Commission (FFWCC) in F.A.C. 39-27 as endangered, threatened, or species of special concern, (3) species listed as game, furbearers, or freshwater game fish in F.A.C. 39-1, and (4) those species which are indicators of, endemic to, or are otherwise unique to specific plant communities and habitat types. Of significance to this permit application are those important species found on-site or within five miles of the site, which would be expected to be affected by the proposed project.

Existing background information was reviewed to determine the likelihood for occurrence by listed species based on habitats found on site and known geographic ranges. Data sources and information collected and evaluated for the study include:

- Hillsborough County November 2003 aerial photographs
- FDEP Land Boundary Information System (LABINS) website (<http://labins.org>)
- USGS quadrangle map of Brandon, Florida
- Soil Survey of Hillsborough County, 1983 (United States Department of Agriculture (USDA), Soil Conservation Service (SCS))
- *Wildlife Methodology Guidelines*, Section 18.D (Florida Freshwater Fish and Wildlife Commission)
- *Guide to the Vascular Plants of Florida* (Wunderlin, Richard P., 1998)
- Florida Natural Areas Inventory (FNAI) website and database (<http://www.fnai.org>)
- Florida Land Use, Cover and Forms Classification System (FDOT 1999)
- *Guide to the Natural Communities of Florida* (Florida Natural Areas Inventory, June 1998).
- Guidelines for gopher tortoise relocation (FFWCC August, 2001)
- FFWCC website listing of endangered species (<http://floridaconservation.org/endanger>)
- USFWS website listing of endangered species (<http://endangered.fws.gov>)
- Florida's Breeding Bird Atlas webpage (<http://www.wildflorida.org/bba/maps.htm>)
- FFWCC Bald Eagle Nest Locator website (<http://wld.fwc.state.fl.us/eagle>)

- *Field Guide to North American Birds, Eastern Region*, National Audubon Society, 3rd Edition, 1977.
- *Field Guide to Florida*, National Audubon Society, 1st Edition, 1998.
- USGS National Wetlands Inventory Website (<http://wetlands.fws.gov/>)

The U.S. Department of the Interior, Fish and Wildlife Service (USFWS), was contacted in October, 2004 for updated data pertaining to the project site. Data from the USFWS website reconfirms the findings contained in the County's original application, which states that no federally-designated wildlife refuges or critical habitats are located within five miles of the site. This data remains accurate according to the USFWS website data (<http://northflorida.fws.gov/>), the critical habitat list from the Code of Federal Regulations, 50 CFR 17.95 (<http://www.gpoaccess.gov/ecfr/>), and according to the Florida Fish and Wildlife Conservation Commission (see **Appendix 12-1 – Ecology**). However, portions of the Facility site appear to be within the range of federally listed species according to the USFWS website. These include the Florida golden aster, wood stork, (endangered) and the bald eagle, eastern indigo snake, and Florida scrub jay (threatened).

As shown on **Figure 2-7b**, one eagle nest has been found just inside the five-mile study area, although this nest area is not defined as critical habitat. In fact, critical habitats have not been defined for any of the five listed species. Since the construction of the expansion project will only affect an extremely small area (0.3 acres) of uplands already affected by the operation of the Facility for the last 20 years, it is anticipated that the expansion project will not adversely affect any of the above federally-listed species.

The FFWCC and FNAI were contacted to request their assessment of the potential for the occurrence of listed species within the project area. The USFWS now directs applicants to the USFWS website listing of threatened and endangered species for the respective region and state (<http://northflorida.fws.gov/>). Based on the results of the background information review and on-site habitat types and known ranges, a list of potentially occurring species was developed. A listing of endangered, threatened, rare, or species of special concern, which are found in Hillsborough County, provided a database of organisms, which have the potential to occur on the project site. This list is included in **Appendix 12-1 – Ecology**. The FFWCC indicated that the proposed project would not adversely affect any listed species within the project area. However, according to FNAI, within the five-mile search radius, there are occurrences of listed species and areas of Potential Habitat for Rare species. This potential habitat is associated with a known occurrence in the vicinity of wood stork (*Mycteria americana*), Florida sandhill crane (*Grus Canadensis pratensis*), manatee (*Trichechus manatus*), bald eagle (*Haliaeetus leucocephalus*), and eastern indigo snake (*Drymarchon couperi*). As shown on **Figure 2-7b**, one active eagle nest has been

found just inside the five-mile study area (S/T/R - 2/29S/19E). No impacts to the nest are anticipated. The FNAI data also showed that above-listed species occurrences are out of the vicinity of the proposed Facility expansion and would not create conflicts within the project area. No element occurrences were shown within the 50.4-acre project site.

Field observations were conducted in October 2004 by an environmental scientist familiar with Florida flora and faunal species. The survey was conducted to ensure that no rare species inhabit the area to be used for the proposed expansion of the Facility. Field observation methods consisted of multiple pedestrian transects and detailed field observations throughout all habitat types existing on the Facility site. These observations began in the early morning and continued into early afternoon. Pedestrian transects were consistent because most of the vegetative cover/land use within the project site consists of paved parking lots and low pasture grasses. Wildlife sightings were noted from the survey and recorded, however, none of these observations were within the area of the Facility expansion. **Table 2-17** provides a list of notable wildlife sighted on or adjacent to the Facility site.

Table 2-17 Wildlife Sighting Results		
Name	Genus/Species	Status
Wood Stork	Mycteria Americana	State Endangered
Mourning Dove	Zenaida macroura	Game animal
White Ibis	Eudocimus albus	Species of Special Concern
Mallard Duck	Anas platyrhynchos	Game animal
Little Blue Heron	Egretta caerulea	Species of Special Concern
Mockingbird	Mimus polyglottos	N/A

No federally listed species were observed during the limited survey period. However, three state-listed species were observed. Based on the duration of the survey, size of the property, and limitations of the survey coverage, the results are not conclusive regarding potential utilization of the site by some of the listed potential species. **Appendix 12-1** provides a summary of listed wildlife species and the likelihood for their occurrence within various habitats. Other species that have the potential to occur on the site, as well as the result of the observations for specific target species, are discussed in further detail below.

Bald eagles (*Haliaeetus leucocephalus*) may forage in the wetlands to the north of the project site. No nests were observed on or near the site, nor does the FFWCC have

record of a nest closer than 3.7 miles to the site. Since there will be no impacts to the wetlands on or adjacent to the site, no impacts are anticipated to this species.

Burrowing owls (*Speotyto cunicularia*) build their nests in high sandy ground, preferably open habitats with short grasses and few trees. Their distinctive burrows clearly indicate their presence. No burrows were observed during the wildlife survey and there will be no impacts to the improved pasture area due to this project, therefore, no impacts are anticipated to this species.

Florida sandhill cranes (*Grus canadensis pratensis*) nest in grassy marshes, which maintain standing water during the birds' nesting season. They forage in wet prairies, marshy lake margins, and pastures. They may utilize the offsite wetlands to the north for nesting and foraging, however, most of the wetlands are dominated by nuisance species and do not represent ideal nesting or foraging habitat. Sandhill cranes were not observed on the site during the October 1, 2004 site visit. Impacts to this species are anticipated to be low due to the previous loss of habitat.

Southeastern American kestrels (*Falco sparverius paulus*) utilize open pine habitats, woodland edges, prairies, and pastures with low tree canopy cover for foraging. Kestrels usually nest in tall dead tree cavities, typically abandoned woodpecker holes, with an unobstructed view of surroundings. They forage in improved pastures, mixed rangeland, open pine woods, and forested upland and wetland areas. Kestrel foraging habitat occurs throughout the improved pasture areas offsite in the northern parcel and TECO easement. There are no impacts to the improved pasture areas offsite; therefore, no impacts to this species are anticipated.

Wading bird species targeted include: woodstork (*Mycteria americana*), limpkin (*Aramus guarana*), little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), tricolored heron (*Egretta tricolor*), roseate spoonbill (*Ajaia ajaja*), and white ibis (*Eudocimus albus*). Wading bird observations were conducted onsite around the retention ponds and adjacent conveyance ditches during the morning hours of the wildlife survey. Wetlands and ponds were visually surveyed from the perimeters and observations were made in the pond interiors. The FNAI maps (Appendix 12-1) were consulted to identify the documented presence of wading bird rookeries in the vicinity and none were noted.

The attraction of listed wading birds to the site is the retention ponds and the food supply available. During the October 2004 site visit, three listed wading birds were observed: wood stork, white ibis, and little blue heron. Because no impacts to any of the ponds or wetlands are proposed, the likelihood for impact to these species from the project is low. In addition, there are large freshwater marshes just north of the Facility. The wetlands offsite will be isolated from direct effects of the expansion due to the large buffer existing between the project and the nearest adjacent wetland (>300 feet). In addition, any dewatering activity will be contained within onsite ponds and ditches long enough to avoid any secondary impacts.

Adjacent habitat for these wading birds is offered north and west of the site in numerous wetlands with equal or greater habitat value and functions.

American alligators (*Alligator mississippiensis*) utilize a wide variety of water bodies and wetlands, potentially including the scrub-shrub wetland on the Facility site. Signs of their nesting were investigated. No alligators or possible nest sites were noted during the October 1, 2004 site visit. Because no impacts to this wetland area are proposed, impacts to this species are not expected.

Gopher tortoises (*Gopherus polyphemus*) occupy a wide variety of upland sites. No burrows were observed on the Facility site; therefore, no impacts are anticipated to this species. A number of commensal species are associated with gopher tortoises, including gopher frogs (*Rana capito*), short-tailed snake (*Stilosoma extenuatum*), Florida pine snake (*Pituophis melanoleucus mugitus*), the Florida mouse (*Peromyscus floridanus*), and the eastern indigo snake (*Drymarchon corais couperi*). None of these commensal species were observed during the wildlife survey. The likelihood of occurrence of these species within the proposed project area is anticipated to be low due to lack of undisturbed habitat on the Facility site.

Sherman's fox squirrel (*Sciurus niger shermani*) occupies a wide variety of habitats including sand hills (high pine), pine flatwoods, pastures, and other open, ruderal habitats with scattered pines and oaks. Longleaf pine cones and seeds are an important food source. Nesting occurs in pine trees and feeding in open areas such as the improved pasture. No fox squirrels were observed during the wildlife survey. Longleaf pines were observed west of the TECO easement and project site, although no nests were noted during the survey. The likelihood of impacts to this species is considered to be low due to the project not impacting the adjacent parcel.

The Florida scrub jay (*Aphelocoma coerulescens*) occupies xeric oak scrub, sand hills, pine scrub and scrub oak habitat. There is no scrub jay habitat within the site, therefore the potential for the occurrence of this species is low. The likelihood of impact to this species is therefore considered to be low.

Black Bear (*Ursus americanus*) occupies woods, swamps and frequents solid waste dumps. Habitat does not exist for the black bear on this site. Signs of the black bear are torn apart stumps, turned over boulders, hair on shaggy barked rubbing trees, none of which were observed during the wildlife survey. Potential impacts to this species are not anticipated.

Species-environmental relationships

There are no species present within the boundary of the Facility site, which are endemic or unique to this site. The species and habitats are common to Hillsborough County and southwest Florida. As initially discussed, the project site has been heavily impacted by drainage, clearing, and maintenance. As such, it offers little or no areas of prime habitat for wildlife. It is not anticipated that the

proposed project will have any effects on area ecology. The site has also been invaded by exotic tree species, reducing vegetative diversity and offering few areas for foraging and cover. Existing fauna should not be displaced by the proposed expansion; however, if fauna onsite is forced to move, adjacent habitat to the north will provide wildlife habitat equal to or greater than that existing onsite. The location of the Facility expansion is adjacent to the existing Facility and will have no impact on any species habitat.

2.3.5.1 Pre-Existing Stresses

As reported in the original application, pre-existing environmental stresses within the Facility boundary are evident. Prior to Facility construction, the site had been impacted by cattle grazing. This activity stressed vegetation and natural communities within the site and adjacent area. Prior to cattle grazing, logging of the site occurred. This activity most likely removed the mature oak-pine canopy and made the surrounding habitat unsuitable for many species of wildlife. More recently, an infestation of exotic plants, namely Brazilian pepper, has made the area unusable by a majority of wildlife species. Drainage of the site has been improved by the construction of the original Facility and offsite wetlands remain in approximately the same size and location.

2.3.5.2 Measurement Programs

In 1983 and 2004, all upland and wetland vegetation community types were delineated on 1:200 (1"= 200') Hillsborough County aerials and ground-truthed by a biologist familiar with Florida flora and fauna to ensure accuracy. Community types were classified based upon the Level III and IV Classifications of the Florida Land Use and Cover Classification System (FLUCFCS). This class of data was obtained from medium and low altitude aerial photography supplemented by ground level confirmation of observed data. Global Information Systems Software (GIS) was used to delineate land use on the Facility site and surrounding areas as shown on Figure 2-24.

2.3.6 Noise

A complete technical analysis of baseline ambient noise conditions was completed for this application and is contained in its entirety in **Appendix 11-1**. This study includes detailed methodologies, which were utilized in order to estimate operational impacts associated with the Facility.

Raw data results of monitoring completed using a hand-held sound pressure level meter are presented in **Appendix 11-1**. These measurements were made at predetermined locations as is explained below.

Existing ambient sound levels were measured on September 17, 2004 and October 1, 2004, at seven different locations in the site vicinity in order to establish baseline conditions during day and night-time periods. These baseline condition monitoring sites are represented in **Figure 2-25** as numbered circles. Site 1 was selected to collect existing ambient noise levels at the boundary of that portion of the site where development would occur (between the existing Facility and the nearest sensitive receptors).

Site 2 was selected because it is the closest residence to the proposed expansion area and access road whilst still remaining on site property. Site 3 was selected because it is in the direct vicinity of the closest main residential area to the site and Falkenburg Road. Monitoring Site 4 was selected because it is the closest commercial manufacturing facility to the PI (Point of Intersection) of the access road and Falkenburg Road. Sites 5 through 7 were selected to determine the impact, if any, on the southern bordering distribution (warehousing/light industrial) facilities located just south of the existing railway.

The noise levels recorded at each of the seven sites are presented in **Tables 3-1- 3-4 of Appendix 11-1**. These levels are in decibels using the A-weighting network, and are designated dBA. The higher the decibel level, the louder the sound. A change of ten times the energy level of the sound is represented as a 10-dBA change in the sound level scale.

The Hillsborough County Environmental Protection Commission has criteria for ambient noise levels based on the receiving land use and time of day. Residential, public space and open space areas are assigned the most stringent sound level limits followed by commercial or business areas and manufacturing or industrial areas. Monitoring Sites 1, 2, 4, 5, 6, and 7 are all within manufacturing/industrial areas; therefore, the sound level limits at these sites are higher than at the other site. Monitoring Site 3 falls under the residential, public space, and public right-of-way category for sound level limits. Limits for this category, as shown in **Table 2-18**, are lower than the limits for manufacturing/industrial areas. A comparison of the measured sound levels with the County sound level limits shows that limits are currently exceeded at monitoring Site 3.



Hillsborough County Energy
Recovery Project



Figure 2.25
Noise Monitoring
Locations

Aerial Taken (11/2003)

Table 2-18 Noise Baseline Data Summary September 17, 2004 – October 1, 2004			
Site	Time	L_{eq} (dBA)	Hillsborough County Noise Criteria Sound Level Limit (dBA)^b
1 (B&A) ^c	8:00am	64.1	75
	6:00pm	63.3	75
	10:00pm	50.7	75
2 (B&A) ^d	8:00am	68.7	75
	6:00pm	66.7	75
	10:00pm	61.0	75
3 (B&A) ^c	8:00am	74.8 ^a	60
	6:00pm	75.0 ^a	60
	10:00pm	65.1 ^a	55
4 (B&A) ^c	8:00am	73.6	75
	6:00pm	73.2	75
	10:00pm	67.1	75
5 (B&A) ^c	8:00am	64.8	75
	6:00pm	64.5	75
	10:00pm	52.8	75
6 (B&A) ^c	8:00am	58.2	75
	6:00pm	60.7	75
	10:00pm	50.6	75
7 (B&A) ^c	8:00am	52.1	75
	6:00pm	50.6	75
	10:00pm	45.4	75

Source: Burcaw & Associates Incorporated, Public Sector Department

a - Level currently exceeds limits as set by Hillsborough County Environmental Protection Commission

b - Hillsborough County Environmental Protection Commission (<http://www.epchc.org/Noise.htm>)

c - Recorded on September 17, 2004

d - Recorded on October 1, 2004

Section 4

Effects of Site Preparation and Plant and Associated Facilities Construction

This overview of anticipated construction activities associated with the expansion of the Facility is provided as a preface to the discussion of the effects of site preparation and construction. The duration of field construction for the expansion of the Facility will be approximately 21 months. The entire design, construction, and start-up period will extend for approximately 28 months from notice to proceed to full plant operation. The principal construction phases will include limited site preparation (site clearing and preparation,) expansion of the Facility (building and process equipment erection, electrical and mechanical systems installation, instrumentation), and finalization (painting, landscaping, and clean-up). Completion of final construction activities may extend into the start-up period.

4.1 Land Impact

4.1.1 General Construction Impacts

Impact on Solid Waste Generation and Disposal

During construction associated with the expansion of the Facility, a variety of spent materials and solid waste will be generated, including vegetative matter, wood, paper products, concrete, scrap metal and lumber, and miscellaneous oils and fluids required for equipment operation. These will be disposed and/or recycled periodically using a licensed hauler to transport the materials to properly permitted disposal/recycling facilities.

Minimal site clearing activities are anticipated because the expansion is occurring within the existing Facility footprint. However, any non-marketable wood debris generated by the removal of landscape plants will go to an FDEP approved site for processing or disposal or burned on-site.

It is anticipated that small quantities of used oil and spent solvents may be generated on-site during equipment maintenance and various construction activities. Used oil will be generated at a rate of about one drum (55-gallon barrel) every two to three months. Typically, fewer spent solvents would be generated than used oil, except during certain phases of equipment installation. Drums of used soils and spent solvents will be stored on pallets within a protected area.

The drums will be properly labeled and covered with a weatherproof canvas or plastic drop cloth. Neither used oil nor spent solvents will be stored on-site for more than 90 days. Transport and disposal will be handled by properly licensed contractors.

It is estimated that approximately 60 tons of solid waste will be generated during construction associated with the Facility's expansion. Whenever practical, recyclable materials will be recovered from this waste stream.

Staging, Material, Lay down, and Workforce Parking Areas

The staging, materials lay down, storage, and workforce parking areas will be assigned to locations where construction activities are minimal. Staging will be assigned to an area adjacent to the main Facility, which will keep staged work as close to the actual construction area as possible. General workforce parking and a construction office will be located near the material laydown area. These areas will be prepared to minimize dust and potential run-off (e.g., silt screens, hay bales, gravel or mulch parking, etc.). Stormwater run-off will be directed to existing stormwater system. An erosion control plan will be required during construction.

Land Disturbance

Minimal disturbance to existing terrain is anticipated because the Facility expansion is occurring within the existing footprint of the site and adjacent to existing structures.

4.1.2 Roads

The project site is accessed from Falkenburg Road. Other than the main Facility access road, there are no other paved roads on-site and none will be built for this project.

4.1.3 Flood Zones

The Facility site is not located within the 100-year flood plain designated on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps. Consequently, this section does not apply to this project.

4.1.4 Topography and Soils

The existing site topography will be minimally altered by the proposed Facility expansion. As construction progresses, a portion of the site area will be covered with impervious surfaces such as foundations and buildings. The estimated amount of additional impervious surface area is 0.32 acres.

The creation of new impervious surfaces will not change the site drainage features and percolation rates therefore no new storm water management facilities are needed for the expansion project.

The following measures will be suggested to the contractor to control soil erosion and air pollutants during construction:

- On-site traffic will be limited to the main access road and/or feeder roads as much as possible;
- Designated lay-down area and construction worker parking areas.

The existing site buffer zone will be maintained along the site border to minimize visual impacts during construction.

4.2 Impact on Surface Water Bodies and Uses

4.2.1 Impact Assessment

No impact to surface water bodies and uses is anticipated due to Facility expansion construction activities. There are no proposed intake or discharge structures for cooling water or other process waters; therefore, an NPDES discharge permit is not required related to the Facility expansion. The proposed expansion will create additional impervious surface area of 0.32 acres is found to have no impact on the existing retention/detention basins as discussed in **Section 3.8**.

4.2.2 Measuring and Monitoring Programs

Stormwater runoff from the construction areas will be directly discharged to onsite stormwater system. Furthermore, since the Facility is fully enclosed and roofed, storm water will not come into contact with solid waste and no significant impacts to the quality of surface waters in the vicinity are expected (e.g., no turbidity impact).

Stormwater runoff from the developed site will be directed to one of several on site retention basins. In accordance with SFWMD requirements, dry pretreatment will also be provided. This allows for siltation and filtration of storm water before it reaches the retention and/or detention basin(s). Since the majority of storm events in the Hillsborough County area are less than one inch in total rainfall, appreciable discharge from the site will occur infrequently.

4.3 Groundwater Impacts

4.3.1 Impact Assessment

The saturated thickness of the surficial aquifer below the site varies depending upon seasonal precipitation patterns and varying depths to the confining layer. During the wet season, the water table of the surficial aquifer is within one to five feet below ground surface. In the dry season, the water table of the surficial aquifer declines to depths of about three to seven feet below ground surface.

Minimal groundwater impacts are anticipated as a result of the Facility expansion. The Facility was originally designed on a large enough footprint to accommodate another unit without extending the existing foundation. Therefore, no dewatering activities will be required.

4.4 Ecological Impacts

4.4.1 Impact Assessment

Impacts to fish and wildlife populations caused by construction of the proposed expansion of the Facility are expected to be minimal. The Facility fenced area occupies approximately 17.3 acres of the 50.4-acre parcel. The Facility expansion will

be located within the main building itself, which was previously developed during the original Facility's construction. The open areas within the fenced area are composed of Bahia grass, gravel and paved lots, and stormwater retention and detention ponds. The existing habitats on-site are not unique or sensitive. The expansion will not impact any sensitive habitats outside the fenced area. In addition, with the possible exception of the American alligator, listed species do not currently inhabit the area within the fenced area of the site.

The Facility expansion and continued operation will result in the majority of the site remaining in its existing state. Only 0.32 acres of the site will be transformed from open area to a building or for other activities. Because of this fact, there are a limited number of factors to consider when assessing the significance of potential effect. One factor is that the site was originally disturbed for agricultural purposes and has been vegetationally and hydrologically altered by logging, drainage, and construction activities over the course of 20 years. Another factor is that there is little ecological diversity on the project site. There appears to be no plant species of unique interest on-site. The proposed expansion area is an area within the existing footprint of the Facility with little or no ecological value. The displacement of any fauna by the proposed project would be mitigated for by the availability of similar and adequate habitats adjacent to north of the expansion area where the fauna can migrate and reestablish. This area should provide an equal or greater amount of vegetative diversity and productive habitat than what currently exists in the expansion area.

The overall effect on the local ecosystem (both on and off-site) from construction activities will be minor. The existing habitats on-site will not be altered by Facility expansion. The present diversity of habitats onsite will not be impacted by the Facility expansion. There are no proposed impacts to wetlands.

4.5 Impact on Human Populations

The expansion of the Resource Recovery Facility will create both positive and negative impacts on the local and regional populations. Positive impacts will include the creation of construction jobs, the secondary influx of monies into the local economy from the construction workforce, and revenues from the purchase of construction equipment and supplies for the Facility expansion project. Negative impacts are anticipated to be minimal but could include possible short-term visual and noise impacts and traffic increases due to construction worker arrivals and departures and deliveries of equipment and supplies.

4.5.1 Sensitive Receptors

Sensitive receptors are individuals, institutions, or enterprises that are located in proximity to the project site that are affected by the construction. A summary of the demography and existing land use within a five-mile radius of the project site is presented in **Section 2.2**. Based on the demographic and land use section of this application, the predominant land uses on the Facility site's periphery include a

TECO power transmission line and associated easement, a CSX railroad corridor, and county property which is utilized by functions including an animal shelter, and a county jail.

A fairly comprehensive review of the land use and demographic features of the area surrounding the site is presented in **Section 2.2**. As indicated earlier, major land uses adjacent to the site include farm land and various mixed industrial activities. These land uses are not considered sensitive receptors for the purposes of this analysis.

The closest sensitive receptors to the project site are the light commercial and light industrial sites located on Falkenburg road. These properties and sites have existed on Falkenburg Road in the vicinity of the Resource Recovery Facility for 20 years and are not likely to be impacted by the expansion project.

On Falkenburg Road, other than the county facilities and light industrial sites, there are mixed commercial properties, office parks, and various mixed business sites. Fire stations are located both to the north and to the south of the Facility. Hillsborough Community College (HCC) has a Brandon campus located approximately a mile north off of Falkenburg. None of these properties should be adversely impacted by the expansion of this Facility.

Other sensitive receptors include commercial developments on roadways in the area including Broadway Ave and Woodberry Ave. These areas also include mostly commercial and industrial sites that are unlikely to be impacted.

The nearest established neighborhood, Woodberry Estates, is located off of Woodberry Road, east of Interstate 75, about 2,600 feet east of the site boundary. This neighborhood is located approximately 4,200 feet from the proposed facility and about 4,650 feet from the proposed stack location. There are no other schools, hospitals, churches or other potentially sensitive activities in the vicinity of the site. Interstate 75 is a significant buffer between the site and this neighborhood.

No effects on sensitive receptors are anticipated due to the Facility expansion. The distance from the Facility site to the nearest residential neighborhoods, and the presence of the existing industrial and commercial properties with no obvious effects from the current Facility, support this determination.

4.5.2 Workforce

During construction associated with the expansion of the Facility, the daily workforce is expected to average between 25 to 75 people. The initial phase of construction will require a workforce of approximately 50 people, while peak phases will require approximately 125 persons. The workforce from the eight to the eighteenth month of the construction schedule should average from 75 to 125 people. Throughout the course of the project construction, a total of approximately 750 people of various

construction trades may be employed. **Figure 4-1** illustrates the estimated workforce requirements during Facility construction.

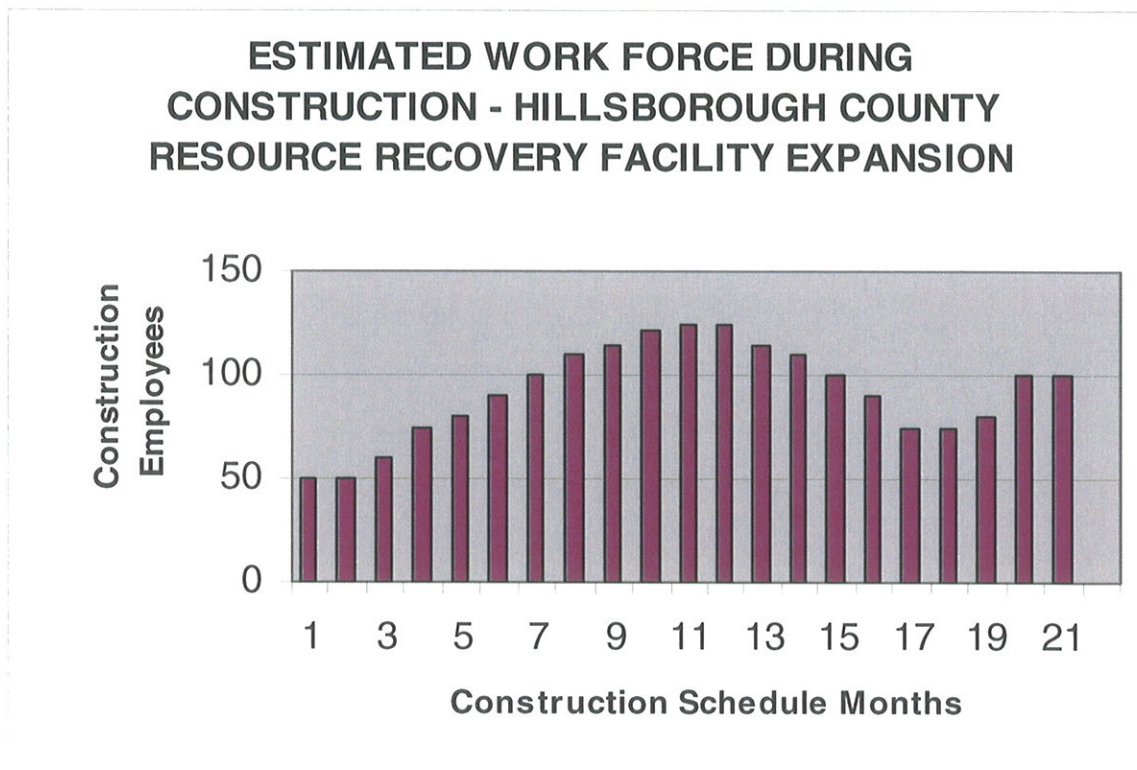


Figure 4.1
Estimated Workforce Requirements

Work Shift

The majority of activities required for the expansion of the Facility will take place on an eight hour per day shift, five days a week. Depending on construction progress and deadline constraints, alternative schedules, such as shifts of ten hours per day, four, five or six days per week and overtime, may be implemented. However, all remaining construction activities will be conducted on an eight hour per day, five day per week shift basis.

Construction Workforce Revenues

On a short-term basis, the Facility expansion construction will provide the benefits of a \$100 million construction project in the area. The construction phase will provide jobs for the construction labor and will create additional revenue for the local economy from the purchase of construction materials and services. Secondary benefits will include the secondary spending into the local Tampa Bay area economy from the construction labor force and related employment increases in these service sector jobs, and increased employment opportunities and sales revenues for businesses providing construction materials to the Facility project site.

Workforce Availability

Most of the workforce for this project will be provided by the available labor pool in the Tampa Bay regional area. No major relocation of construction workers and families is anticipated. Therefore, no impact on available housing, schools or other community support assets is expected.

4.5.3 Traffic Associated with Construction

An updated, complete traffic impact analysis, performed to assess the impacts associated with Facility operation at the existing capacity of 1200 TPD, as well as at the projected Facility capacity of 1800 TPD, showed no significant impacts on the surrounding roadway network. This traffic analysis is provided in Appendix 10.13 of this application.

Construction associated with the expansion of the Hillsborough County Resource Recovery Facility will impact the level of traffic at the site entrance/exit located on Falkenburg Road and to the surrounding roadway network. This traffic impact is associated with the number of vehicles which will enter and exit the Facility site per day over the duration of construction. The four general categories of traffic which will enter and exit the site include vehicles associated with the general workforce, delivery of construction equipment, hauling of demolition material and delivery of heavy materials (concrete and steel), and delivery of major equipment for installation. The traffic anticipated over the duration of construction is indicated in Figure 4-2.

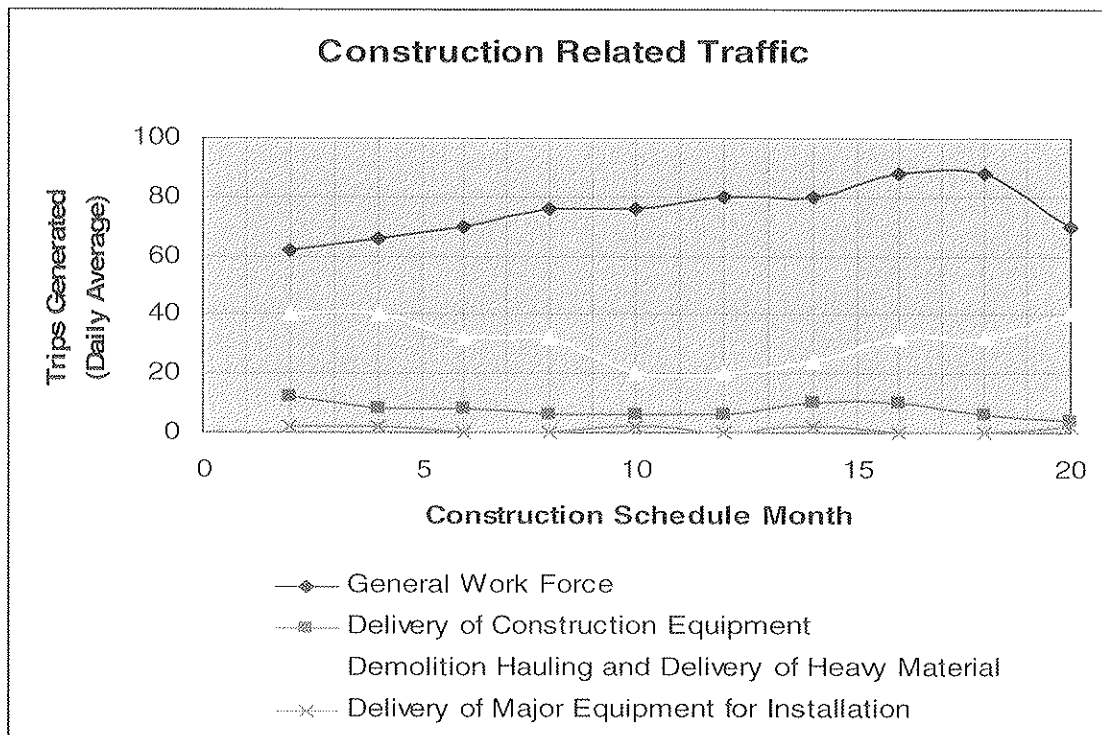


Figure 4-2
Construction Related Traffic

Traffic associated with the general workforce is expected to have the greatest impact on the Falkenburg Road site entrance. This daily traffic volume, consisting mainly of passenger vehicles, will closely follow the workforce requirements for the construction of the plant. The estimated number of vehicles expected to enter and exit the site under this general category was determined by assuming that seventy percent of the workforce will drive to the site and the remaining thirty percent will be passengers. These vehicles will typically enter the site at the start of the work day and exit following completion of the day's construction activity. Minimal construction worker traffic is anticipated during the hours of construction activity. A limited amount of traffic will be generated as a result of the construction activity which is not directly related to commuting workforce. This may include sub-contractor and inspector visits to the project site. This traffic is anticipated to be minimal and is included in this category.

The traffic resulting from the delivery of necessary construction equipment to the site is anticipated to have minimal impact over the duration of construction. The majority of this equipment will be brought to the site during the initial phase of construction. Once this equipment is transported to the site it will remain on-site until construction activities associated with the equipment are completed. The traffic associated with the delivery and removal of construction equipment from the site is indicated as point impacts in **Figure 4-2** due to the short duration of traffic (assuming one day for a piece of equipment to be delivered or removed from site).

Delivery of heavy construction materials including structural steel and concrete products along with the removal of demolition materials from the site will result in the greatest increase in truck traffic during project construction. The major items included under this category are the delivery of concrete, structural steel, pavement and other heavy materials. The traffic impact resulting from the hauling of demolition material and delivery of concrete and structural steel will be concurrent with phases of the construction schedule. These two activities, demolition and heavy material delivery, are expected to result in the highest level of traffic entering and exiting the site, with the exception of workforce traffic.

Truck traffic associated with construction activities will typically occur between the hours of 8 AM and 5 PM. Minor peaks in truck traffic volume from construction activities can be expected to occur for about an hour during mid-morning and for another hour starting shortly after lunch. At other periods during the day, truck traffic should be generated at a fairly uniform rate.

As indicated, truck traffic will reach its peak when demolition hauling and heavy materials delivery activities coincide. When this occurs, the average truck traffic volume should be about three to four truck trips per hour with daily peaks of about five to ten trips per hour. This increase represents only five percent or less of existing hourly traffic volumes on Falkenburg Road.

The level of traffic anticipated as a result of hauling major equipment for installation is not expected to be of great impact. This equipment will be delivered prior to, as well as during, the scheduled time for installation to insure that it is on-site and ready for installation. The estimated level of traffic associated with transporting this equipment to the site over the duration of construction is indicated in **Figure 4-2**.

Of the four general categories of construction traffic, commuting workers have the greatest potential for creating adverse effects. The daily volume from this source is the greatest of all categories considered. Additionally, the schedule of arriving and departing construction workers somewhat coincides with existing peak traffic periods on local roadways.

The maximum number of construction workers expected will be about 125 at any one day. As indicated, with an allowance for car pooling, absenteeism, and other modes of transport it is expected that vehicles of commuting employees will represent a number equal to 70 percent of the workforce. Therefore, it is expected that during maximum construction periods 88 vehicles will be added to local roadways from commuting construction workers in both the morning and afternoon peak traffic periods. This will reduce the available capacity of the roadway but will not result in any unacceptable roadway capacity problems.

4.6 Impact on Landmarks and Sensitive Areas

There are no landmarks or sensitive areas within the site limits or within the immediate vicinity of the site, therefore no impacts on landmarks and sensitive areas are anticipated.

4.7 Impact on Archaeological and Historic Sites

During the original permitting of the Facility, Ray Williams from the University of South Florida conducted an investigation of archeological and historical remains within the 50 acre tract. This archeological and historical survey was conducted for the Department of Solid Waste, Hillsborough County, Florida. A cultural resource assessment was performed, beginning with a literature review. The Florida Master Site File (FMSF) listed no historic or prehistoric sites known to be present within the tract boundaries. There was also a literature review which included examination of historical and archeological literature and historic records.

Field visits and testing culminated in the excavation of 34 sub-surface test pits to determine if any sites of historical or archeological significance could be located. Testing was done since surveys in nearby, similar areas indicate that there may be sites present even though there is no surface indication of them. Test results found no material of archeological significance. An historic assessment indicated that no significant historic sites have existed on the property. Furthermore, no significant historic events have occurred on the property.

The results of this archeological and historical survey indicated that the project will have no impact on any cultural resources, prehistoric or historic. A current consultation with Staff Archaeologist Lisa N. Lamb of PanAmerican Consulting, Inc. of Tampa, Florida indicated that it is highly unlikely that any evidence has changed within the bounds of the property tract since the original survey was conducted and that no new study or revision was justified.

The archeological and historical survey conducted in 1983 for the original permitting of the Hillsborough County Resource Recovery Facility is located in **Appendix 8.3**.

4.8 Special Features

This section describes and discusses all special features associated with site preparation and plant and associated facilities construction that may have an influence on the environment and ecological systems of the plant site and adjacent areas as a result of the Facility expansion.

During construction associated with the expansion of the Facility, solid and liquid waste may be generated. The waste may consist of discarded packaging material, refuse produced by construction workers, earth spoils, sanitary waste, or used oils and other waste associated with this type of construction activity. Earth spoils will be transferred to a Class III landfill or other suitable area. Sanitary waste and used oils will be handled by the appropriate licensed haulers/disposers. Proper handling and disposal of these wastes onsite is essential to maintaining the aesthetic and ecological integrity of the site and surrounding areas.

4.9 Summary of Impacts and Benefits from Construction

Benefits from construction associated with the expansion of the Facility include:

- The employment of construction laborers throughout the course of construction, during which a total of approximately 750 workers will be employed.
- The sale of goods and services relating to the construction operations this should include increased employment for construction product companies providing goods and services to the construction site.
- Additional income to the area generated by the construction workforce, including retail and service oriented businesses, which will benefit from increased sales to the construction laborers.

Impacts from construction of the expansion Facility include:

- A temporary increase in solid waste generated due to construction activities.
- Localized, short-term air quality impacts from fugitive dust and fuel combustion emissions.

- Short-term visual and noise impacts (e.g., machinery and pile driving) and increased traffic during construction.
- The minimal disturbance of existing land and terrain.
- The minimal alteration of site topography.

4.10 Variances

No variances from standards or guidelines are anticipated.

Section 5

Effects of Plant Operation

This chapter describes (1) the operational interaction of the plant and associated facilities with the environment, and (2) Hillsborough County's plans and programs for monitoring the environmental impacts resulting from plant operation. In the discussion of environmental effects, effects that are considered unavoidable but are temporary or are subject to later amelioration are clearly distinguished from those which are determined to be irreversible or unavoidable. In addition, mitigation efforts are described which serve to reduce or eliminate the associated environmental impacts.

To the extent practicable, the impacts of operation of the Facility are quantified, and the source of each impact is described. In addition, impacts due to failure of control devices are estimated, where appropriate. Finally, this application discusses the relationship between local "short-term" and "long-term" effects.

5.1 Effects of the Operation on the Heat Dissipation System

As described in **Section 3.5.1**, a two-cell cooling tower is presently in operation. An additional cooling tower cell is proposed with this permit application. There will be no thermal discharges and therefore **Section 316** demonstrations are not applicable.

5.1.1 Temperature Effects on Receiving Body of Water

This section is not applicable to the project because the Facility does not discharge to any surface or ground water. Effluent discharged from the resource recovery facility is sent to the co-located Falkenburg Wastewater Treatment Plant which is designed to handle the quantity and quality of facility discharges.

5.1.2 Effects on Aquatic Life

This section is not applicable to the project, because effluent discharged from the Facility is sent to the co-located wastewater treatment plant.

5.1.3 Biological Effects of Modified Circulation

As described in original application, the Facility uses potable water from the existing water supply main in Falkenburg Road and uses effluent from the co-located WWTP for process water. Discharges from the Facility are sent back to the wastewater treatment plant. No water body will be directly affected by the operation of the Facility. Stormwater runoff is discussed in **Section 5.3.4**.

5.1.4 Effects of Offstream Cooling

It is estimated that the cooling tower on the expanded Facility will use 1.3 million gallons per day of treated effluent from the Wastewater Treatment Plant to "make up" for water lost to evaporation, drift, and discharged to the sanitary sewer. The WWTP

will provide secondary treatment of the influent wastewater followed by filtration and high-level disinfection. This level of treatment will continue to ensure the provision of a high quality effluent which is suitable for reuse in the Facility's cooling towers. Chlorination of the effluent stream will be provided in conformance with Chapter 62-610.460 of the Florida Administrative Code.

During the cooling process, approximately 0.015 percent of the make-up water is lost as droplets in the exhaust, called the cooling tower "drift". Therefore, approximately 4,300 gallons per day would be lost as drift. The drift will be of approximately the same quality as the treated wastewater used as make-up water. Once the droplets of water comprising the drift are vented from the tower, they are carried away from the Facility. The distance traveled is dependent on the size of the droplets formed. Aerosol particles or droplets larger than 600 microns in diameter (approximately 70 percent of the drift mass) would be expected to settle within 400 feet of the cooling towers. Smaller particles would be carried further (Furlong, 1974).

The nearest major residential area located is over 4,600 feet away from the Facility cooling towers. Almost all particles or droplets will have settled out, or will have been diluted. Additionally, prevailing winds are from the east, so that the drift will be moved predominantly to the west of the site.

The reuse water used in the cooling towers will comply with the requirements for reuse water used in public access areas. It complies with the FDEP requirements for effluent used in cooling towers with no setbacks or buffer areas.

5.1.5 Measurement Program

The existing reclaimed water supply system from the WWTP includes online water quality monitoring at the compliance monitoring point. The operating protocol ensures high level disinfection as is in compliance with Rule 62-610-463, F.A.C.

5.2 Effects of Chemical and Biocide Discharges

5.2.1 Industrial Wastewater Discharges

There are no offsite industrial discharges to surface waters from the operation of the Facility. Effluent from the Facility goes directly to the co-located Falkenburg Wastewater Treatment Plant. All applicable State and Federal discharge regulations and water quality standards for industrial wastewater including chemical and biocidal wastes, and oil and grease will be achieved. The Falkenburg WWTP will be designed for Class I reliability to safeguard against plant upsets.

5.2.1.1 Impact of Blowdown and Waste Discharges on the WWTP

Effluent discharge from the Facility consists primarily of two streams, sanitary wastes generated by the Facility's employees and blowdown. Blowdown is the wastewater collected from boilers and cooling towers.

The quantity of blowdown discharged from the Facility is minimal since blowdown is reused in the ash dischargers for residue quenching. The quality of cooling tower and boiler blowdown are dependent upon both the influent water quality and the maximum contaminant concentration tolerable in the recirculating loops. In general, the concentration of solids leaving the cooling tower and boiler loops as blowdown water is magnified due to evaporation. Wastewater discharges from the Facility to the WWTP must meet the maximum concentration and other restrictions shown on Table 5.1.

Table 5-1 Facility Wastewater Discharge Limits		
Material Characteristic	Maximum Allowable Limits	
Arsenic as As	0.25	ppm
Cadmium as Cd	0.09	ppm
Chromium (total)	4.2	ppm
Copper as Cu	1.4	ppm
Lead as Pb	0.18	ppm
Mercury as Hg	0.002	ppm
Nickel as Ni	2.2	ppm
Selenium as Se	0.16	p pm
Silver as Ag	1.5	ppm
Zinc as Zn	3.2	ppm
pH	6.0 – 8.5	su

Because the WWTP is designed to treat wastewater generated by a variety of potential sources including industries, landfill leachate, sewage, and grease wastes, the resource recovery discharges do not adversely impact the operation or effectiveness of the plant. In addition, because the quantity of effluent discharged from the Facility represents a very small portion of the total wastewater flow treated at the WWTP (less than one percent), the concentration of dissolved solids in the effluent are diluted prior to treatment.

5.2.1.2 Impact of WWTP Effluent on Facility and Other Reuse

The concentration of dissolved solids in the WWTP effluent are acceptable for all

types of effluent disposal with the exception of boiler makeup at the resource recovery facility and possibly some industrial reuse applications. In order to prevent scale build-up and metal corrosion, dissolved minerals and suspended material are removed from the boiler make-up water using a treatment process. This treatment will take place at the resource recovery facility.

5.2.2 Cooling Tower Blowdown

The Falkenburg WWTP is currently permitted and operational. The ultimate capacity of the Falkenburg WWTP is 9 million gallons per day (MGD). Disposal of treated wastewater effluent at the resource recovery facility will not be the sole means of effluent disposal. Alternative methods of effluent disposal will include industrial and residential reuse.

5.2.3 Measurement Program

The Facility discharges to the WWTP are monitored for temperature and pH. As noted previously, the maximum concentrations and restrictions for the discharge were shown on Table 5.1.

5.3 Impacts on Water Supplies

5.3.1 Surface Water

There are no direct impacts to surface water associated with the operation of the Facility because the Facility does not directly discharge to a surface water body. The Facility obtains its process water from treated wastewater onsite. Cooling tower blowdown and other plant industrial and sanitary wastewater discharges to the existing Falkenburg Wastewater Treatment Plant. Therefore, there are no long-term impacts to surface water associated with the operation of the Facility nor there any impacts anticipated with the expansion of the Facility.

5.3.2 Groundwater

There are no significant impacts to groundwater quality or quantity associated with the normal operation of the existing and proposed facility structures or site operations. For the Facility expansion, there are no anticipated impacts to groundwater quantity or quality associated with the site operations.

The concrete refuse storage pit is sealed to prevent leachate from escaping to the surrounding soil and groundwater, and to prevent groundwater from seeping into the bunker. The refuse storage pit is pitched to allow collection and removal of any liquids which may accumulate on the bottom. The refuse pit is constructed so that the pit is surrounded/immersed in groundwater. Leakage of groundwater into the pit would occur only in the unlikely event of a crack or failure in the pit's concrete floor, through the water-tight, impermeable seal. For these reasons, the potential for impacts on ground and surface water quality, and on terrestrial and aquatic environments is insignificant.

As discussed in the original application, any release of chemical contaminants from the Facility to the groundwater at the site is not expected to result in any significant impact to groundwater quality of the more sensitive groundwater resources of the Floridan aquifer. To date, there have been no groundwater discharges at the Facility.

The direction of regional groundwater flow in the Floridan aquifer is generally toward the southwest. However, the direction of flow within the surficial aquifer is more variable and dependent upon topography, drainage, elevation of the water table, and the influence of groundwater pumping within the vicinity. Accordingly, the direction of surficial groundwater flow is expected to be generally toward the southwest corner of the site.

1. The bottom of the refuse pit will lie within the surficial materials (sand, clayey sand), and any release of chemical contamination would be confined to these surficial materials and would not affect the Floridan aquifer.
2. The Floridan aquifer and the surficial aquifer are separated by a clay confining unit of relatively low permeability which generally has a thickness of about 10 feet across the site. All indications are that this unit is continuous and possibly thicker in the vicinity of the site (see **Section 2.3.1.2** for discussion and mapping). This would provide an effective barrier between the surficial material and the Floridan aquifer.
3. The potentiometric surface of the Floridan aquifer lies generally within this confining unit, which means that a contaminated plume would be prevented from downward vertical migration into the Floridan aquifer by the upward vertical component of hydrostatic head exerted by the confined Floridan aquifer. Once a contaminant plume has descended to an equilibrium level above or within the confining unit, further plume movement would generally be restricted to lateral migration with little or no vertical mixing within the lithologic matrix.

5.3.3 Drinking Water

The closest private wells in the vicinity of the site have been located and are not expected to be affected in terms of quality or flow, either during construction or during the operational life of the proposed expansion. An existing water main in Falkenburg Road will supply potable water to the site. Complete well inventories for the surrounding areas have been provided by SWFWMD and are contained in **Appendix 9.3**.

5.3.4 Leachate and Runoff

Stormwater runoff from vegetated areas, paved surfaces, and rooftops is collected in the stormwater retention/detention basins. These areas are delineated on **Figure 3.3**. All refuse or residue storage areas will be enclosed so that no runoff will occur from these surfaces. Ground and surface water quality is thereby protected from materials that would have been carried away by runoff from storage areas.

5.3.5 Measurement Program

The retention pond in the southwest corner of the site is periodically checked by the County for turbidity, conductivity and oil and grease.

5.4 Solid/ Hazardous Waste Disposal Impacts

5.4.1 Solid Waste

This section discusses impacts created by the disposal of solid wastes on the site not already covered in Section 5.2 or 5.3. This section also discusses the potential benefits to be gained from the reuse of solid wastes for power generation. The section concludes with a description of the impacts on directly affected offsite landfill operations.

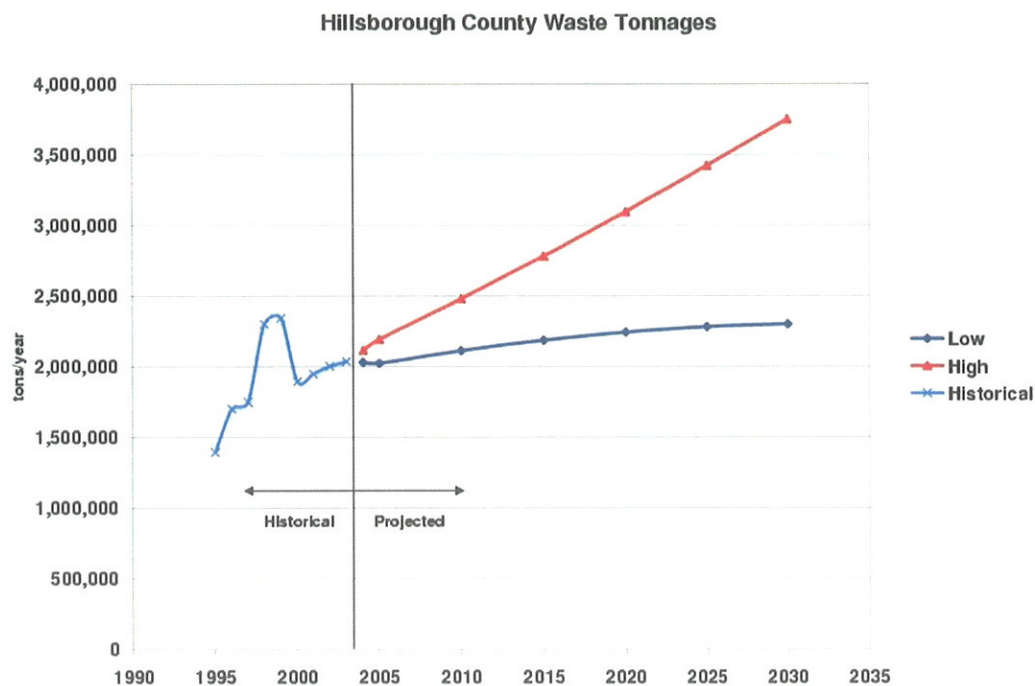


Figure 5-1
Projected Waste Tonnages

The Facility has a net beneficial impact on solid waste disposal in Hillsborough County. The estimated processible solid waste quantities expected to be delivered annually to the resource recovery facility through the year 2010 are shown in Figure 5-1.

5.4.2 Hazardous Waste

This section, as described, is not applicable to the proposed Facility expansion, because there will be no handling or disposal of hazardous wastes at this Facility.

The Facility will accept only municipal solid waste which includes residential,

commercial, and non-hazardous industrial (e.g., office and package wastes) wastes. Public and private users of the Facility are informed of these limitations. Signs are posted at the weigh-in station providing information on wastes accepted at the Facility. Routine visual inspections by personnel at the weigh-in station monitor the types of wastes received upon arrival at the Facility gates and random inspections of waste loads per 62-701, F.A.C. are conducted by the County's tipping floor attendant. The crane operators visually inspect waste in the pit while mixing MSW and feeding the combustion units. This would allow the detection of large potentially hazardous materials such as drums or gas cylinders to prevent charging into the furnace.

County employed spotters are stationed on the tipping floor of the Facility and its associated transfer stations. If hazardous waste is discovered in any load delivered to these facilities, it will be reloaded onto the vehicle that delivered it if possible. If the delivery vehicle has already left the Facility, any hazardous waste will be removed from the waste stream and kept in an isolated area until it can be disposed of properly.

5.4.3 Ash Testing

Chemical and toxicity testing of the combined ash residue (including both combustion residue and air pollution control devices) was conducted during acceptance testing. Further, quarterly total metals testing is conducted in accordance with 62-702 F.A.C.

Based on the USEPA and FDEP regulatory limits, the ash residue has always been non-hazardous. Therefore, the ash is suitable for disposal in a Class I Sanitary Landfill. The expansion project will not change the characteristics of the ash generated.

Solid waste generated by plant operations (employee refuse, packing material, etc.) is collected from receptacles located throughout the Facility and deposited into the main solid waste stream for processing. Materials not suitable for incorporation into the solid waste stream are separated for off-site disposal to an appropriate facility. All sanitary wastewaters will be collected and discharged to the headworks of the co-located wastewater treatment plant. Therefore, no impacts associated with sanitary and other waste discharges are anticipated during plant operations.

5.5 Sanitary and Other Waste Discharges

There will be no changes to sanitary waste discharges.

5.6 Air Quality Impacts

5.6.1 Impact Assessment

Air Quality impact analyses are provided in Volume III of the application.

5.6.2 Monitoring Program

A continuous emission monitoring program will be operated for opacity, oxygen,

sulfur dioxide, carbon monoxide and nitrogen oxide concentrations. The equipment will be installed, calibrated and maintained in accordance with applicable USEPA and FDEP regulations. Periodic compliance testing will also be conducted for pollutants with emission limiting standards in accordance with applicable USEPA and FDEP regulations.

5.7 Noise

A complete analysis of baseline ambient noise is presented in **Section 2.3.6**. The proposed Facility expansion is not expected to cause any perceptible increase in the noise levels that currently exist in the areas near the Facility. Noise impacts are further discussed in **Appendix 11.1**.

5.8 Changes in Non-Aquatic Species Populations

5.8.1 Impacts

The proposed expansion will occur within the existing Facility boundaries. It is anticipated that the Facility expansion will have no impacts on existing species populations, diversity, relative abundance, species composition, distribution, dominance, or gradient distribution of important non-aquatic species.

5.8.2 Monitoring

No significant impacts to non-aquatic species populations are expected. Therefore, long-term monitoring programs are not proposed.

5.9 Other Plant Operation Effects

Transportation impacts of the proposed Facility expansion and a complete traffic study is presented in **Appendix 11.2**. The expansion project is not expected to have any significant impacts on the surrounding roadways.

5.10 Archaeological Sites

For the original application, an archaeological and historical survey for the proposed site was completed in May 1983 (see **Appendix 8.3**). According to this report, the Florida Master Site File listed no historic or prehistoric resources known to be present within the tract boundaries. An historic assessment indicated that no significant historic sites have existed on the property. Furthermore, no significant historic events have occurred on the property, according to the report. The research concluded that the survey tract has no significant historic period or cultural resources: a fact that was confirmed by the field investigations.

The report concluded that the projected use of the property will not impact any historic or prehistoric cultural resources. The Florida Department of State, Division of Archives, History, and Records Management also concluded that the proposed project is unlikely to affect any significant archaeological or historic resources.

Therefore no significant prehistoric or historic cultural resources will be impacted by the proposed Facility expansion, since the expansion will be within the existing Facility boundaries.

5.11 Resources Committed

Numerous natural and human resources will be consumed, converted or made unavailable for future use if the proposed Facility expansion is implemented.

The resources used in the construction of the Facility will be committed to this project. Some building materials will be irretrievably used in the expansion of the Facility or irreversibly committed to the Facility. Certain lumber products and concrete structures would be committed as well as glass, ceramics, paint, insulation and steel paving materials. In addition to the materials consumed during construction, the energy and human labor expended cannot be retrieved. However, this type of commitment of resources is typical for major capital intensive projects.

Financial commitments include dedication of bond funds or other sources of construction funds. As with the commitment of labor and materials, the financial requirements for a major capital project are very typical.

The combustion process chemically alters many of the compounds within the waste stream. Therefore, the materials consumed in the combustion process are permanently lost. This, however, is considered a positive "reuse" of a material for the generation of energy which otherwise would have been buried in a landfill. The Facility expansion will generate over 1.7 billion kilowatt-hours of electricity during a 20-year life. In addition to the revenue earned on the electricity sold to the power company, the energy production translates into over \$260 million reduction on oil expenditures over the 20 years and reduction in consumption of nearly 4 million barrels of oil. It also offers the potential for recovery of reusable materials such as ferrous and nonferrous metals.

5.12 Variances

It is not anticipated that any variances from applicable standards will be sought as part of the site certification proceedings.

Section 6

Transmission Lines and Other Linear Facilities

The expansion project will not involve the construction of any new transmission line corridors or other long narrow siting corridors (e.g., rail lines, influent or effluent pipelines, etc.) from the site.

The site abuts a 200-foot wide easement of the Tampa Electric Company (TECO). The environmental features of the corridor in the vicinity of the site are described in conjunction with the main site area descriptions in **Section 2**. These environmental features include existing land use, future land use, and zoning.

6.1 Transmission Lines

The abutting TECO easement contains three 230 kV transmission lines, as well as a 20-foot easement for the Houston Texas Gas and Oil Corporation. The nearest electric substation is located approximately 3000 feet due south of the site, adjacent to the TECO easement corridor.

Based upon information supplied by the contractor (Covanta), the Tampa Electric Company (TECO) will perform an interconnection study in the first quarter of 2006. The purpose of the study is twofold:

1. To determine the interconnection system required to serve the proposed facility expansion. The study will be an examination of alternative interconnection arrangements. It will consider the requirements of safe and reliable operation of the interconnected system and make a recommendation to guide in the contract negotiations.
2. To study the ability of the composite area expansion plan to satisfy TECO planning criteria.

The objectives of the study are:

1. To collect load flow data for the study year and planned future expansion.
2. To assess the steady state and transient stability performance of the alternative interconnection arrangements for normal and contingency conditions consistent with TECO planning criteria.

Major items will include:

- Steady-state voltage regulation and line loading will be evaluated in response to single and some multiple contingencies

- Transient stability analysis will be done on all alternatives interconnecting the proposed facility to the existing system. Twelve, twenty-four, and sixty cycle reclosing times will be modeled
- Detailed evaluation will be done at three different load levels - 100%, 60% and 40% of peak

The data required by TECO, which will be supplied by the contractor (Covanta), are:

1. Proposed system one-line diagrams, including impedances.
2. Plant load and generation. Projected duration curves.
3. Generator Ratings (including power factor) and WATT-VAR capability curves for all generators.
4. Proposed relay and protection scheme.
5. Stability data, as follows:
 - All D and Q axis impedances and time constants for generator
 - Generator inertia constant
 - Generator saturation curve
 - Excitation system type and constants for stability modeling
 - Steam system and governor type and constants for stability modeling

If new power lines are required, TECO will be responsible for constructing the transmission line from the selected substation to the project boundary (including obtaining any required permits) within their existing right-of-way. If the study concludes that additional right-of-way is necessary, TECO will be responsible for obtaining it.

6.1.1 Electromagnetic Effects

Currently, the Hillsborough County Facility produces about 29 MW of electrical power. The proposed facility will produce about 46 MW as a product of combusting the refuse. Some of this energy will be used to power the Facility while the rest will be fed into the Tampa Electric Company (TECO) power grid. Currently, 230 kV high voltage transmission lines (HVTL) are located in the TECO easement to the west of the site. The existing transmission lines will accommodate the additional electricity generated from the new turbine generator. There will be no new transmission lines constructed after the expansion and, therefore, no further analyses of electromagnetic fields are required.

6.2 Associated Linear Facilities

This section is not applicable to the proposed project because there are no associated linear facilities.

Section 8

Site and Plant Design Alternatives

An analysis of alternatives to the expansion project is not required because this project is not subject to review in an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA).

8.1 Alternatives Sites

Because this application proposes to expand the existing waste-to-energy facility in Hillsborough County, a discussion of alternative sites is not applicable.

8.2 Proposed Site Design Alternatives

Because the site and facility already exist, there were few alternatives to consider. The only major alternative was the size of expansion. The Facility was originally designed to accommodate an additional 400 ton per day (tpd) unit, identical to the existing units. However, after considering the solid waste projections and population growth projections, the County decided to install a larger unit.

The largest unit that the existing Facility can readily accommodate is a nominally rated 600-tpd unit. To expand beyond this would require the construction of an entirely new waste-to-energy facility, which was not determined to be economically feasible.

Section 7

Economic and Social Effects of Plant Construction and Operation

The County's Facility expansion will provide several benefits to the community. These are summarized in the following list:

1. It provides an ecologically sound and economical method to dispose of solid waste.
2. It decreases the potential threat to groundwater from landfilling solid waste.
3. It recovers energy from the combustion of the solid waste, which otherwise would be discarded and not utilized.
4. It decreases the volume of the solid waste, thus reducing the volume of material (i.e., ash) that must be placed in a landfill. In turn, it reduces amount of land required for new landfill capacity and prolongs the life of the existing landfill.
5. It recovers energy from municipal solid waste and therefore decreases the need for fossil fuels.
6. The sale of energy generates revenue for the County.
7. It is an essential component of the County's integrated waste management plan.

It is sometimes difficult to quantify the economic and, in particular, the social ramifications of Facility construction and operation. The discussion below not only addresses those readily quantifiable cost items and benefit items (such as worker earnings), but also discusses the qualitative costs and benefits of the proposed project.

7.1 Socio-Economic Benefits

Land disposal of solid waste is becoming increasingly difficult in Hillsborough County. Permitting of additional landfills has been constrained by a rapid increase in land prices, a decrease in available land, public resistance, and regulations. Because of these restrictions on landfilling, County officials have pursued resource recovery as a more efficient method of solid waste disposal. The following paragraphs describe the benefits associated with a modern resource recovery facility.

The resource recovery system of disposal, although initially more expensive than landfilling, becomes more attractive as the prices of real estate and energy continue to increase. In addition, resource recovery is an ecologically sound method of waste disposal. The Facility will be designed in an aesthetically pleasing manner. The Facility site includes extensive landscaping and will continue to do so.

The expanded Facility will have a continuous, nominal design-rated capacity of 657,000 tons per year, and is expected to operate at or above its guaranteed capacity. Of the waste processed by the Facility, less than 25 percent by weight (containing less than 0.3 percent putrescible debris) will require landfilling. This significant decrease in waste tonnage corresponds to a 90 percent reduction in waste volume. Consequently, the annual land area requirement for landfilling will be substantially reduced. With resource recovery facilities serving the County and the City of Tampa, the estimated site life of the Southeast County Landfill can be extended.

Another benefit related to resource recovery is the reduced potential for damage to valuable surface water and groundwater resources. Landfilling of unprocessed garbage may result in water resources contamination by organic materials leaching out of the waste. In contrast, materials processed by resource recovery consist of burned-out matter discharged from the grate and flyash, which are relatively inert (i.e., containing less than 0.3 percent putrescible material).

A third benefit related to the resource recovery program is the generation of a minimum of 85 million kilowatt hours of electricity per year (based on a guaranteed tonnage of 186,000 tons/year and 450 KWH/ton net output). This energy production is equivalent to a decrease in use of imported crude oil by 186,000 barrels per year (or a minimum of 4.0 million barrels in 20 years). At current oil prices, this decrease in dependence on foreign crude oil translates into a reduction of about \$260 million over 20 years in foreign spending, assuming \$65 per barrel. Because no inflation was figured into this calculation, the \$260 million is a very conservative number.

Currently, the Facility employs 42 people. With the expansion, an additional eight people are expected to be required to run the Facility.

There would also be indirect beneficial impacts from the resource recovery operation on industries throughout the regional economy. Examples include increased sales and jobs in industries, which supply the facility, and retail establishments, which supply goods and services to the workers in the affected businesses.

Benefits will also be derived from Facility construction. For the duration of construction, the direct benefits of a \$100 million construction project will be felt in the local economy through provision of local jobs and the purchase of construction materials and services.

Indirect benefits from Facility construction include increased sales and jobs in industries, which supply the construction firms. These indirect benefits will also occur to retail establishments, which sell goods and services to workers employed by construction of the Facility.

A social benefit associated with the existing Facility development is the provision of a public education/visitors center at the site. Tours of the Facility and information on state-of-the-art resource recovery are available to all visitors.

7.2 Socio-Economic Costs

This section is a description of the costs associated with constructing and operating the energy recovery facility in Hillsborough County over a 20-year period.

The proposed expansion will be on the existing Facility site. Thus, no additional land will need to be purchased. The site is already appropriately zoned for this type of Facility. An expansion of the existing Facility will not affect real estate values of the adjacent industrial properties.

The costs associated with site preparation, access road and facility construction, utilities extension and all other legal, administrative, and financing costs (not including capitalized interest during construction and various reserve accounts) are estimated at approximately \$100 million. The County will finance these costs through a line of credit and the issuance of revenue bonds. However, since the bonds have not yet been issued, a breakdown of costs plus interest is not currently available.

The operator of the Facility will receive from the County an annual operating and maintenance fee of approximately \$7 million (based on 280,000 tons/year and 2004 costs). These costs, however, are not fixed; they will be periodically adjusted over the life of the operating agreement in accordance with selected price indices.

An evaluation of costs over a 20-year financing period was conducted in order to quantify the estimated cost/benefit of plant construction and provide a basis for comparison with continued landfilling of solid waste.

Items included in construction and maintenance are tipping or user's fees, bonding costs, energy revenues and general overhead and maintenance.

It should also be noted that Hillsborough County will have paid for the expansion at the end of the 20-year financing period. At the end of 20 years, the plant may be worth as much as 50 percent of the new Facility, assuming proper maintenance over this period. The present worth of the County-owned plant would decrease the cost by about \$14 million, resulting in a total cost of \$36 million. There are also some unquantifiable economic benefits, which may further reduce this cost. For example, the decreased risk of contaminating environmental resources is a real social and environmental benefit, which may be translated into economic benefits. Ecological/environmental losses, e.g. displacement of wildlife, habitat disruption, and deterioration of aesthetic and scenic values, will be minimal and are therefore not cited as costs of the project.



Application for Power Plant Site Certification

Hillsborough County Resource Recovery Facility Expansion

Volume II



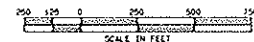
Hillsborough County
Florida

Appendix 1
Site and Adjacent Area
Property Ownership

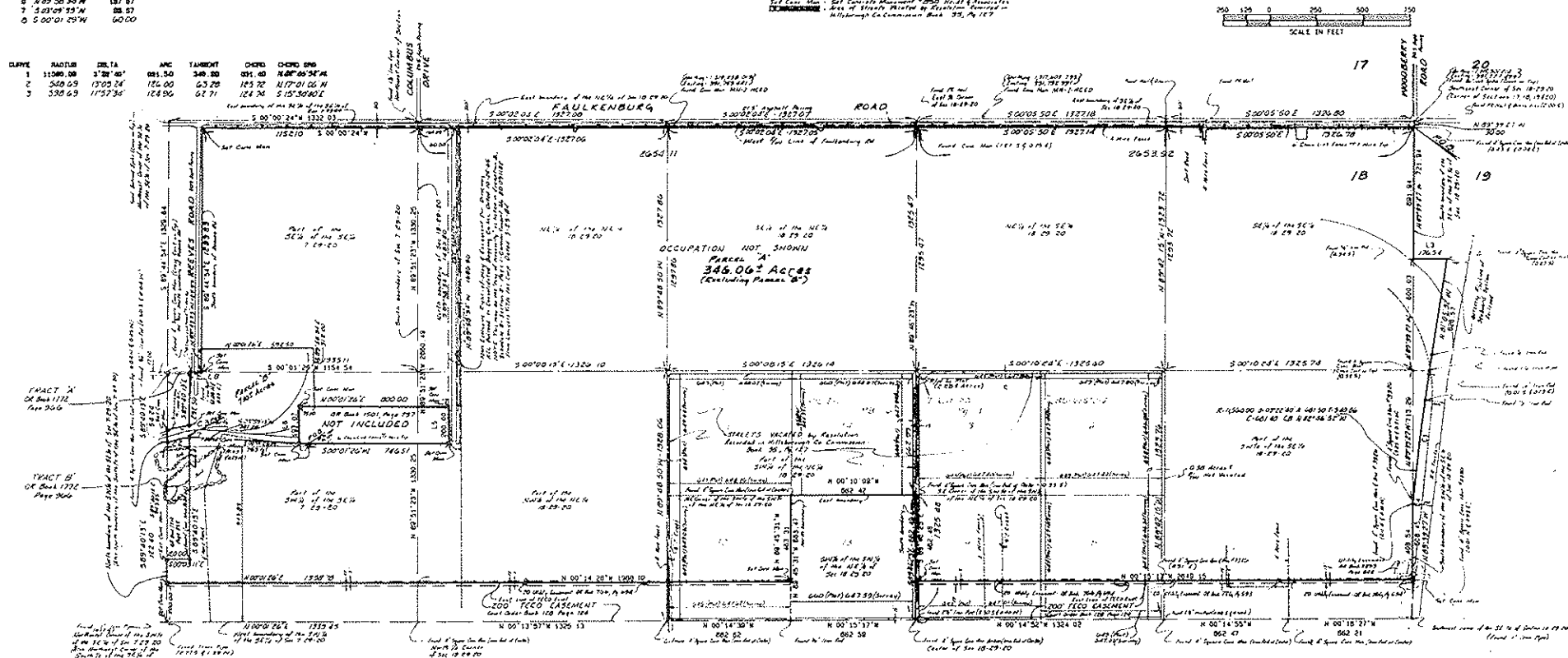
Appendix 1-1
Deed for Property and Survey of
353 Acre Tract

CLIFFE	RAJULIN	DETA	ANC	TAMBOUR	CHERO	CHERO SP
1	31080.00	3'28'40"	025.50	340.20	031.40	16.00'00"
2	540.69	13'05'24"	124.00	63.20	125.72	11.77'01"
3	540.69	11'53'36"	124.00	63.21	125.73	11.55'00"

Set Case Man
 • Utility Pole and overhead wire
 • Utility Pole and Guy Anchor
 • Railroad Track Centerline
 • Set Concrete Manhole #550 Next to Sewerline
 • Area of Slope Planted by Reclamation Bureau in
 Hillsborough Co. Conservancy Book 95, Pg 107



Hearings are Grid Based on
State Plane Coordinates
using Hillsborough County
Monuments $44^{\circ}N-1^{\circ}E$ & $44^{\circ}N-3^{\circ}E$

[illegible][illegible][illegible]

DE. Canal 501, Pa. 757

A parcel of land in the Southwest 1/4 of the Southwest 1/4 of Section 7, Township 28 North, Range 31 East, and in the Northwest 1/4 of the Northwest 1/4 of Section 18, Township 28 South, Range 26 East, Hillsborough County, Florida, described as follows:

From the Northeast corner of said Southwest 1/4 of the Southwest 1/4 of Section 7, Township 28 North, Range 31 East, to the North boundary thereof to a point; thence S. 88°21'24" E., 73.1 feet to a point; thence that it be 93.9 feet Easterly and parallel to the West boundary of said Section 7, Township 28 North, Range 31 East, to the Northwest corner of said Southwest 1/4 of the Southwest 1/4 of Section 7, Township 28 North, Range 31 East; beginning; from said point of Beginning, continue S. 80°27'28" E., 386.31 feet to a point; thence S. 83°54'24" E., 286.99 feet; thence N. 80°01'12" E., 286.99 feet to a point; thence S. 80°01'12" E., 286.99 feet along a line; thence S. 82°09'32" E., 33.92 feet to the Point of Beginning.

Parcel A containing 346.80 acres more or less which includes 4.38 acres of platted right-of-way as shown on the Plat of South Tampa Subdivision in Plat Book 8 of Page 3, but excludes 7.08 acres in "PARCEL B".

Parcel B containing 7.00 Acres more or less.

The information shown on this map is based upon Commitment No. 80-01162 by Lloyds's Title Insurance Company, dated March 27, 1984.

Haldt & Associates, Inc. makes no representations or guarantees pertaining to easements, rights-of-way, setback lines, reservations, agreements, or other matters not shown on this map.

BOUNDARY SURVEY
LAND AT FAULKENBURG ROAD

The Survey Prepared For Hillsborough County

[illegible]

Secondary resources	(1990)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	298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 **HEIDT & ASSOCIATES, INC.**
1000 S. DAVENPORT BLVD.
CHICAGO, ILL. 60605

4JP0522841 21

THIS DEED, Made this 25th day of May, A.D., 1984, between SEABOARD SYSTEM RAILROAD, INC., a Virginia corporation, formerly Seaboard Coast Line Railroad Company, formerly Seaboard Air Line Railroad Company and as successor by merger to Atlantic Coast Line Railroad Company, hereinafter called "Grantor"; HILLSBOROUGH COUNTY, a political subdivision of the State of Florida, hereinafter called "Grantee"; and UNITED STATES TRUST COMPANY OF NEW YORK, Corporate Trustee under the First (formerly General) Mortgage dated March 1, 1950, made by the former Atlantic Coast Line Railroad Company, to which Seaboard System Railroad, Inc., is successor by merger, and CHEMICAL BANK, Corporate Trustee under the Consolidated Mortgage dated as of March 15, 1971, made by the former Seaboard Coast Line Railroad Company, to which Seaboard System Railroad, Inc., is successor by merger, hereinafter called "Trustees";

(Wherever used herein, the terms "Grantor" and "Grantee" shall be construed in the singular or plural as the context may require or admit and shall include the heirs, legal representatives and assigns of individuals and the successors and assigns of corporations.)

WITNESSETH: That Grantor, for and in consideration of the sum of TWO HUNDRED FIFTEEN THOUSAND TWO HUNDRED FIFTY AND 00/100 DOLLARS (\$215,250.00), to it in hand paid by Grantee, the receipt of which is hereby acknowledged, has granted, bargained and sold, and by these presents does grant, bargain, sell and convey unto Grantee that certain tract or parcel of land situate, lying and being at Tampa, County of Hillsborough, State of Florida, and described as follows, to wit:

A parcel of land in the S $\frac{1}{2}$ of the SE $\frac{1}{4}$ of Section 7, Township 29 South, Range 20 East, more particularly described as follows: From the northwest corner of the S $\frac{1}{2}$ of the SE $\frac{1}{4}$ of Section 7, run S 89°40'13" E, 322.40 feet along the north boundary thereof to a point; run thence S 00°03'11" E, 120.00 feet to a point; run thence S 89°40'13" E, 664.41 feet to the point of beginning; from said point of beginning, run thence S 03°59'15" W, 581.28 feet to a point; thence S 89°58'34" E, 197.07 feet to a point; thence S 00°01'26" W, 75.00 feet to a point; thence S 89°58'34" E, 312.00 feet to a point; thence N 00°01'26" E, 592.50 feet to a point; thence N 89°43'25" W, 125.59 feet to a point; thence N 00°01'29" E, 60.00 feet to a point; thence N 89°40'13" W, 292.50 feet to a point on a curve; thence northerly 124.96 feet along the arc of said curve concave to the west, whose radius is 598.69 feet having a central angle of 11°57'34" and whose chord bears N 15°30'40" W, 124.74 feet to a point on the north boundary of said S $\frac{1}{2}$ of the SE $\frac{1}{4}$ of Section 7; thence N 89°40'13" W, 54.24 feet along said north boundary to a point on a curve; thence southerly 126.00 feet along the arc of said curve concave to the west whose radius is 548.69 feet through a central angle of 13°09'24" and whose chord bears S 17°01'06" E, 125.72 feet to the point of beginning; containing 7.00 acres, more or less, as shown on print of survey dated March 23, 1984, last revised May 21, 1984, prepared by Heidt & Associates, Inc.

GRANTOR, its successors or assigns, reserve a 20-foot wide track right of way, i.e., 10 feet wide on each side of the center line of Grantor's tracks as located thereon.

TOGETHER with all and singular the rights, members, hereditaments and appurtenances to said premises belonging or in anywise incident or appertaining.

TO HAVE AND TO HOLD said premises unto Grantee in fee simple forever; SUBJECT, However, to reservations, conditions, restrictions and easements of record, or apparent from an inspection of the premises, including but not limited to that portion of Reeves Road as located thereon.

Except as to the matters referred to in the preceding paragraph, Grantor hereby binds itself that the premises are free from encumbrances, that it is seized of said premises in fee and that it will fully warrant and forever defend all and singular said premises unto Grantee against Grantor and all other persons lawfully claiming or to claim the same or any part thereof.

The recitals of fact made hereinabove are to be taken only as recitals made by Grantor and not by Trustees.

The property hereinabove conveyed is subject to the lien of the First (formerly General) Mortgage made by the former Atlantic Coast Line Railroad Company, dated as of March 1, 1950, as supplemented and modified, under which mortgage United States Trust Company of New York is Corporate Trustee, and Trustee joins herein for the purpose of releasing and does hereby release the property hereinabove conveyed from the lien of said mortgage pursuant to the provisions of Section 6.01 of Article Six thereof.

The property hereinabove conveyed is subject also to the lien of the Consolidated Mortgage made by the former Seaboard Coast Line Railroad Company, dated as of March 15, 1971, as supplemented, under which mortgage Chemical Bank, a New York corporation, is Corporate Trustee and L. F. Sadler of Jacksonville, Florida, is Individual Trustee, and Corporate Trustee joins herein for the purpose of releasing and does hereby release the property hereinabove conveyed from the lien of said mortgage pursuant to the provisions of Section 5.17 of Article Five thereof; Individual Trustee being relieved of any obligation to join in such release by Section 10.06 of Article Ten of said mortgage.

IN WITNESS WHEREOF Grantor and Trustees have caused these presents to be duly signed and sealed the day and year first above written.

Signed, sealed and delivered
in the presence of:

[Signature]
[Signature]

SEABOARD SYSTEM RAILROAD, INC.

By

Attest

[Signature]
Corporate Secretary

Signed, sealed and delivered
in the presence of:

[Signature]
[Signature]

UNITED STATES TRUST COMPANY OF
NEW YORK, as Corporate Trustee
as aforesaid.

By

Attest

[Signature]
Assistant Secretary

- 3 -

Signed, sealed and delivered
in the presence of:

J. J. Cash
J. J. Murray

CHEMICAL BANK, as Corporate Trustee
as aforesaid.

By

J. J. Murray

Attest

TRUST COMPANY

E. J. Carter

FLORIDA FORM

STATE OF NEW YORK }
 COUNTY OF NEW YORK }

I hereby certify that on this day before me, an officer duly authorized to take acknowledgments in the State and County above set forth, personally appeared JAMES E. LOGAN and Thomas S. Moser respectively, SBT. Vice President and Assistant Secretary of UNITED STATES TRUST COMPANY OF NEW YORK, a corporation under the laws of the State of New York, to me known to be the persons described in and who executed the foregoing instrument, and they severally acknowledged before me the execution thereof as such officers, by virtue of due and proper corporate authority in them vested, and that the said instrument is the act and deed of said corporation.

And the said Thomas S. Moser, Assistant Secretary as aforesaid, also acknowledged before me that he affixed to said instrument the corporate seal of said corporation, by like authority in him vested.

WITNESS my signature and official seal in the County and State above set forth, this 30TH day of

11/17 1964

John M. Guiliano
 Notary Public

My commission Expires

JOHN M. GUILIANO
 Notary Public, State of New York
 No. 41-423573
 Qualified in Suffolk County
 Commission Expires March 30, 1966

FLORIDA FORM

STATE OF FLORIDA
COUNTY OF DUVAL

I hereby certify that on this day before me, an officer duly authorized to take acknowledgments in the State and County above set forth, personally appeared J. T. Rice and Robert A. Bernard respectively Vice President and Corporate Secretary of SEABOARD SYSTEM RAILROAD, INC. a corporation under the laws of the State of

Virginia to me known to be the persons described in and who executed the foregoing instrument, and they severally acknowledged before me the execution thereof as such officers, by virtue of due and proper corporate authority in them vested, and that the said instrument is the act and deed of said corporation.

And the said Robert A. Bernard Corporate Secretary as aforesaid, also acknowledged before me that he affixed to said instrument the corporate seal of said corporation, by like authority in him vested.

WITNESS my signature and official seal in the County and State above set forth, this 25th day of May 19 84.

Angelia C. Woodell
Notary Public.

NOTARY PUBLIC, STATE OF FLORIDA
My commission Expires Sept. 15, 1987
Bonded Thru Patterson Becht Agency

THIS DEED, Made this 1st day of June, A.D., 1984, between SEABOARD SYSTEM RAILROAD, INC., a Virginia corporation, formerly Seaboard Coast Line Railroad Company, formerly Seaboard Air Line Railroad Company and as successor by merger to Atlantic Coast Line Railroad Company, hereinafter called "Grantor"; HILLSBOROUGH COUNTY, a political subdivision of the State of Florida, hereinafter called "Grantee";

(Wherever used herein, the terms "Grantor" and "Grantee" shall be construed in the singular or plural as the context may require or admit and shall include the heirs, legal representatives and assigns of individuals and the successors and assigns of corporations.)

WITNESSETH: That Grantor, for and in consideration of the sum of TEN MILLION SIX HUNDRED FORTY-ONE THOUSAND THREE HUNDRED FORTY-FIVE DOLLARS (\$10,641,345.00), to it in hand paid by Grantee, the receipt of which is hereby acknowledged, has granted, bargained and sold, and by these presents does grant, bargain, sell and convey unto Grantee that certain tract or parcel of land situate, lying and being at Tampa, County of Hillsborough, State of Florida, and described as follows, to wit:

A parcel of land located in Hillsborough County, Florida, more particularly described as follows: From a point in the center line of Faulkenburg Road marking the section corner of Section 17, 18, 19 and 20, Township 29 South, Range 20 East; run thence N 89°39'27" W, 30.00 feet along the south line of the SE¼ of the SE¼ of said Section 18 to a point in the west line of said Faulkenburg Road, said point being the point of beginning; continue thence N 89°39'27" W, 691.94 feet along said south line of said SE¼ of the SE¼ of said Section 18 to a point; thence S 00°03'30" W, 176.54 feet to a point in the northerly right of way line of Seaboard System Railroad, said point being 100 feet from and at right angles to said Seaboard System main track; thence N 81°05'32" W, 626.57 feet along said Railroad right of way, which continues to be 100 feet from and at right angles to said Railroad main track, to the point of curvature of a curve concave to the southwest; thence continue 681.50 feet along said Railroad right of way and the arc of said curve whose radius is 11,560.00 feet, with a central angle of 03°22'40" and whose chord bears N 82°46'52" W, 681.40 feet to the point of tangency; thence continue N 84°28'12" W, 18.08 feet along said Railroad right of way to a point that is 100 feet from and at right angles to said Railroad main track and that is on the south line of the SW¼ of the SE¼ of said Section 18; thence N 89°39'27" W, 408.54 feet along said Railroad right of way and said south line of Section 18 to a point on the east line of a 200-foot easement granted to Tampa Electric Company as recorded in Court Order Book 128, Page 104, of the Public Records of Hillsborough County, Florida; thence N 00°15'17" W, 2649.15 feet along said east line of said Tampa Electric Company easement to a point of intersection with the south boundary of the SW¼ of the SW¼ of the NE¼ of said Section 18; thence S 89°46'23" E, 462.48 feet along said south boundary of the SW¼ of the SW¼ of the NE¼ to the southeast corner thereof; thence N 00°10'09" W, 662.42 feet along the east boundary of said SW¼ of the SW¼ of the NE¼ to the northeast

corner thereof; thence N 89°45'31" W, 463.31 feet along the north boundary of said SW¼ of the SW¼ of the NE¼ to a point on the said east line of said Tampa Electric Company easement; thence N 00°14'28" W, 1988.10 feet along the east line of said Tampa Electric Company easement to a point on the north line of said Section 18; thence N 00°01'26" E, 1338.78 feet along the east line of said Tampa Electric Company easement to a point on the north line of the SW¼ of the SE¼ of Section 7, Township 29 South, Range 20 East; thence S 89°40'13" E, 122.40 feet along said north line of the SW¼ of the SE¼ to a point marking the northwest corner of a tract described in O.R. Book 1710 at Page 252; thence S 00°03'11" E, 120.00 feet along the westerly boundary of above said tract to a point; thence S 89°40'13" E, 664.41 feet along the south boundary of above said tract and Tract B as described in O.R. Book 1772 at Page 966 to a point on a curve and marking the southeast corner of above said Tract B; thence northwesterly 126.00 feet along the easterly boundary of above said Tract B and the arc of a curve concave to the southwest, whose radius is 548.69 feet with a central angle of 13°09'24" and whose chord bears N 17°01'06" W, 125.72 feet to a point on the north boundary of the SW¼ of the SE¼ of said Section 7, marking the northeast corner of above said Tract B; thence S 89°40'13" E, 54.24 feet along the north boundary of the SW¼ of the SE¼ of said Section 7, to a point on a curve marking the northwest corner of Tract A as also described in O.R. Book 1772 at Page 966; thence southerly 124.96 feet along the arc of a curve concave to the southwest, whose radius is 598.69 feet, with a central angle of 11°57'34" and whose chord bears S 15°30'40" E, 124.74 feet to the southwesterly corner of said Tract A; thence S 89°40'13" E, 292.50 feet along the southerly boundary of said Tract A to the southeast corner thereof, on the north boundary of Reeves Road; thence S 00°01'29" W, 60.00 feet to the south boundary of Reeves Road; thence S 89°44'54" E, 1299.89 feet to a point on the west line of Faulkenburg Road, said point being 30.00 feet westerly of and at right angles to the east boundary of the SE¼ of the SE¼ of said Section 7; thence S 00°00'24" W, 1152.10 feet along the west line of Faulkenburg Road, said line being 30.00 feet westerly of and parallel to the east boundary of the SE¼ of the SE¼ of said Section 7 to a point on the north boundary of Section 18, Township 29 South, Range 20 East; thence continuing S 00°02'04" E, 2654.11 feet along the west line of Faulkenburg Road, said line being 30.00 feet westerly of and parallel to the east boundary of the NE¼ of said Section 18; thence continuing along the west line of Faulkenburg Road, said line being 30.00 feet westerly of and parallel to the east boundary of the SE¼ of said Section 18, S 00°05'50" E, 2653.92 feet to the point of beginning.

LESS AND EXCEPT, a parcel of land in the SW¼ of the SE¼ of Section 7, Township 29 South, Range 20 East, and in the NW¼ of the NE¼ of Section 18, Township 29 South, Range 20 East, Hillsborough County, Florida, described as follows: From the

northwest corner of said SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 7,
run S 89°40'13" E, 943.85 feet along the north
boundary thereof to a point; run thence
S 00°01'26" W, 753.61 feet along a line that is
943.85 feet easterly of and parallel to the west
boundary of the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Section 7, to
the point of beginning; from said point of beginning,
continue S 00°01'26" W, 746.51 feet to a point;
thence S 89°58'34" E, 200.00 feet; thence
N 00°01'26" E, 800.00 feet to a point; thence
N 89°58'34" W, 197.07 feet to a point; thence
S 03°09'33" W, 53.57 feet to the point of beginning;

AND less and except seven acre parcel conveyed separately
dated May 25, 1984 recorded in Official Record Book _____
on Page _____ of the Public Records of Hillsborough County,
Florida.

Containing 346.06 acres, more or less, as shown
on print of survey dated March 23, 1984, last revised
May 21, 1984, prepared by Heidt & Associates, Inc.

TOGETHER with all and singular the rights, members, hereditaments and
appurtenances to said premises belonging or in anywise incident or
appertaining.

TO HAVE AND TO HOLD said premises unto Grantee in fee simple forever;
SUBJECT, However, to reservations, conditions, restrictions and easements of
record, or apparent from an inspection of the premises. SUBJECT ALSO to
easement dated October 22, 1965, whereby the former Atlantic Coast Line
Railroad Company granted Consolidated Bagging Company, Inc., a 60-foot wide
right of way for ingress and egress from the west right of way line of
Faulkenburg Road to the west line of Consolidated Bagging Company's property,
a 20-foot utility easement as recorded in O.R. Book 766, Page 694, of
Hillsborough County, Florida, a 20-foot utility easement as recorded in O.R.
Book 726, Page 593, of Hillsborough County, Florida, a utility easement
granted Tampa Electric Company dated April 17, 1974, as recorded in O.R.
Book 2893, Page 842, Hillsborough County, Florida, and all fences, ponds, and
roads as located thereon.

Except as to the matters referred to in the preceding paragraph, Grantor
hereby binds itself that the premises are free from encumbrances, that it is
seized of said premises in fee and that it will fully warrant and forever
defend all and singular said premises unto Grantee against Grantor and all
other persons lawfully claiming or to claim the same or any part thereof.

IN WITNESS WHEREOF Grantor has caused these presents to be duly signed
and sealed the day and year first above written.

Signed, sealed and delivered
in the presence of:

SEABOARD SYSTEM RAILROAD, INC.

Joseph C. Wood
James R. [unclear]

By *James L. Kiesler*
James L. Kiesler,
Assistant Vice-President-Real Estate

Appendix 1-2
List of Adjacent Property

OWNERSHIP WITHIN 150 FEET
OF PROPOSED SITE
(per 1982 Tax Rolls)

As to properties abutting proposed site:

- (1) Seaboard Coast Line Railroad Company
500 Water Street
Jacksonville, Florida 32202

Folio #5
67977.0000
68001.0000
68017.0000
67973.0000

As to properties on East side of Faulkenburg Road:

- File 67897.0000 (1) James A. & Beverly A. Taylor
2109 E. Lumsden Road
Valrico, Florida 33594

- 67217.2030 (2) Thomas L. & Elizabeth I. Fahringer
P. O. Box 1412
Brandon, Florida 33511

- 67395.0000 (3) Samuel E. and Aurea Leon
Rt. 3 Box 95
Tampa, Florida 33619

- 67896.0000 (4) McDonald - Logan Inc.
P. O. Box 5357
Tampa, Florida 33675

- 67774.0000 (5) J. L. and Mary Coker
Rt. 3 Box 97
Tampa, Florida 33619

- (6) Ken Foster
128 N. Parsons Ave.
Brandon, Florida 33511

As to properties South of Seaboard Coast Line Railroad

- (1) Interstate Park of Commerce Ltd.
519 E. Madison Street
Tampa, Florida 33602

Folio #6
68052.0516
68052.0518
68052.0520

- 68052.0514 (2) OKI Realty Corporation
2643 Crescent Springs Road
Erlanger, Kentucky 41018
Local Agent: John Swart
P. O. Box 23804
Tampa, Florida 33623

IDENTIFICATION OF SUBDIVISIONS
WITHIN 250 FEET
OF PROPOSED SITE:

- 1) South Tampa Subdivision, Plat Book 6, page 3.
- 2) Faulkenburg Industrial Park, Plat Book 47, page 58
- 3) Fisher's Farms, Plat Book 26, page 1.
- 4) Interstate Park Commerce, Plat Book 52, page 32.

Appendix 2

Zoning and Land Use Plan

Appendix 2-1

Standard Zoning Districts

PART 2.01.00 STANDARD ZONING DISTRICTS**Sec. 2.01.01. Intent**

The County is divided into districts of such number, shape, characteristics, area, common unity of purpose, adaptability, or use as will accomplish the objectives of the Comprehensive Plan and this Code.

Sec. 2.01.02. Establishment of Zoning Districts**A. Generally**

The unincorporated portion of Hillsborough County shall be divided by this Code into Zoning Districts, the boundaries and designations of which shall be shown on a series of maps, covering in time the entire unincorporated area of Hillsborough County, and identified as the Official Zoning Atlas of Hillsborough County, hereafter Official Zoning Atlas.

B. List of Zoning Districts

AM Agricultural Mining

A Agriculture

AR Agricultural Rural

AS-0.4 Agricultural, Single-Family Estate

AS-1 Agricultural, Single-Family

ASC-1 Agricultural, Single-Family Conventional

AI Agricultural Industrial

RSC-2 Residential, Single-Family Conventional

RSC-3 Residential, Single-Family Conventional

RSC-4 Residential, Single-Family Conventional

RSC-6 Residential, Single-Family Conventional

RSC-9 Residential, Single-Family Conventional

MH Residential, Single-Family Mobile Home Overlay

RDC-6 Residential, Duplex Conventional

RDC-12 Residential, Duplex Conventional

RMC-6 Residential, Multi-Family Conventional

RMC-9 Residential, Multi-Family Conventional

RMC-12 Residential, Multi-Family Conventional

RMC-16 Residential, Multi-Family Conventional

RMC-20 Residential, Multi-Family Conventional

BPO Business, Professional Office
OR Office Residential
CN Commercial, Neighborhood
CG Commercial, General
CI Commercial, Intensive
M Manufacturing
SB Show Business Overlay
SPI-HC Historic and Cultural Conservation
SPI-RVR Recreational Vehicle and Private Pleasure Craft Residential Overlay
SPI-UC-1 Special Public Interest-University Community
SPI-UC-2 Special Public Interest-University Community
SPI-UC-3 Special Public Interest-University Community
SPI-AP-1 Special Public Interest - Airport
SPI-AP-2 Special Public Interest - Airport
SPI-AP-3 Special Public Interest - Airport
SPI-AP-4 Special Public Interest - Airport
SPI-AP-5 Special Public Interest - Airport
SPI-AP-V Special Public Interest - Airport
SPI-NMD Special Public Interest - North Dale Mabry Overlay
PD Planned Development
IPD-1 Interstate Planned Development
IPD-2 Interstate Planned Development
IPD-3 Interstate Planned Development
POD Pedestrian Oriented Development
TOD Transit Oriented Development
TND Traditional Neighborhood Development
BMS Brandon Main Street
CPV Citrus Park Village
R-BPO Restricted-Business Professional Office Overlay

(Ord. No. 02-13, § 2, 8-1-02; Ord. No. 03-36, § 2, 11-12-03)

Sec. 2.01.03. Official Zoning Atlas

- A. The Official Zoning Atlas, together with all lawfully adopted explanatory material shown thereon or therewith, is hereby adopted by reference and declared to be part of this Code.
- B. Where the scale generally applicable to the basic atlas sheets or supplemental

maps is inadequate for presentation of details in particular areas, such areas may be cross-referenced on the basic atlas sheets or supplemental maps to separate inset maps at the appropriate scale.

C. Other supplements, in the form of maps, indices, guides, illustrations, records, reports, interpretive material and standards, may be officially adopted, directly or by reference, to facilitate administration and public understanding of the Official Zoning Atlas or of regulations adopted for the zoning districts or other division established thereby.

Sec. 2.01.04. Zoning District Boundaries

A. For the special purposes set out below, where boundaries and designations are not shown directly on the basic atlas sheets, they shall be indicated by overlays to such sheets or as separate maps. Overlays or separate maps shall have the same force and effect as the basic atlas sheets.

B. A district symbol or name shown within district boundaries in the Official Zoning Atlas indicates that district regulations pertaining to the district extend throughout the whole area surrounded by the boundary line, except as otherwise specifically provided.

C. Where uncertainty exists as to boundaries of districts, or other areas delineated for regulatory purposes in the Official Zoning Atlas, the following rules shall apply:

1. Boundaries indicated as approximately following the centerlines of streets, alleys, rights-of-way, or easements shall be construed as following such centerlines as they exist on the ground (except where variation of actual location from mapped location would change the zoning status of a lot or parcel, in which case the boundary shall be so interpreted as to avoid such change). In the event of vacation, the boundary shall be construed as remaining in its location except where ownership of the vacated property is divided other than at the center, in which case the boundary shall be construed as moving with the ownership. However, existing right-of-way is not subject to zoning regulations unless vacated.

2. Boundaries indicated as approximately following boundaries of streets, alleys, other public or private property lines, rights-of-way, or easements shall be construed as following such boundaries, except where variation of actual location from mapped location would change the district status of a lot or parcel, in which case the boundary shall be so interpreted as to void such change.

3. Boundaries indicated as approximately following mean high waterlines or centerlines of river, canals, lakes, bays, or other bodies of water shall be construed as following such mean high waterlines, or centerlines. If said mean high waterline or centerlines changes, the boundary shall be construed as moving with the change, except where moving would change the district status of a lot or parcel, in which case the boundary shall be interpreted in such manner as to avoid such change.

4. Boundaries indicated as approximately parallel to or extensions of features described in Paragraphs 1, 2 and 3 above, shall be construed as being parallel to or extensions of such features.

5. Where distances are not specifically indicated on any map in the Official Zoning Atlas, they shall be determined by reference to the scale of the map.

6. Boundaries indicated as entering any body of water, but not continuing to intersect with other zoning boundaries or with the limits of the jurisdiction of the

County, shall be construed as extending, in the direction in which they enter the body of water, to intersect with other zoning boundaries or with the limits of County jurisdiction.

(Ord. No. 00-21, § 2, 5-18-00)

PART 2.02.00 USES ALLOWED WITHIN ZONING DISTRICTS

Sec. 2.02.01. Use Classifications and Definitions

The following sections describe the categories of uses which apply within Hillsborough County. Each category contains a description of the fundamental characteristics of the category and a list of representative uses. It is not possible to list each and every individual use which may be allowable within a category. The intent is to describe the category and provide a sufficient number of illustrative or representative uses to allow other uses to be assigned to a category as they are proposed in a zoning district.

A. Residential Uses

Residential uses are those which provide dwellings or structures intended for occupancy for housekeeping, and includes units which are single-family (attached or detached), accessory apartments, multi-family in a variety of housing styles, including but not limited to duplex, triplex, quadplex, garden apartments, villas and townhouses, mid-rise and high-rise apartment buildings, and garage apartments. Also included are manufactured homes, mobile homes, condominium ownership, cooperatives, and other ownership arrangements. Residential uses also include bed and breakfast, group homes, congregate care homes, assisted living facilities, life care treatment, foster homes, and may include special housing needs such fraternities and sororities, or farm worker housing. Certain uses are also allowable in the residential use category by development order, and are specified in 2.03.00. Residential units, while allowable, must meet the density limitations shown in the comprehensive plan. In addition, not all housing types are allowable in every zoning district. Refer to 2.02.03 which describes which housing types are allowable in each residential zoning district.

B. Agricultural Uses

1. Agricultural uses are those related to the production, keeping, or maintenance, whether for sale or personal use, of plants and animals for food, forage, fiber, or ornamental purposes. Agricultural uses are characterized as predominantly outdoor activities, with structures covering a very small portion of the land. However, some specific production activities may require relatively large amounts of land coverage, such as poultry houses, greenhouses, and kennels. Trip generation is very low; the number of employees per acre is very small. Nuisance may occur due to dust, odor, or pests, depending upon the type of activity. The uses within this category may include both domestic and exotic species, except as specifically prohibited by other regulations.

2. Included uses are silviculture; horticulture; aquaculture; crop production; pasture lands; livestock; bees; orchards; plant farms; kennels; rural home industry; agricultural manufacturing; and structures and facilities necessary to agricultural production activities, including barns, sties, pens, corrals, stables, greenhouses, milking parlors and dairies, feedlots, silos, and other substantially similar facilities and structures whether for the primary use or accessory to agricultural activity. Also included is land application disposal. Agricultural uses may also include a bed and breakfast, farm worker housing, and residences for the farm owner, operator, or caretaker, where the residential use(s) is directly associated with the principal agricultural use of the land.

C. Cultural/Institutional Uses

1. Cultural/institutional uses provide a personal service in the form of education, culture, fine arts displays and exhibits, and similar activities. Uses in this category are predominantly day-time activities, are moderately intense as measured by degree of land coverage, level of traffic, but may be periodically intense due to special events which create large amounts of traffic within a short time period as well as increased demands for parking. Number of employees and users will vary widely due to the periodic nature of institutional uses. Institutional uses may be public or private.

2. Institutional uses include, but are not limited, to libraries, galleries, and museums; pre-kindergarten, kindergarten, primary, elementary, middle, and secondary schools; child care, day care, or child nurseries; community centers; churches and synagogues; parks and recreation facilities with or without lighted fields and courts. Specifically not included in this category are theaters and auditoriums or other similar places of assembly; colleges and universities are not included.

D. Neighborhood Business and Commercial

1. Land use activities in this category are those which serve the surrounding neighborhood or a small group of neighborhoods. Uses are small-scale, have low-to mid-range trip generation, typically require access to collectors, and operate primarily in daytime or early evening hours. Intensity as measured by impervious surface coverage and floor area ratio is relatively low, with a predominance of one-story and low-rise buildings outside of activity centers. This category does not include large-scale discount supercenters or big box retailers.

2. Typical uses in this category include commercial recreation, entertainment, retail, hospitality, adult uses, and general business, such as retail goods stores; financial institutions with or without drive-up facilities; funeral homes and mortuaries; shopping centers; agricultural stands; neighborhood convenience stores with or without gas pumps; car wash; grocery stores; specialty food stores; and supermarkets; bowling alleys; billiards and pool parlors, spas, gyms, and health clubs; commercial, vocational, business or trade schools; bed and breakfast establishments and guest lodges; hotels and motels; service businesses such as blueprint, printing, catering, travel agencies, mail and package services, repair shops, upholstery, and laundries; personal services such as beauty shops, barbers, employment services, or photography studios; adult care centers, child care centers, nursing homes; restaurants; general offices, professional offices, and governmental offices, schools for the performing or fine arts and for martial arts.

E. General Business and Commercial Uses

1. Land use activities in this category are those which serve the surrounding neighborhood, a small group of neighborhoods, or are community-serving. Uses are small- and medium-scale, have mid-range trip generation, typically require access to collectors and arterials, and operate primarily in daytime or early evening hours. Intensity as measured by impervious surface coverage and floor area ratio is relatively low, with a predominance of one-story and low-rise buildings outside of activity centers. Uses tend to be in individual structures or in community-scale shopping centers. This category does not include large-scale discount supercenters or big box retailers.

2. Typical uses in this category include commercial recreation, entertainment, retail, hospitality, adult uses, and general business, such as retail goods stores; financial institutions with or without drive-up facilities; funeral homes and mortuaries; farm and garden supply centers; agricultural stands; neighborhood

convenience stores with or without gas pumps; car wash; grocery stores, specialty food stores, and supermarkets; bowling alleys, billiards and pool parlors, spas, gyms, and health clubs; community hospitals; commercial, vocational, business or trade schools; bed and breakfast establishments and guest lodges; hotels and motels; mini-warehouses; service businesses such as blueprint, printing, catering, travel agencies, mail and package services, repair shops, upholstery, and laundries; personal services such as beauty shops, barbers, employment services, photography studios, adult care centers, child care centers, nursing homes; restaurants; general offices, professional offices, and government offices; domestic vehicle sales rental and minor service and repair, schools for the performing or fine arts and for martial arts.

F. High Intensity/Highway Commercial Uses

1. Business uses in the high intensity/highway commercial use category are those which typically have high or extremely high traffic associated with the use. Uses generally require access to a major or minor arterial or have close proximity to major intersections or interchanges with limited access facilities. These uses are characterized by outdoor activity and outdoor storage, a high demand for parking, a high level of impervious surface coverage, as well as high levels of trip generation. High intensity/highway commercial uses are those which are major employment centers, or which serve the traveling public and are oriented to vehicular travel; however, they are distinguished from regional uses by scale. These uses are intense as measured by the impacts to adjacent properties, but are typically not of an overall size or building mass as a regional activity center. These uses often have an actual or potential negative impact on surrounding properties due to late hours of operation, noise, and or light. Uses may be located in several buildings, as in shopping centers or business parks, or may be located in a single building, such as a discount supercenter, or big box retailer.

2. Examples of uses in this category include, but are not limited to the following: all types of vehicle sales, rental, service, repair, and storage, including truck stops, body shops, road services, car wash facilities, and the sales, rental, repair and service of new or used automobiles, boats, buses, farm and garden equipment, motorcycles, trucks, recreational vehicles, and mobile homes; gasoline sales and service, combination gasoline sale and food marts; large scale discount centers, supercenters, large scale building supply centers and do-it-yourself centers, big-box retailers; free-standing taverns, bars, lounges, night clubs, and dance halls; financial institutions with drive-up facilities; restaurants with drive-up facilities; agricultural stands, temporary or permanent; outdoor arenas, rodeo grounds, livestock auction facilities, race tracks (auto, dog, go-kart, horse, motorcycle), shooting and firing ranges; veterinary offices and animal hospital with outside kennels; minor industry; storage yards for equipment, machinery, and supplies for building and trades contractors, garbage haulers; flea markets or similar outdoor or indoor/outdoor sales complexes, whether temporary or permanent; hotels and motels; and other substantially similar facilities and uses.

G. Industrial, Manufacturing, Distribution Uses

1. The characteristics of uses in this category include large or extremely large lots, often with a single user or single employer, where manufacturing, processing, storing, or distribution of goods occurs. Buildings are typically one floor, but may cover large expanses of land. High levels of employment, two or three shifts per day, and potential negative impacts from truck traffic, rail, employee shift changes, noise, or industrial, chemical, heat producing, and manufacturing processes all are typical of uses in this category. These uses may

also have substantial and significant outdoor storage and/or outdoor activity. Uses are not typically open to the general public.

2. Typical uses in this category are manufacturing, processing, production, and assembly plants; warehousing, with or without distribution centers; lumberyards; dry cleaning plants; large-scale printing plants; slaughterhouse and animal processing plants; power plants; and substantially similar uses.

H. Mining and Extractive Activities

This category includes all uses where resources are removed from the ground, such as mines, land excavation, and the like.

I. Office and Professional Services

1. Office and professional service uses have only moderate impacts to surrounding properties due to primarily day-time operations, low to moderate trip generation, and the absence of significant impacts due to noise, light, or pollution. There is no outdoor storage or outdoor activity associated with these uses. Commercial uses are accessory only.

2. Typical uses in this category include service businesses such as blueprint, printing, catering, travel agencies, mail and package services, repair shops, upholstery, and laundries; personal services such as beauty shops, barbers, employment services, or photography studios; restaurants; general offices professional offices, and government offices; medical offices or clinics with scheduled or emergency services by physicians, dentists, chiropractors, psychiatrists, podiatrists, physical therapists, optometrists, and other medical practitioners, including ambulatory/day surgery centers. This category also includes diagnostic centers which provide radiology, and medical screening and testing services. Facilities to provide medical equipment, supplies, devices, eyeglasses, hearing aids, or other similar items for personal use upon advice of a health provider may be included in this category so long as they are functionally associated with the office or clinic and are not an isolated or freestanding use. This category does not include hospitals or other health care facilities which provide overnight lodging.

J. Outdoor/Passive Uses

1. Outdoor/passive uses are characterized by uses which have large and extremely large amounts of land, few and small structures, little coverage of the land with paved areas, little or no vehicular use, low trip generation rates, little outdoor lighting, and low numbers of employees or other users per acre of land. Activities tend to be low impact and are predominately or exclusively daytime activities.

2. Included are walking and hiking trails, bridle paths, greenways, game preserves, natural preserves, parks with picnic areas, camps, and similar low impact uses. Also allowable are country clubs, golf clubs, and golf driving ranges, cemeteries (either human or pet). Mausoleums, or crematoriums, may be permitted, provided they function accessory to and on the same site as related cemetery.

K. Neighborhood Public Service and Emergency Service Uses

1. This category represents those uses which, while they may be of moderate intensity, with a high degree of outdoor storage and outdoor activity, a high ratio of land coverage, and potential nuisance, are nevertheless necessary as support to surrounding uses. Any potential nuisance is mitigated by limitations on scale of development, consistent with neighborhood scale development.

2. The type of uses included in this category include, but are not limited to neighborhood-scale fire stations; components of water systems; components of wastewater systems; electricity substations; neighborhood support services; and substantially similar and related uses.

L. General Public Service and Emergency Service Uses

1. This category represents those uses which are relatively high intensity, often with 24-hour operations, a high degree of outdoor storage and outdoor activity, a high ratio of land coverage, a high level of nuisance due to noise, and high levels of truck or large vehicle traffic.

2. The types of uses included in this category include, but are not limited to general aviation airports and heliports (but not Tampa International Airport); railyards and terminals; ambulance services; fire stations; water plants and systems; wastewater plants and systems; maintenance, garage, and storage yards for school buses, highway construction equipment, telephone equipment, utility company trucks and equipment; microwave, radio, and television transmission towers; radiotelephone communication facilities, electricity substations; and substantially similar and related uses.

M. Regional Business and Commercial Uses

This category contains those business and commercial uses which serve several communities or an entire region. These uses require a high degree of access, typically locating near a limited access transportation facility or the intersection of major arterials. Uses are relatively high intensity as measured by trip generation and land coverage. Uses tend to be located in extremely large-scale complexes, such as a commercial shopping mall, commerce park, or similar facility. The distinguishing characteristics of this category are not the specific uses which may be included, but the scale of the development. All uses in the general commercial, high intensity commercial, office and professional services, medical office would be allowable and are classified as regional business and commercial due to scale and intensity of use. Tampa International Airport is included in this category. Uses in this category will be developments-of-regional-impact under chapter 380, Florida Statutes.

N. Regional Cultural and Entertainment Facilities

1. This category contains those cultural and entertainment uses which serve an entire region or the entire state. These uses require a high degree of access, large amounts of parking, and typically locate near a limited access transportation facility or the intersection of major arterials. Uses are relatively high intensity as measured by trip generation and land coverage. Uses are often enclosed with controlled access from the surrounding area. Uses are often under the control of a single entity, and are of a scale consistent with developments-of-regional-impact under chapter 380, Florida Statutes.

2. Uses in this category include colleges and universities, amusement and theme parks, performing arts centers, hospitals and medical centers, convention centers, and substantially similar facilities.

O. Solid Waste Facilities

This category is for uses such as landfills (classes I, II, and III), hazardous waste transfer facilities, recycling centers, composting and other yard waste facilities, and substantially similar facilities.

(Ord. No. 97-18, § 2, 12-18-97; Ord. No. 00-21, § 2, 5-18-00; Ord. No. 03-9, § 2, 6-5-03; Ord. No. 03-36, § 2, 11-12-03)

Sec. 2.02.02. Allowable Uses In Zoning Districts

1. The table below indicates the categories of uses which are allowable in each standard zoning district within Hillsborough County. The categories of uses are arranged in the vertical column on the left side of the table and the zoning districts are listed across the top. "P" indicates that the use is permitted, subject to the standards of this Code. "C" indicates the use is a Conditional Use that may be allowed in the identified district pursuant to conformance with the design standards contained in Article VI. No public hearing is required for Conditional Uses unless otherwise stated in the applicable standards in Article VI. "S" designates uses as Special Uses that may be established in the district, pursuant to a noticed public hearing as described in Part 10.02.00 and in conformance with the standards contained in Article VI. An "A" indicates the use is an Accessory Use that may be established in the district pursuant to the requirements of Article VI. Uses identified with an "N" are potentially permitted Conditional Uses in the identified district pursuant to the criteria contained in Section 6.11.65 (Non-Industrial Uses in Industrially Designated Areas). A blank space indicates that the use is prohibited. All uses are subject to the development standards of the zoning district in which it is to be located as well as all other rules and regulations of this Code and Hillsborough County.

2. All uses are potentially permitted in Planned Development (PD) districts, subject to the policies of the Comprehensive Plan, the requirements of Part 5.03.00 of this Code and all other rules regulations and ordinances of Hillsborough County. Land uses permitted in existing Planned Development districts are specified in the PD's conditions of approval. Requests for rezonings or modifications to Planned Developments are reviewed in accordance with Part 10.03.00 of this Code.

3. All uses permitted in Traditional Neighborhood Developments (TNDs), Pedestrian-Oriented Developments (PODs) and Transit-Oriented Developments (TODs) are identified in Part 5.08.00 of this Code.

TABLE INSET:

NOTE: TABLE IS TOO LARGE FOR PROPER DISPLAY

Endnotes:

1 Separate Alcohol Beverage Special Use Permit required.

2 Permitted only in HI (Heavy Industrial) Comprehensive Plan Category.

3 Reviewed and permitted in accordance with the design standards of Article VI at site development/building permit review, unless separation requirement is not met. In such cases, a noticed public hearing is required.

4 Permitted subject to review according to Public Facility Siting Policy.

5 Permitted subject to review procedures of Interlocal Agreement with School Board.

(Ord. No. 97-18, § 2, 12-18-97; Ord. No. 02-13, § 2, 8-1-02; Ord. No. 02-22, § 2, 11-13-02; Ord. No. 03-9, § 2, 6-5-03; Ord. No. 03-36, § 2, 11-12-03; Ord. No. 04-27, § 2, 6-10-04; Ord. No. 04-30, § 2, 6-10-04)

Sec. 2.02.03. Housing Types

The table below indicates the housing types allowed in each zoning district within Hillsborough County. The housing types are arranged across the top. "P" indicates that the use is allowable by right, subject to the standards of this Code. A blank space indicates that the use is prohibited.

TABLE INSET:

HOUSING TYPE				
ZONING DISTRICTS	Single-Family	Duplex	Multi-Family	Mobile Home
AM	P		P 1	P
A	P		P 1	P
AR	P		P 1	P
AS-O.4	P		P 1	P
AS-1	P		P 1	P
ASC-1	P		P 1	
RSC-2	P			
RSC-3	P			
RSC-4	P			
RSC-6	P			
RSC-9	P			
MH	P			P
RDC-6	P	P		

RDC-12	P	P		
RMC-6	P	P	P	
RMC-9	P	P	P	
RMC-12	P	P	P	
RMC-16	P	P	P	
RMC-20	P	P	P	
SB	P			P
OR	P	P	P	
SPI-UC-1	P	P	P	
SPI-UC-2				
SPI-UC-3	P	P	P	

1 Community Residential Homes and Professional Residential Facilities only.

(Ord. No. 01-30, § 2, 11-15-01)

Sec. 2.02.04. Accessory Uses

A. Generally

1. Accessory uses are uses that are on the same lot or in the same structure with, and of a nature and extent customarily incidental and subordinate to, the principal use of the lot or structure. The procedure for review of accessory uses shall be the same as is required for the principal use unless otherwise identified in Table 2.02.02. All required accessory uses for any principal use, including but not limited to off-street parking and loading areas, retention or drainage areas, and private sewer or water systems shall be located on the same parcel as the principal use and shall have the same or similar zoning district designation as the principal use, except in accordance with the Site Development Review Requirements in 5.02.03 of this Code and/or except as expressly permitted elsewhere in this Code. In no case shall the principal or accessory use be located in a zoning district where that use is not either a permitted use or a permissible Conditional or Special Use.

2. Each of the following uses is considered to be a customary accessory use, and as such, may be situated on the same lot with, but detached from, the principal use with which it is associated.

B. Agricultural Mining, Accessory Uses

1. The following uses shall be permitted as accessory uses in the Agricultural Mining District, accessory to an active phosphate mining facility:

- a. Phosphate research activities; which must meet the performance standards in 6.09.00 as measured at the zoning lot line.
 - b. Classrooms.
 - c. Tank farms.
 - d. Warehouses.
 - e. Maintenance and storage facilities.
 - f. Similar uses.
- 2. Such uses shall be engaged only in phosphate connected activities for the phosphate mining activity on the same zoning lot.
- C. Office, Commercial, Industrial, SPI, and PD Districts
 - 1. Automated teller machines.
- D. RMC-9, RMC-12, RMC-16, SPI-UC-1, SPI-UC-2, PD
 - 1. Dormitories.
- E. All Zoning Districts
 - 1. Radio-TV antenna or dish.
 - 2. Guard house, security mobile home or security residence.
 - 3. Off-street parking.

(Ord. No. 02-13, § 2, 8-1-02; Ord. No. 03-9, § 2, 6-5-03)

Sec. 2.02.05. Temporary Uses

A. Allowable Temporary Uses: Non-Residential Zoning Districts

The following temporary uses may be allowable in non-residential zoning districts:

- 1. Neighborhood fairs and circuses.
 - 2. Contractor's temporary office and/or equipment sheds incidental to construction project.
 - 3. Security residences.
 - 4. Temporary vendors.
 - 5. Agricultural offices.
 - 6. Recyclable goods trailers.
- B. Allowable Temporary Uses: Residential Zoning Districts**
 - 1. Temporary manufactured homes due to medical hardship.
 - 2. Temporary manufactured homes while constructing.
 - 3. Neighborhood fairs.
 - 4. Model dwelling units and pre-construction sales offices.
 - 5. Garage, yard sales.
 - 6. Temporary vendors (non-profit).

C. Standards

No more than two permits for temporary uses shall be issued for the same site within a one-year period unless otherwise specified in section 6.11.00.

D. Procedures

Temporary uses shall be issued in accordance with the procedures contained at 10.01.00 for the issuance of development permits.

(Ord. No. 00-38, § 2, 11-2-00)

Appendix 2-2
Land Use Element and Solid Waste
Use Element

Land Use Element:

Growth Management Strategy:

“Goal: Ensure that character and location of land uses optimizes the combined potentials for economic benefit and the enjoyment and the protection of natural resources while minimizing the threat to health, safety and welfare posed by hazards, nuisances, incompatible land uses and environmental degradation.”

Policy A 2.9:

“Prior to the placement of any new or expanded major public facility or public building or grounds, such as landfills, correctional facilities and wastewater treatment plants, the proposed site and possible impacts shall be evaluated in accordance with the criteria specified below:

General Criteria

- a) The County shall provide opportunities at the time of planning and site selection for citizens and neighborhoods to express their viewpoints on major facility siting and design; and in order to ensure neighborhood preservation, the County shall take into consideration the viewpoints of citizens and neighborhoods in the final decision making process in major facility siting and design.
- b) In the planning, siting, land acquisition and development of major public facilities the County shall consider alternatives, including not siting the facility. The alternatives evaluation shall include consideration of such factors as technical aspects of the facility, costs, design, impacts on the environment and availability of public facilities and services, including transportation impacts and future operation and maintenance costs of alternative sites as well as public safety and welfare factors.
- c) Opportunities shall be provided for adjacent property owners and neighbor-hoods to choose to participate in the review process.
- d) The siting process for these facilities shall also avoid any detrimental effects on existing and planned development in the study area as well as consider the ancillary impacts associated with the particular facility and ensure that those uses also will not negatively affect the community.

Policy A-2.10:

New development and redevelopment must mitigate the adverse noise, visual, odor and vibration impacts created by that development upon all adjacent land uses.

Policy B-7.1:

Economic development areas shall be any area with land use designation consistent with the potential impacts of desirable economic growth.

Policy B-7.2:

Economic development areas should be within designated transit corridors.

Policy B-7.3:

Economic development areas shall be within the County's Urban Growth Boundaries.

Electrical Power Generation Facilities

Because of the growth in all classifications experienced by Hillsborough County and projected increases as supported by this Plan, Hillsborough County is expected to require additional electric generation capacity to serve the needs of its citizens in all of their endeavors - industrial, commercial, agricultural and residential. In order to maximize a desirable development pattern and to minimize the potential for adverse impacts upon other types of land uses, it is necessary to provide the policy framework to analyze such facilities based upon various factors, such as the nature of the facility, the compatibility with surrounding uses, the need and obligation of Tampa Electric Company to provide reliable, low cost electric service and the County's obligations to require needed infrastructure for future growth. Development of an Electrical Power Generation Facility (EPGF) is subject to the Goals, Objectives and Policies of the Land Use Element, applicable development regulations and established locational criteria for specific land use.

Objective C-33: To locate future electric power generation facilities in geographical areas which are compatible with such use considering surrounding areas, accessibility to modes of transportation to support the facilities' fuel requirements, enhancement of employment and minimization of any potentially adverse impact to environmentally sensitive areas and residential areas, while balancing Tampa Electric Company's legal obligations to provide reliable, low cost electric service to all citizens in strict compliance with all Federal, State and local environmental laws, rules and regulations.

Policy C-33.1:

Placement of future electric power generating facilities shall be given consideration in areas adjacent to other industrial areas, and/or adjacent to rail and/or adjacent to rail and/or water borne transportation for fuel required to serve that type of use.

Policy C-33.3:

All land approved for an electrical power generation facility shall require a planned unit development rezoning.

Policy C-33.4:

Electric power generating facilities shall have an affirmative duty to protect any environmentally sensitive areas through buffering and/or other mitigating techniques. The environmentally sensitive areas shall be specifically detailed on the site plan submitted as part of the rezoning.

Policy C-33.5:

The location of all electric power generating facilities shall strictly comply with all federal, state, and local laws, rules, and regulations pertaining to the site, certification, permitting,

and environmental requirements pertaining to same. See tables in background report for a listing of the minimum local, state and federal requirements which apply.

Policy C-33.6:

The Board of County Commissioners shall not approve any rezoning for an electrical power generating facility that does not demonstrate adequate protection and reservation of natural resources, including air, water, plant and animal life, and adequate protection of human health, safety and welfare.

Policy C-33.7:

An application for rezoning for the purpose of utilizing land for an Electrical Power Generating Facility may only be filed after submission of an application to the State under the Power Plant Siting Act. Further said zoning application shall include all information required by the State Department of Environmental Protection for initial submission in accordance with the Power Plant Siting Act and any additional studies required by the County. For the purposes of rezoning review the standard time requirements for processing an application shall be waived or otherwise altered to allow appropriate consideration of all information. Any rezoning shall be conditioned upon the issuance of a written order approving in whole, or approving with conditions, the application for power plant siting by the Governor and Cabinet sitting as the Siting Board. If the Siting Board denies the siting, then the zoning shall revert to Agricultural or the zoning in existence at the time of rezoning application if other than Agricultural.

Solid Waste Element:

Goal 1:

Hillsborough County shall provide for an environmentally sound and efficient solid waste management system.

ISSUES: The impact of commercial, industrial and residential growth in Hillsborough County is readily apparent. As growth continues, responsibilities for collections, handling and disposal of the growing volumes of solid waste must be undertaken by the County for its residents. The County government must plan and operate its solid waste management system in an efficient and environmentally sensitive manner.

OBJECTIVE 1.2: The County shall provide for increases in disposal capacity of solid waste facilities to meet future needs.

Policy 1.2.1:

The County shall conduct an annual review of future facility needs and budget for those needs within the Capital Improvements Element.

OBJECTIVE 1.3: The County shall continue to operate solid waste facilities in compliance with minimum air, groundwater and surface water pollution standards established by federal, state and local laws, regulations and guidelines.

Policy 1.3.1:

The County shall conduct an annual review of facility operations and operating practices to evaluate compliance with federal and state requirements.

Policy 1.3.2:

The County shall conduct an annual review of technology and innovations available in solid waste management to exceed federal and state requirements.

Policy 1.3.3:

Based on annual reviews, county staff shall provide recommendations of measures to correct or enhance the existing solid waste management system.

Policy 1.3.4:

The level of service to be maintained by all facilities shall be as stated in the Capital Improvements Element.

OBJECTIVE 1.5: The County's solid waste management system shall take all practical measures to minimize the volume of the solid waste stream.

Policy 1.5.1:

The County shall continue recycling programs to separate the majority of newspaper, glass, plastic bottles, steel cans and aluminum cans reaching County disposal facilities.

Policy 1.5.2:

The County shall continue to review and implement recycling and waste reduction programs designed to reduce the per capita solid waste stream reaching County disposal facilities in compliance with state legislative guidelines.

The proposed County resource recovery facility, has been evaluated to determine whether it is consistent with the Comprehensive Plan. As presented in Section 2.2.2.1 of this chapter, the definition of Public/Quasi-Public refers to the Goals, Policies, and objectives of the 2015 Hillsborough Comprehensive Plan. In order to determine consistency, the development proposal has been considered within the context of the standards and criteria found within those Goals, Policies and Objectives.

Appendix 2-3
Siting Board's Final Order

State of Florida



Commissioners:

JOSEPH P. CRESSE
GERALD L. (JERRY) GUNTER, Chairman
SUSAN WAGNER LEISNER
JOHN R. MARKS, III
KATIE NICHOLS

Executive Director
DAVID L. SWAFFORD
(904) 488-7181

Public Service Commission

November 7, 1983

Received DER

NOV 9 1983

Mr. Hamilton S. Oven, Jr., P.E.
Administrator, Power Plant Siting
Department of Environmental Regulation
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32301

P P S

Dear Mr. Oven:

The attached orders constitute the Commission's final reports, as required by Section 403.507(1)(b) of the Power Plant Siting Act, on the applications of Pinellas and Hillsborough Counties for power plant certification.

As the orders indicate, the matter was handled in the form of a Proposed Agency Action. No person requested a hearing within the required time; therefore, the Commission's finding that a need exists for the proposed plants has become final.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "D. Swafford", written over the typed name.

DAVID L. SWAFFORD
Executive Director

DLS/cd

CC: Commissioners
Electric & Gas Department
Legal Department
Department of Community Affairs
Hillsborough County
Pinellas County

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition by Hillsborough County) DOCKET 830419-EU
for determination of need for a solid) ORDER NO. 12610
waste-fired cogeneration power plant.) ISSUED: 10-14-83

The following Commissioners participated in the disposition of this matter:

GERALD L. GUNTER, Chairman
JOSEPH P. CRESSE
JOHN R. MARKS, III
KATIE NICHOLS
SUSAN W. LEISNER

NOTICE OF PROPOSED AGENCY ACTION

ORDER

BY THE COMMISSION:

Under the Florida Electrical Power Plant Siting Act, Section 403.501, Florida Statutes, the Commission is charged with the responsibility of determining whether construction of a proposed electrical generation facility is necessary to meet the present or expected need for electricity in all or part of Florida. Under the Act, the Department of Environmental Regulation must determine whether the proposed plant will comply with all relevant environmental standards and whether the proposed site for the plant is suitable for that use. Weighing all of these determinations, the Governor and Cabinet, sitting as the Power Plant Siting Board, ultimately determine whether approval will be granted for construction of the proposed plant.

Certification under the Act must be obtained for the construction of any generating facility greater than 50 MW, and may be obtained for a smaller facility. Hillsborough County has elected to seek certification of its proposed 39 MW small power production facility, by a petition filed on August 30, 1983.

Hillsborough County proposes to construct and operate a solid waste-fired electrical generating facility using 1,200 tons of municipal solid waste per day as its primary fuel source. In anticipation of its expected needs, Hillsborough County seeks certification for an ultimate site electrical generating capacity of 39 megawatts (gross), using 1,600 tons per day of municipal solid waste fuel. This is a small power production facility within the meaning of PURPA and Rules 25-17.80 through 25-17.87, Fla. Admin. Code.

The proposed plant will ultimately produce 39-megawatts of power which will be sold to Tampa Electric Company. The projected in-service date for the unit is July, 1987, with construction scheduled to begin in the summer of 1984. In its first year of production, the plant will make available for sale to Tampa Electric, about 13 MW on an annual average basis. Generation will continue to increase as the supply of fuel increases and the ultimate capacity available for sale to Tampa Electric will reach about 30 MW on an annual average basis in the late 1990's.

While the Power Plant Siting Act requires the Commission to determine whether a need exists for the proposed generating facility, the purpose of the Commission's need determination is to protect electric utility ratepayers from unnecessary expenditures. The statute lists four criteria the Commission must consider in determining need:

DOCUMENT NO.

10-14-83

- 1) the need for electrical system reliability and integrity;
- 2) the need for adequate electricity at a reasonable cost;
- 3) whether the proposed plant is the most cost effective alternative available; and
- 4) conservation measures taken or reasonably available that might mitigate the need for new plant (Sec. 403.519, F.S.)

Congress and the Florida Legislature have determined that cogeneration and small power production should be encouraged on the premise that they constitute alternate sources of power that either displace production of fossil fuel electricity or use fossil fuels more efficiently. Moreover, the proliferation of cogeneration and small power production facilities may obviate the need for construction of additional generating facilities by electric utilities. Therefore, in the present context, we find that the County's proposed small power production facility will increase electrical system reliability and integrity and will maintain the supply of adequate electricity at a reasonable cost while reducing our dependence on fossil fuel. When viewed as an alternative to construction of additional generating facilities by electric utilities, and considering the permissible level of payments to small power producers outlined in Rules 25-17.80 through 25-17.87, Florida Administrative Code, the proposed facility is the most cost effective alternative available. Finally, construction of the plant is a conservation measure which we have encouraged precisely because it may mitigate the need for additional construction by electric utilities. Therefore, the relief sought in this petition, an affirmative determination of need, will be and the same is hereby granted. It is, therefore,

ORDERED by the Florida Public Service Commission that this Order constitute the final report required by Section 403.507(1)(b), Florida Statutes, the report concluding that a need exists, within the meaning of Chapter 403, Florida Statutes, for the construction of the 39 MW generating facility proposed by Hillsborough County, Florida. It is further

ORDERED that a copy of this Order be furnished to the Department of Environmental Regulation, as required by Section 403.507(1)(b), Florida Statutes. It is further

ORDERED that any person adversely affected by the action proposed herein may file a petition for a formal proceeding, as provided in Rule 25-22.29, within 21 days of the date of this order, November 4, 1983, in the form provided by Rule 25-22.36(7)(a) and (f). It is further

ORDERED that in the absence of such a petition, this Order shall become effective and final as provided by Rule 25-22.29(6), as stated in a subsequent order.

By Order of the Florida Public Service Commission, this
14th day of OCTOBER 1983.

(S E A L)

BED


STEVE TRIBBLE
COMMISSION CLERK

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition of Hillsborough County) DOCKET NO. 830419-EU
for determination of need for a solid) ORDER NO. 12678
waste-fired cogeneration power plant.) ISSUED: 11-14-83

CONSUMMATING ORDER

BY THE COMMISSION:

By Order No. 12610, this Commission proposed to take certain action, subject to a Petition for Formal Proceeding as provided in Rule 25-22.29, Florida Administrative Code. No response has been filed to the order and it has become effective. It is, therefore,

ORDERED by the Florida Public Service Commission that this Order constitute the final report required by Section 403.507(1)(b), Florida Statutes, the report concluding that a need exists, within the meaning of Section 403, Florida Statutes, for the construction of the 39 MW generating facility proposed by Hillsborough County, Florida. It is further

ORDERED that a copy of this Order be furnished to the Department of Environmental Regulation, as required by Section 403.507(1)(b), Florida Statutes. It is further

ORDERED that Order No. 12610 be and the same is hereby determined to be effective and final on November 4, 1983, as provided in Rule 25-22.29(6), Florida Administrative Code. It is further

ORDERED that this docket be closed.

By ORDER of the Florida Public Service Commission, this day 14th of November, 1983.


Steve Tribble
COMMISSION CLERK

(S E A L)

BED

DOCUMENT NUMBER-DATE

09537 NOV 14 1983

FPSC COMMISSION CLERK

RECEIVED
11/15/83

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

IN RE: HILLSBOROUGH COUNTY)
RESOURCE RECOVERY PROJECT) CASE NO. 84-2789
POWER PLANT SITING CERTIFICATION) (LAND USE HEARING)
APPLICATION PA 84-19.)

RECOMMENDED ORDER

Pursuant to notice, an administrative hearing was held before Diane D. Tremor, Hearing Officer with the Division of Administrative Hearings, on October 22, 1984, in Tampa, Florida. The sole issue for determination at the hearing, pursuant to Section 403.508(2), Florida Statutes, is whether the site selected for Hillsborough County's proposed resource recovery facility is consistent and in compliance with existing land use plans and zoning ordinances.

APPEARANCES

For Hillsborough County:	David S. Dee and Jacob D. Varn Carlton, Fields, Ward, Emmanuel, Smith & Cutler, P.A. P.O. Box 190 410 Lewis State Bank Tallahassee, Fl. 32301
For the Department of Environmental Regulation:	Charles G. Stephens and James L. Torres Twin Towers Office Building 2600 Blairstone Road Tallahassee, Fl. 32301
For the Department of Community Affairs:	C. Lawrence Keesev 2571 Executive Center Circle Tallahassee, Fl. 32301
For the Greater Brandon Citizens Alliance:	Thomas Cone Blain & Cone, P.A. 202 Madison Street Tampa, Fl. 33602

INTRODUCTION

Pursuant to the Florida Electrical Power Plant Siting Act, Sections 403.501 - 403.517, Florida Statutes, Hillsborough County filed, on August 2, 1984, an application for power plant site certification for a resource recovery facility. The statutory scheme calls for both a land use hearing and a certification hearing. This land use portion of the proceeding pertains to the

sole issue of whether or not the proposed site conforms with existing land use plans and zoning ordinances.

In support of its position of conformance, Hillsborough County adduced the testimony of seven witnesses and its Exhibits 1-7, 11, 14-17, 19, 20, 27A-G, 30, 31, 34, 36-38, 42, 44, 50, 51, 53, 54, and 56 were received into evidence. Testifying on Hillsborough County's behalf were: Robert Hauser, Jr., an engineer with Camp Dresser & McKee (CDM), who was accepted as an expert witness in the areas of solid waste management disposal, including resource recovery facilities; Dr. Marc Rogoff, the coordinator of the Hillsborough County resource recovery program; Donald F. Elias, the supervisor of the Atmospheric Sciences Division of CDM, who was accepted as an expert in the areas of air pollution, noise, odor, and resource recovery; William Oliver, an engineer who was accepted as an expert in the area of transportation analysis; Gary Engelhardt, Hillsborough County's Zoning Administrator, who was accepted as an expert in zoning and land use planning; James Stutzman, a senior planner at the Hillsborough County City-County Planning Commission, who was accepted as an expert in zoning and land use planning; and Richard Eric Gehring, the district director of the consulting firm of Post, Buckley, Schuh and Jernigan, who was accepted as an expert in zoning and land use planning. Hillsborough County also introduced the deposition testimony of three expert witnesses: Richard Klusza, a real estate appraiser; Paul Darst, a senior planner with the Department of Community Affairs; and David McDevitt, a planner with the Department of Community Affairs.

The Department of Community Affairs, the Department of Environmental Regulation and the Southwest Florida Water Management District are parties to this proceeding, pursuant to Section 403.508, Florida Statutes. They stipulated prior to the hearing that they do not dispute Hillsborough County's contention that the proposed project is consistent and compatible with the local land

use plan and zoning regulations. The Department of Environmental Regulation introduced one exhibit to establish proof of publication of notice for the land use hearing. The Department of Environmental Regulation and the Department of Community Affairs did not call any witnesses. The Southwest Florida Water Management District did not participate at the land use hearing.

Prior to the hearing, the Greater Brandon Citizens Alliance ("Alliance") filed notice of its intent to be a party. At the hearing, however, the Alliance's counsel presented an opening argument and then withdrew the Alliance's request to be a party. Counsel for the Alliance also explained that the Alliance had voluntarily dismissed with prejudice its lawsuit challenging the validity of the zoning and land use plan for the proposed Hillsborough County resource recovery facility.

One witness testified as a member of the general public. Barbara Stillie, a member of the Board of Directors of the Greater Brandon Chamber of Commerce, testified that the Chamber opposed the proposed facility on the grounds that it would negatively impact the residential and business atmosphere and the orderly and healthy growth of the area.

Subsequent to the hearing, Hillsborough County submitted proposed findings of facts and proposed conclusions of law. The other parties did not submit proposed orders. To the extent that Hillsborough County's proposed findings of fact are not included in this Recommended Order, they are rejected as being not supported by competent substantial evidence adduced at the hearing, irrelevant or immaterial to the issues in dispute or as constituting legal conclusions as opposed to factual findings.

FINDINGS OF FACT

Upon consideration of the oral and documentary evidence presented at the hearing as well as the parties' prehearing stipulations of fact, the following relevant facts are found:

The Site:

1. Hillsborough County desires to build a resource recovery facility and a wastewater treatment plant on an undeveloped 50 acre parcel of land ("the site") owned by the County and situated in an unincorporated area of Hillsborough County. The site is located approximately 5 miles east of downtown Tampa, 2.5 miles northwest of the unincorporated community of Brandon, 0.6 mile north of State Road 60 and 0.75 mile west of the Interstate 75 by-pass.

The site is an open, grassy pasture with a few trees, and is presently used for grazing. It is not an environmentally sensitive or pristine area. There are no viable wetlands on the site.

2. The proposed site is bounded by a railroad track on the south, a TECO 230 KV electric transmission line corridor on the west, Faulkenburg Road and a pipe fabrication facility on the east and approximately 300 acres of improved pastureland on the north. Hillsborough County owns the site, the pasture to the north and the land used by the pipe fabricating facility.

3. Nine square miles (5600 acres) of land around the site are designated in the local comprehensive plan for industrial development. Approximately 80% of the land within one mile of the site is zoned for light industrial use. There are many existing industrial facilities in the area, including a pipe fabrication facility, two cement batch plants, a foundry, a garbage collection company with a garbage truck storage area, an automobile battery manufacturer, a bagging company and an oil reprocessing plant which is on the Environmental Protection Agency national priority list of hazardous waste sites.

4. Although there are a few homes scattered along Faulkenburg Road, they constitute nonconforming land uses in this industrial district. The resource recovery facility will be built on the western portion of the 50-acre site and will be more than 1700 feet (560 yards) from the nearest home. The nearest residential subdivision, Woodbury Estates, is 4200 feet (.79 mile) away from the resource recovery building. This subdivision is located

on the far (east) side of the Interstate 75 by-pass. Since the interstate highway is elevated in this area, it forms a natural dividing line or buffer between the industrial and residential areas.

The Resource Recovery Facility and Wastewater Treatment Plant

5. The primary purpose of the proposed resource recovery facility is to receive solid waste and convert it into electrical power. This "waste to energy" facility will initially have 3 boilers, will dispose of 1200 tons of refuse each day and will produce 29 MW of electricity. A fourth combustion unit will be added in the future. With the fourth unit, the facility will use 1600 tons of refuse each day and produce 39 MW of electricity. Mass burn technology will be used and refuse will be the sole combustion fuel. It would take 280,000 barrels of oil each year to produce the same amount of electricity at a power plant. Over the 20-year life of the facility, Hillsborough County will recover the energy equivalent of 5.6 million barrels of oil. The electricity will be sold to TECO, thus reducing the cost of solid waste management.

6. The resource recovery facility and the .75 MGD (eventually to be increased to 3.0 MGD) wastewater treatment plant will be owned by Hillsborough County and operated by a private company under a 20-year contract. It is intended that the facility and the plant will work as an integrated system. The wastewater treatment plant will provide process and cooling water for the resource recovery plant. No groundwater will be used. The resource recovery plant will dispose of treated effluent from the wastewater treatment plant by evaporation. The wastewater treatment plant will treat the liquid wastes from the resource recovery plant. If approval for the on-site wastewater treatment plant cannot be obtained, effluent from another wastewater treatment facility would be brought to the site. Ash and residue will be taken from the resource recovery plant to the Southeast Hillsborough County Landfill for disposal.

7. The site development plans for the entire project contemplate that enclosed refuse trucks will enter the facility from Faulkenburg Road. The trucks will be weighed in the scale house area, proceed up a ramp into the enclosed refuse receiving-unloading building and then exit back onto Faulkenburg Road. The facility consists of the refuse receiving-unloading building, the refuse storage and crane area building, the boiler house portion of the building and the air pollution control system and residue processing portions of the building. There will be an administration building, an electrical switch yard and parking areas. The maximum building height is 140 feet (the boiler building) and the maximum elevation on the flue gas stack is 220 feet. Trees and shrubbery will be planted around the site to provide screening and buffering.

Local Comprehensive Plan

8. The Hillsborough County land use map is part of the local comprehensive plan, known as the Horizon 2000 Plan. Prior to February of 1984, the site was designated on the land use map as Light Industrial. The types of uses allowed in such areas are industrial activities that create a minimal degree of impact on the surrounding environment, particularly in terms of non-objectionable levels of noise, vibration, dust or odors. In February of 1984, the land use map was amended so as to change the designation of the proposed site for the resource recovery facility from Light Industrial to "Public/Semi-Public." The amendment to the land use map was formally reviewed and approved by four different groups in Hillsborough County. First, the amendment was reviewed and approved by the staff of the Hillsborough County City-County Planning Commission, which reviews all proposed amendments to the comprehensive plan. Second, the amendment was reviewed and approved by the staff of the Department of Development Coordination. The Department of Development Coordination submits comments to the Planning Commission concerning any amendment to the local comprehensive plan. Third, the change was approved by a

unanimous vote of the Planning Commission. Finally, it was approved by a unanimous vote of the Board of County Commissioners. The Board found that the proposed site for the resource recovery facility was compatible with the Light Industrial designation contained in the Horizon 2000 Plan, and that the redesignation to Public/Semi-Public was designed to provide notice on the land use map of the existence of a public facility.

9. The Public/Semi-Public land use designation is used to identify the location of existing or proposed public facilities that have unique significance to the community. For example, this designation is used to identify the location of the Tampa International Airport, the University of South Florida and the Hillsborough Heights Landfill. The proposed resource recovery facility and wastewater treatment plant are major public facilities that will provide unique benefits to the citizens of Hillsborough County.

Zoning

10. The proposed site was formerly zoned as Restricted Industry or "M-1A." In May of 1984, zoning on the site was changed to Community Unit District or "C-U." During the review and rezoning process, several public hearings were held and members of the public were provided an opportunity to express their views about the project. The rezoning was reviewed and approved by six different entities or individuals. Specifically, it was approved by the staff of the Planning Commission; the staff of the Department of Development Coordination; various agencies in Hillsborough County, including the Health Department, Traffic Department, and Hillsborough County Environmental Protection Commission; the Zoning Administrator for Hillsborough County; an independent zoning hearing master who conducted an evidentiary hearing; and a unanimous vote of the Board of County Commissioners.

11. According to the zoning regulations, the purpose of the "C-U" zone is to provide the maximum in development opportunities, subject to reasonable restrictions on height, area,

setback, etc. While the "C-U" zone is not limited as to the types of land uses that are permissible, facilities built in a "C-U" zone must be compatible with surrounding land uses. To determine whether the proposed facility will be compatible with other uses of the land surrounding the proposed site, it is necessary to examine the external impacts anticipated from construction or operation of the resource recovery facility.

External Impacts

12. The resource recovery facility and wastewater treatment plant will be one of the most attractive industrial developments in the area. The project has been designed to resemble an office building and the site will have extensive landscaping, including trees, shrubs and berms. The facility will be fully enclosed to minimize noise, odor, dust and other off-site impacts. The impacts associated with the facility will, in most instances, be less than the impacts associated with the existing industrial uses in the area.

13. The operation of the resource recovery facility will increase noise levels by less than 3 decibels at the nearest residence, which is 1700 feet away from the resource recovery building. An increase of 3 decibels is the limit of perceptibility for the normal person. The noise level at the nearest subdivision, located on the other side of I-75, would not be affected. It would be completely masked by existing noise levels.

14. The resource recovery facility will not produce any objectionable odors off-site. The refuse will be unloaded in an enclosed area inside the resource recovery building. The unloading ("tipping") area will be under negative air pressure. The air in the tipping area will be drawn into the furnace, and heat in the furnace will destroy any odiferous compounds in the air. No refuse, ash or other material will be stored outside of the building.

15. The proposed Hillsborough County resource recovery facility must comply with the Florida and national ambient air

quality standards. The Clean Air Act expressly states that those standards were established to protect the public health and welfare, with an adequate margin of safety.

The proposed facility is designed to minimize any potential air pollution. During normal operating conditions, there will be no smoke emissions from the facility. Less than one percent of the time, during severe wintertime conditions, a trace of a condensation plume at the top of the stack might appear, but it would evaporate quickly. At full operation, the proposed sulphur and sulphur dioxide emissions rate for this facility is 23.1 grams per second. As a comparison, the TECO Big Bend Units 1 through 3 emissions are approximately 8,000 grams per second.

16. Except during the construction phase, there will be no dust created by the facility itself under normal operating conditions. Entrance roads will be paved and maintained and the facility is enclosed and maintained under negative pressure.

17. The proposed facility will have very little effect on traffic in the area. Traffic from the resource recovery facility and wastewater treatment plant will comprise less than five percent (5%) of the capacity on Faulkenburg Road and less than one percent (1%) on State Road 60. The County uses a 5% threshold to determine whether there will be a negative impact on traffic. Traffic from the resource recovery facility will have no effect on the peak or rush hour traffic conditions. The proposed facility will generate less traffic and will have less impact on peak hour conditions than a typical light industrial development that could otherwise be built on this site. A site this size associated with light industrial use could typically be expected to generate about 2,650 vehicle trips per day. When the proposed facility is operating at full capacity, approximately 650 vehicle trips per day are anticipated.

18. The proposed facility will not adversely affect the

value of either the existing nearby industrial properties or vacant land in the area. The site surrounding a similar and larger resource recovery facility in Pinellas County is experiencing a great deal of new residential, commercial and industrial development.

Additional Facts

19. The Hillsborough County zoning regulations and comprehensive plan do not expressly designate a particular zoning or land use category for resource recovery facilities. An electrical power plant is one of the uses designated for a "heavy" as opposed to a "light" industrial area. While the proposed facility will burn refuse and produce electricity, it should not be equated to either an incinerator or a power plant because of its technological superiority to a conventional incinerator and its smallness in size as compared to a typical power plant. It will not have the offensive off-site impacts in terms of dust, noise, odor and air pollution that normally occur at an incinerator or power plant.

20. The Department of Community Affairs (DCA), the Department of Environmental Regulation (DER), and the Southwest Florida Water Management District do not dispute Hillsborough County's contention that the project is consistent and compatible with local zoning regulations and the local comprehensive plan. The DCA has concluded that the project is consistent with the goals, objectives, and policies of the State Comprehensive Plan.

21. Notice of the land use hearing was published in the Tampa Tribune on September 7, 1984, and also in the Florida Administrative Weekly on September 7 and September 14, 1984.

CONCLUSIONS OF LAW

The sole issue for determination in this land use portion of the proceeding is whether the proposed Hillsborough County resource recovery facility site is consistent and in compliance with land use plans and zoning ordinances in effect as of the date of the application for power plant site certification.

Case No. 84-2789

Honorable Bob Graham
Governor
State of Florida
The Capitol
Tallahassee, Fl. 32301

Steve Tribble, Clerk
Public Service Commission
101 E. Gaines Street
Tallahassee, Fl. 32301

Honorable Jim Smith
Attorney General
State of Florida
The Capitol
Tallahassee, Fl. 32301

Honorable Doyle Conner
Commissioner of Agriculture
The Capitol
Tallahassee, Fl. 32301

Honorable Ralph Turlington
Commissioner of Education
The Capitol
Tallahassee, Fl. 32301

Honorable George Firestone
Secretary of State
The Capitol
Tallahassee, Fl. 32301

Honorable Bill Gunter
State Treasurer and Insurance
Commissioner
The Capitol
Tallahassee, Fl. 32301

Honorable Gerald Lewis
Comptroller
State of Florida
The Capitol
Tallahassee, Fl. 32301

David Dee and Jacob Varn, Esquires
P.O. Box 190
410 Lewis State Bank
Tallahassee, Fl. 32301

Charles Stephens and James Torres, Esquires
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Fl. 32301

C. Lawrence Keesev, Esquire
2571 Executive Center Circle
Tallahassee, Fl. 32301

Thomas Cone, Esquire
202 Madison Street
Tampa, Fl. 33602

Karen Lloyd
Southwest Florida Water Management District
5060 U.S. 41 South
Brooksville, Fl. 33512

BEFORE THE GOVERNOR AND CABINET
OF THE STATE OF FLORIDA

RECEIVED

DEC 21 1984

Dept. of Environmental Regulation
Office of General Counsel

IN RE: HILLSBOROUGH COUNTY)
RESOURCE RECOVERY PROJECT)
POWER PLANT SITING CERTIFICATION) DOAH CASE NO. 84-2789
APPLICATION PA 83-19) (SITE CERTIFICATION HEARING)

FINAL ORDER OF CERTIFICATION

BY THE GOVERNOR AND CABINET:

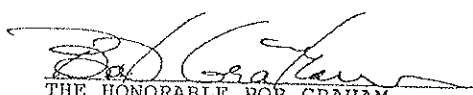
The Governor and Cabinet, sitting as the Siting Board,
having reviewed the Recommended Order which is attached hereto as
Exhibit 1, and otherwise being fully advised herein, issue this
Final Order and, therefore, it is

ORDERED:

1. The Recommended Order (dated November 9, 1984)
prepared by the Hearing Officer in this case is approved and
adopted.
2. The conditions of certification attached to the
Recommended Order as Appendix "A" are approved and adopted.
3. The certification of the Hillsborough County
resource recovery facility is specifically subject to the
conditions of certification contained in Appendix "A."
4. Pursuant to Section 403.504(13), Florida Statutes,
the Department of Environmental Regulation shall retain \$5,000.00
from Hillsborough County's application fee to verify the emission
rates from the facility in accordance with the conditions of
certification.

DONE AND ORDERED this 20th day of December, 1984,
in Tallahassee, Florida, pursuant to the vote of the Governor and
Cabinet, sitting as the Siting Board, at a duly constituted
Cabinet meeting on December 18, 1984.

FOR THE GOVERNOR AND CABINET,
SITTING AS THE SITING BOARD


THE HONORABLE BOB GRAHAM
Governor

The action of the Siting Board is based on the following vote:

	<u>For</u>	<u>Against</u>	<u>Absent</u>
Honorable Bob Graham	✓		
Honorable George Firestone			✓
Honorable Bill Gunter	✓		
Honorable Gerald A. Lewis	✓		
Honorable Jim Smith	✓		
Honorable Ralph D. Turlington	✓		
Honorable Doyle Conner	✓		

FILING AND ACKNOWLEDGEMENT

Filed, on this date, pursuant to
Section 120.52(10), Florida Statutes
(1983), with the designated Department
Clerk, receipt of which is hereby
acknowledged.

Aiane M. Kiser
Clerk

12/21/84
Date

Copies furnished to:
(See attached list)

COPIES FURNISHED TO:

Jacob D. Varn, Esquire
David S. Dee, Esquire
Post Office Drawer 190
Tallahassee, Florida 32302

Honorable Bob Graham
Governor
The Capitol
Tallahassee, Florida 32301

Gary Stephens, Esquire
Assistant General Counsel
State of Florida Department
of Environmental Regulation
2600 Blairstone Road
Tallahassee, Florida 32301

Honorable George Firestone
Secretary of State
The Capitol
Tallahassee, Florida 32301

C. Lawrence Keesey, Esquire
Department of Community Affairs
Howard Building
2572 Executive Center Circle
Tallahassee, Florida 32301

Honorable Jim Smith
Attorney General
The Capitol
Tallahassee, Florida 32301

Karen A. Lloyd, Esquire
Southwest Florida Water
Management District
2379 Broad Street
Brooksville, Florida 33512

Honorable Bill Gunter
Treasurer and Insurance
Commissioner
The Capitol
Tallahassee, Florida 32301

Bonnie E. Davis, Esquire
Public Service Commission
101 East Gaines Street
Tallahassee, Florida 32301

Honorable Gerald Lewis
Comptroller
The Capitol
Tallahassee, Florida 32301

Hamilton S. Oven, Jr.
Department of Environmental
Regulation
Twin Tower Office Building
2600 Blairstone Road
Tallahassee, Florida

Honorable Doyle Conner
Commissioner of Agriculture
The Capitol
Tallahassee, Florida 32301

Diane D. Tremor
Hearing Officer
Division of Administrative
Hearings
The Oakland Building
2009 Apalachee Parkway
Tallahassee, Florida 32301

Honorable Ralph D. Turlington
Commissioner of Education
The Capitol
Tallahassee, Florida 32301

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

IN RE: HILLSBOROUGH COUNTY	)	
RESOURCE RECOVERY PROJECT	)	
POWER PLANT SITING CERTIFICATION	)	CASE NO. 84-2789
APPLICATION PA 84-19.	)	(SITE CERTIFICATION
	)	HEARING)

RECOMMENDED ORDER

Pursuant to notice, an administrative hearing was held before Diane D. Tremor, Hearing Officer with the Division of Administrative Hearings, on November 8, 1984, in Tampa, Florida. The issue for determination at the hearing was whether the application for Power Plant Site Certification filed by Hillsborough County, Florida, for the construction and operation of a resource recovery facility should be approved and site certification granted by the Governor and Cabinet, sitting as the Siting Board.

APPEARANCES

For Hillsborough County:	Jacob D. Varn and David S. Dee, Carlton, Fields, Ward, Emmanuel, Smith & Cutler, P.A. P.O. Box 190 410 Lewis State Bank Tallahassee, Fl. 32301
For the Department of Environmental Regulation:	Charles G. Stephens Twin Towers Office Building 2600 Blairstone Road Tallahassee, Fl. 32301
For the Department of Community Affairs:	David Jordan 2571 Executive Center Circle Tallahassee, Fl. 32301

INTRODUCTION

Pursuant to the Florida Electrical Power Plant Siting Act, Sections 403.501 through 403.517, Florida Statutes, Hillsborough County filed, on August 2, 1984, an application for the construction and operation of a resource recovery facility. The statutory scheme calls for both a land use hearing and a certification hearing. The land use hearing was held on October 22, 1984, and, in a Recommended Order dated November 9, 1984, the undersigned concluded that the

proposed site is consistent and in compliance with existing land use plans and zoning ordinances.

At the certification hearing held on November 8, 1984, the parties stipulated that the transcript and exhibits from the prior land use hearing should be included and incorporated as a part of the evidentiary record. Accordingly, Hillsborough County's Exhibits 1-7, 11, 12, 14-17, 19, 20, 27A-G, 30, 31, 34, 36-38, 42, 44, 50, 51, 53, 54, 56, DER Exhibit 1, and the transcript of the testimony of seven witnesses were accepted into evidence as a portion of the record of this proceeding.

In support of its application for site certification, Hillsborough County adduced the testimony of six witnesses and its Exhibits 27H, 27I, 37, 47, 48, 58, 59 and 60 were received into evidence. Testifying on behalf of the applicant were Robert Hauser, Jr., who was accepted as an expert witness in the areas of solid waste management and disposal, including resource recovery facilities; Dr. Robert Powell, who was accepted as an expert witness in the areas of surface water and groundwater hydrology; Louis R. Tortora, Jr., who was accepted as an expert witness concerning wastewater disposal and treatment facilities; Donald F. Elias, who was accepted as an expert witness in the areas of air pollution, noise, odor, and resource recovery; Clair Fancy, the Deputy Bureau Chief in the DER Bureau of Air Quality Management, who was accepted as an expert in air pollution control and engineering; and Hamilton Owen, Jr., the Administrator of DER's program for power plant siting, who was accepted as an expert concerning power plant siting and the Department's requirements.

The Department of Community Affairs (DCA), the Department of Environmental Regulation (DER), the Public Service Commission (PSC), and the Southwest Florida Water Management District (SWFWMD) are parties to this proceeding, pursuant to Section 403.508, Florida Statutes. The DER and the DCA participated at the hearing, but did not call any witnesses. The DER's Exhibit 2 was received into evidence.

No individual, group or agency spoke in opposition to the project at the site certification hearing. No public witnesses testified at the hearing. No one asked to intervene as a party to the site certification hearing.

Subsequent to the hearing, Hillsborough County submitted proposed findings of fact and proposed conclusions of law. The other parties did not submit proposed orders. To the extent that Hillsborough County's proposed findings of fact are not included in this Recommended Order, they are rejected as being not supported by competent substantial evidence adduced at the hearing, irrelevant or immaterial to the issues in dispute or as constituting legal conclusions as opposed to factual findings.

The following findings of fact and conclusions of law should be considered in conjunction with the Recommended Order dated November 9, 1984, entered by the undersigned Hearing Officer for the land use portion of this proceeding.

FINDINGS OF FACT

Upon consideration of the oral and documentary evidence presented at the hearing, as well as the parties' prehearing stipulations of fact, the following relevant facts are found:

The Site

1. Hillsborough County desires to construct and operate a resource recovery facility and a wastewater treatment plant on an undeveloped 50 acre parcel of land located in an unincorporated area of Hillsborough County. The site is an open, improved pasture that is currently used for grazing. Nine square miles surrounding the proposed site are zoned for industrial development. The site is bounded by a railroad track, a TECO 230 KV electric transmission line corridor, a pipe fabrication facility, and improved pasture. There are numerous existing industrial facilities in the area near the site.

2. The proposed site is presently owned by Hillsborough County. It is not an environmentally sensitive or pristine area. There are no viable wetlands on the site, and it is not in the 100

year flood plain. No rare, threatened or endangered animal or plant species have been detected on the site. No significant archaeological or historical areas have been found on the site.

Construction Impacts

3. Construction of the proposed resource recovery facility is expected to take about 34 months. The subsurface conditions on site are typical of the area and the site is suitable for the planned construction. Access roads, enclosed refuse unloading areas, boilers, cooling towers, air pollution control equipment, and associated facilities will be built. An advanced secondary sewage treatment plant, with a capacity of 3 million gallons per day, will be built on the site after the appropriate permits are issued in a separate permitting proceeding.

4. Since the site and the surrounding industrial areas have already been disturbed by prior human activities, the construction of the resource recovery facility should not have any adverse impact on the environment or endangered species. There will be some short-term increases in noise and dust during construction, typical of any large construction project. The noise will not adversely affect the industrial neighborhood surrounding the site, and watering is planned for dust depression.

5. Some small increase in storm water run-off is expected as a result of the removal of vegetation in the construction areas. Several stormwater retention basins will be built to collect, detain and filter stormwater run-off during construction. The basins were designed to comply with all of the applicable DER and SWFWMD requirements. The basins will retain and filter the first $\frac{1}{2}$ inch of run-off over a 72-hour period. The basins also will regulate the volume and rate of flow of stormwater leaving the site.

6. Hillsborough County will dewater the area where the refuse bunker will be built. The dewatering activities will not last more than 6 months or adversely affect groundwater conditions. SWFWMD permits are not required for this type of site dewatering. Dewatering the site will not affect wells located off-site, since the maximum draw-down in the water table at the property boundary

would range from 1.5 to 3.5 feet.

7. If necessary, the water collected during the dewatering activities will be filtered through the stormwater basins before it is discharged. The water discharged from the basins will not have any significant impact on the quality or quantity of the water downstream. This discharge will be subject to the conditions of a National Pollutant Discharge Elimination System (NPDES) permit from the United States Environmental Protection Agency.

8. There will be no dredge and fill activity in connection with the proposed project, and no wells will be installed. There will be no construction on state sovereignty lands, and the County will not use or cross the property of any other local, state or federal agency. Hillsborough County will not need any variances to construct or operate the resource recovery facility, and it has certified that the project is consistent with the Florida Coastal Management Program.

9. Hillsborough County will not build any linear facilities or transmission lines in conjunction with this facility. The site is located adjacent to an existing TECO transmission line corridor, and TECO will connect the resource recovery facility to its transmission line network.

Plant Operations

10. When the resource recovery facility is built, enclosed refuse trucks will deliver municipal solid waste to the facility. The trucks will unload the refuse into the sealed refuse bunker inside the resource recovery facility. The refuse will be deposited by crane in a hopper that leads into the furnace. The refuse will be burned in the furnace to produce heat, which will be used to produce steam in the boiler, which will be used to produce electricity in a turbine generator.

Operational Impacts on Water Resources

11. Hillsborough County will not use any surface or groundwaters at the site to operate the resource recovery plant. The resource recovery facility will use treated effluent from a wastewater treatment plant for cooling and process water. Potable water will be obtained from an existing water main, and no water or injection

wells for this project will be required.

12. There will not be any discharge of liquid waste into any surface or ground waters. Liquid wastes (e.g., blow-down) from the resource recovery plant will be used to wet the ash before it is taken to the county landfill for disposal. Excess liquid waste will go to the wastewater treatment plant.

13. There is very little chance of any surface or ground-water pollution occurring at the resource recovery plant because the facility does not have any holding ponds, cooling ponds, coal piles, sludge piles, or other typical sources of water pollution. The refuse, ash and residue will be kept in sealed bunkers inside the fully enclosed resource recovery building.

14. When the resource recovery facility is operating, stormwater run-off at the site will be collected and filtered through stormwater basins. The water discharged from the stormwater basins will not materially affect the quality or quantity of the water downstream.

Air Quality

15. The resource recovery facility is designed to minimize any potential air pollution, and will utilize the best available control technology (BACT). It will not burn hazardous waste or sewage sludge, and will only use municipal solid waste as fuel.

16. Hillsborough County conducted a detailed study of the existing air quality at the site, which included five years of meteorological data. This data was used in a computer model approved by the Environmental Protection Agency to calculate the maximum ground-level pollutant concentrations that might occur as a result of the resource recovery facility. Hillsborough County's computer analysis utilized a very conservative approach which was designed to maximize the potential impacts of the proposed facility.

17. The potential emissions and impact of many pollutants were evaluated. The analyses show that the maximum predicted emissions from the proposed resource recovery facility are far below all of the applicable air quality standards. Other analyses demonstrated

that the emissions from the facility would not adversely affect sensitive receptors, such as the Class I Chassahowitzka National Wilderness Area, or other air quality related values, such as soils, vegetation and visibility.

18. State and federal law require Hillsborough County to utilize the best available control technology. In this case, a high efficiency electrostatic precipitator will be used to control particulate matter and certain metals. The design of the facility and good operating procedures will control the emissions of carbon monoxide and nitrogen oxides. Sulfur dioxide emissions will be limited by burning only municipal solid waste, a low sulfur content fuel.

Benefits of the Resource Recovery Facility

19. Hillsborough County's "waste to energy" facility will dispose of solid waste and produce electricity. Initially, it will dispose of 1200 tons of refuse each day and produce 29 megawatts (MW) of electricity. After it is expanded in the future, the resource recovery plant will dispose of 1600 tons of refuse each day and produce 39 MW of electricity.

20. By producing electricity from solid waste instead of fossil fuel, Hillsborough County will conserve non-renewable resources. Over a 20 year operational period, the energy equivalent of 5.6 million barrels of oil will be recovered, representing a savings of \$156 million. When burning 1600 tons of refuse per day, the County will recover the energy equivalent of 150,000 tons of coal each year.

21. Burning the refuse reduces its volume by 90 percent. By reducing the volume of material to be landfilled, the resource recovery facility will eliminate the need for approximately 17.5 million cubic yards of space at landfills.

22. The proposed resource recovery facility will utilize "mass burn" technology, a technology proven to be a reliable form of resource recovery at a great number of facilities located throughout the world. Hillsborough County has conducted several

studies which show that the proposed mass burn resource recovery facility is the most reliable, cost effective method of long-term solid waste disposal for Hillsborough County.

Agency Recommendations

23. Pursuant to Section 403.519, Florida Statutes, the Florida Public Service Commission (PSC) made an affirmative determination that there is a need for the resource recovery facility. Noting that Congress and the Florida Legislature have encouraged such facilities because they constitute alternative sources of power which displace the production of electricity with non-renewable fossil fuels, the PSC found that the proposed resource recovery facility:

"will increase electrical system reliability and integrity and will maintain the supply of adequate electricity at a reasonable cost while reducing our dependence on fossil fuel."

24. The Florida Department of Commerce reviewed the proposed project and concluded that:

"In addition to its efficient use of solid waste, this project has the secondary benefit of improving the image of the Tampa Bay Area as a good location for high technology industry. When our Development Representatives are conducting plant site tours in Hillsborough County, this project will be a visible example of an efficient use of resources by local government.

The Hillsborough County Resource Recovery Project is consistent with the goals and programs of the Florida Department of Commerce."

25. The Tampa Bay Regional Planning Council (TBRPC) found that the project is consistent with the TBRPC's adopted growth policy. The proposal also is consistent with the TBRPC policy of encouraging research, development and implementation of resource recovery.

26. The Florida Department of Community Affairs evaluated the proposed project and concluded that it is consistent with the goals, objectives and policies of the State Comprehensive Plan.

27. The Southwest Florida Water Management District determined that the project will comply with all of the applicable SWFWMD requirements, including the requirements for stormwater basins, site dewatering, and the consumptive use of water. Since SWFWMD encourages the reuse of water, SWFWMD also endorsed Hillsborough County's plan

to reuse water at the resource recovery facility.

28. The Department of Natural Resources (DNR) concluded that the project would not affect any state lands. The DNR and the Florida Game and Fresh Water Fish Commission had no comments concerning the project.

29. The Hillsborough County Environmental Protection Commission reviewed the plans for the proposed project and raised several potential issues. Those issues were considered by the Department of Environmental Regulation and addressed in the proposed conditions of site certification.

30. The Department of Environmental Regulation coordinated the agency review process for this facility. Based on its independent evaluation and the reports submitted to it by the various agencies that reviewed the proposed project, the DER concluded that Hillsborough County has given reasonable assurances that the resource recovery project will comply with all of the applicable environmental rules and regulations. For this reason, DER recommended in its report, and stipulated prior to the site certification hearing, that the project should be approved, subject to the conditions of site certification that are attached to this Recommended Order. DER also stipulated that the project is consistent with the Florida Resource Recovery and Management Act, Chapter 403, Part IV, Florida Statutes (1983).

31. Notice of the site certification hearing was published in the Tampa Tribune on October 6, 1984. Notice was also published in the Florida Administrative Weekly on October 5, 1984, in Volume 10, Number 40. A news release was given to the Florida Information Bureau in Tallahassee on October 8, 1984.

CONCLUSIONS OF LAW

Adequate and sufficient notice of the site certification hearing has been given to all parties and to the general public. Sections 403.501 through 403.517, Florida Statutes, known as the "Florida Electrical Power Plant Siting Act," governs this proceeding. In a statement of legislative intent, Section 403.502 provides:

"It is the policy of this state that, while recognizing the pressing need for increased power generation facilities, the state shall ensure through available and reasonable methods that the location and operation of electrical power plants will produce minimal adverse effect on human health, the environment, the ecology of the land and its wildlife, and the ecology of state waters and their aquatic life. It is the intent to seek courses of action that will fully balance the increasing demands for electrical power plant location and operation with the broad interests of the public."

When performing this balancing test, recognition is to be given to the need for abundant, low cost electrical energy; assurances that the operational safeguards of the facility are technically sufficient to protect the citizens of Florida; and a reasonable balance between the need for the facility and the environmental impacts resulting from the construction and operation of the facility. Section 403.502, Florida Statutes.

In this proceeding, the applicant has demonstrated by competent, substantial evidence that its proposed resource recovery facility will provide abundant, low cost electrical energy and, at the same time, reduce the cost of solid waste management. The construction and operational safeguards have also been demonstrated to be technically sufficient for the welfare and protection of the citizens of Florida. The construction and operation of the facility, if performed in accordance with the terms of the application and the proposed conditions of certification, will not adversely affect the quality or quantity of surface water or ground water at or near the site, or otherwise contribute to a violation of water quality standards. Likewise, if the facility is built and constructed in accordance with the application and in compliance with the conditions of site certification, it will meet all state and federal ambient air quality standards. Hillsborough County has stipulated that it accepts and can and will comply with the proposed conditions of site certification. Thus, the balance between the need for the facility and the environmental impact from construction and operation of the facility has been achieved.

All of the reports, studies and comments required by Section

403.507, Florida Statutes, have been completed and presented to the Department of Environmental Regulation. All such reports and comments, including those from local and regional agencies, were favorable to the certification of the proposed resource recovery plant. The proposed project has been demonstrated to be in compliance with all applicable environmental rules and regulations and with other state laws. The Department of Environmental Regulation has recommended certification of the facility at its ultimate capacity of 39 MW, subject to the conditions of certification attached to this Recommended Order. In summary, it is concluded that the construction and operation of the resource recovery facility at the proposed site will comply with all applicable statutes, rules, regulations and criteria of the State of Florida and, therefore, is entitled to certification, with conditions, pursuant to Chapter 403, Florida Statutes.

RECOMMENDATION

Based upon the entire record in this proceeding and the findings of fact and conclusions of law contained in this Recommended Order, it is

RECOMMENDED that Hillsborough County be granted certification by the Governor and Cabinet, sitting as the Siting Board, for the location, construction and operation of the proposed resource recovery facility at its ultimate site capacity of 39 megawatts, subject to the conditions of site certification attached to this Recommended Order as Appendix "A".

Respectfully submitted and entered this 28th day of November, 1984, in Tallahassee, Florida.


DIANE D. TREMOR, Hearing Officer
Division of Administrative Hearings
The Oakland Building
2009 Apalachee Parkway
Tallahassee, Florida 32301
(904) 488-9675

Filed with the Clerk of the Division
of Administrative Hearings this 28th
day of November, 1984.

Copies furnished:

See attached page

Case No. 84-2789

Honorable Bob Graham
Governor
State of Florida
The Capitol
Tallahassee, Fl. 32301

Steve Tribble, Clerk
Public Service Commission
101 E. Gaines Street
Tallahassee, Fl. 32301

Honorable Jim Smith
Attorney General
State of Florida
The Capitol
Tallahassee, Fl. 32301

Honorable Doyle Conner
Commissioner of Agriculture
The Capitol
Tallahassee, Fl. 32301

Honorable Ralph Turlington
Commissioner of Education
The Capitol
Tallahassee, Fl. 32301

Honorable George Firestone
Secretary of State
The Capitol
Tallahassee, Fl. 32301

Honorable Bill Gunter
State Treasurer and Insurance
Commissioner
The Capitol
Tallahassee, Fl. 32301

Honorable Gerald Lewis
Comptroller
State of Florida
The Capitol
Tallahassee, Fl. 32301

David Dee and Jacob Varn, Esquires
P.O. Box 190
410 Lewis State Bank
Tallahassee, Fl. 32301

Charles Stephens and James Torres, Esquires
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Fl. 32301

C. Lawrence Keesev and David Jordan, Esquires
2571 Executive Center Circle
Tallahassee, Fl. 32301

Thomas Cone, Esquire
202 Madison Street
Tampa, Fl. 33602

Karen Lloyd
Southwest Florida Water Management District
5060 U.S. 41 South
Brooksville, Fl. 33512

Appendix 3
Final Draft Materials Separation Plan
for Hillsborough County, Florida

Hearing Transcripts

HILLSBOROUGH COUNTY
FLORIDA

SOLID WASTE MANAGEMENT DEPARTMENT

PUBLIC MEETING

DATE: Monday, October 3, 2005

TIME: 7:00 p.m. - 7:08 p.m.

PLACE: Resource Recovery Facility
350 Faulkenburg Road
Tampa, Florida 33619

REPORTED BY: MS. CATHY J. JOHNSON MESSINA
NOTARY PUBLIC, RPR

APPEARANCES

NAME	AFFILIATION	PHONE NUMBER
THOMAS SMITH	Hillsborough County Solid Waste	813-276-2909
DANNIE BENNETT	Hillsborough County Solid Waste	813-992-1221
JOSEPH TRESHLER	Covanta Energy	727-856-2917
DAN STROBRIDGE	Camp, Dresser & McKee	813-281-2900
JASON GORRIE	Camp, Dresser & McKee	813-281-2900
GLENN HOAG	Covanta Hillsborough	813-684-5688
DAVID DEE, ESQ.	Landers & Parsons, P.A.	850-681-0311

1 (WHEREUPON, the following Public
2 Meeting was held at 7:05 p.m.):)

3 MR. SMITH: My name is Thomas Smith. I'm with the
4 Hillsborough County Solid Waste Management Department.

5 I'd like to officially open this public meeting to
6 receive public comment on the Preliminary Draft Materials
7 Separation Plan for Hillsborough County.

8 The plan was prepared in compliance with the
9 requirement set forth in 40 CFR 60.57b. This is done and is
10 part of the expansion of the Hillsborough County energy
11 facility.

12 Do we have any documents that we want to enter into
13 the record at this point?

14 MR. DEE: Yes. My name is David Dee. I'm an
15 attorney with the law firm of Landers and Parsons in
16 Tallahassee. I'm assisting the County with the efforts to
17 obtain the environmental permits for the expansion of the
18 facility.

19 For the record, I'd like to introduce the notice
20 that was published in the Tampa Tribune on Monday,
21 August 29th, 2005, announcing this meeting and identifying the
22 agenda and the issues that were to be discussed tonight in
23 compliance with the requirements of Federal law.

24 I'd also like to introduce as Exhibit Number 2 a
25 copy of the Preliminary Draft Materials Separation Plan that's

1 been prepared for Hillsborough County. This is the plan that
2 is the subject of tonight's meeting.

3 At this time, it would be appropriate to have the
4 other people here in attendance identify themselves and
5 identify their affiliation or their business organization.

6 MR. TRESHLER: Joseph Treshler, Covanta Energy.

7 MR. DEE: And Covanta is the operator of this
8 facility, right?

9 MR. TRESHLER: We're the operator of the facility.

10 MR. HOAG: Glenn Hoag, Facility Manager, Covanta
11 Hillsborough.

12 MR. GORRIE: Jason Gorrie, Camp, Dresser & McKee.
13 We're the independent engineer for Hillsborough County Solid
14 Waste.

15 MR. STROBRIDGE: I'm Dan Strobridge also with CDM.

16 MR. DEE: These gentlemen were brought to the
17 hearing tonight so that they could receive comments about the
18 plan, describe the plan to the public and respond to questions
19 from the public.

20 At this time, however, there are no members of the
21 public here to provide us with comments.

22 The opportunity for submitting written comments
23 will continue until October 5th. And unless there are any
24 other issues that need to be addressed, I would recommend that
25 we adjourn the hearing at this time.

1 MR. SMITH: Second the motion.

2 MR. DEE: The meeting is adjourned.

3
4 (WHEREUPON, the Public Meeting adjourned
5 at 7:08 p.m.)
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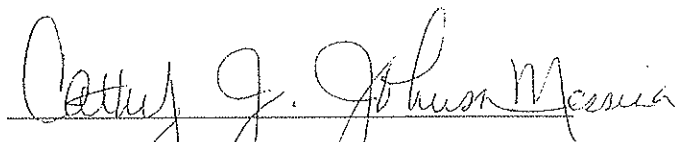
1 STATE OF FLORIDA)

2 COUNTY OF HILLSBOROUGH)

3 I, CATHY J. JOHNSON MESSINA, Registered Merit
4 Reporter and Notary Public in and for the State of Florida at
5 large, hereby certify that the Public Hearing was recorded in
6 Stenotypy by me and that the foregoing pages constitute a true
7 and correct transcription of my recordings thereof.

8 I FURTHER CERTIFY that I am neither an attorney
9 nor of counsel for the parties to this cause nor a relative or
10 employee of any attorney or party connected with this
11 litigation and that I have no interest in the outcome of this
12 action.

13 WITNESS my hand and seal this 4th
14 day of October, 2005, at Tampa, Hillsborough County,
15 Florida.

16
17 
18 Court Reporter
19 My Commission Expires:

20 TRANSCRIPT ORDERED: 10-03-05
21
22
23
24
25



Hillsborough County, Florida

Final Draft Materials Separation Plan for Hillsborough County, Florida

October 2005

Contents

Section 1	Introduction	
1.1	Purpose.....	1-1
1.2	Background and Overview.....	1-1
Section 2	Solid Waste Management System	
2.1	Service Area	2-1
2.2	Facilities and Components	2-1
2.3	Solid Waste Agreements	2-3
2.4	Waste Quantities and Projections	2-4
2.4.1	Population Projections	2-4
2.4.2	Municipal Solid Waste	2-4
2.4.3	Recycling	2-5
Section 3	Materials Separation Plan	
3.1	Objectives	3-1
3.2	Materials Separation Strategy	3-1
3.3	Materials Separation Program	3-1
3.3.1	Curbside Recycling.....	3-2
3.3.2	Yard Waste.....	3-2
3.3.4	Household Hazardous Waste	3-2
3.3.5	Tires	3-2
3.3.6	Commercial Recycling	3-2
3.3.7	Electronics.....	3-3
3.3.8	Ferrous Materials Recovery.....	3-3
3.3.9	Public Education and Interaction	3-3
3.4	New Programs.....	3-3
Section 4	Alternative Disposal Options	

Figures

2-1	Hillsborough County and Neighboring Counties.....	2-1
2-2	County Unincorporated Areas.....	2-2
2-3	Hillsborough County Population Projections.....	2-4
2-4	Hillsborough County Projected Solid Waste Tonnages.....	2-5
2-5	Hillsborough County Historical Recycling	2-6

Section 1

Introduction

1.1 Purpose

This document is the final draft Materials Separation Plan for Hillsborough County (County). The County has prepared this document because the County plans to expand the combustion capacity of its solid waste resource recovery facility (SWRRF or Facility). This final draft Materials Separation Plan has been prepared in compliance with the requirements set forth in 40 CFR 60.57b.

1.2 Background and Overview

In 1984, Hillsborough County (County) was authorized to construct and operate its Facility pursuant to the Florida Electrical Power Plant Siting Act and other applicable laws. The Facility commenced commercial operations in 1987.

The Facility burns approximately 1,200 tons of municipal solid waste (MSW) each day. The heat from the combustion process is used to generate steam, which is used to generate approximately 29 megawatts (MW) of electricity. Since the Facility generates electricity by using MSW as fuel, instead of oil, the Facility reduces the need to use oil for the production of electricity. In this fashion, the Facility displaces the use of approximately 1,200 barrels of oil/day¹.

The County also operates a comprehensive recycling program, which meets the State of Florida's 30% recycling goal. The County's recycling program reduces the amount of material that must be processed at the Facility; however, there is no cost-effective method to recycle all of the MSW that is generated in the County. The County uses the Facility to recover energy, and reduce the volume of MSW that is not recycled.

The County currently generates more MSW than the Facility can process. Moreover, the amount of MSW generated in the County is increasing as a result of population growth. Given the ever-increasing quantities of MSW, the County proposes to expand the processing capacity of its Facility, rather than increase the amount of MSW sent to its landfill for disposal.

In 1999, the County developed a comprehensive plan for the unincorporated portions of the County. This plan includes a master plan for handling solid waste. The solid waste master plan describes the existing systems and the projected needs for solid waste management in Hillsborough County. The solid waste master plan is based on the following goals:

- To provide an environmentally sound and efficient solid waste management system; and

¹ Themelis, Nickolas J., Millrath, Karsten, "The Case for WTE as a Renewable Source of Energy," 12th North American Waste to Energy Conference (NAWTEC12).

- To handle all hazardous waste in a manner that minimizes risk to the citizens and the environment.

The master plan identifies specific objectives that shall be met to accomplish the County's goals. In summary, the major objectives are:

- Strict adherence to all federal and state regulations, including, but not limited to, the regulations concerning the protection of air quality, groundwater and surface water quality, and the management of hazardous waste;
- Continue the County's recycling program and strive to meet or exceed the State of Florida's recycling goal of 30 percent; and
- Maintain comprehensive hazardous waste management and emergency response programs.

The County continues to accomplish its solid waste goals and objectives with an integrated solid waste management system (System). The System has three major components:

- A Recycling Program, which reduces the amount of material that must be taken to the County's Facility or landfill for disposal;
- A Resource Recovery Facility, which reduces the volume of material that must be taken to the County's landfill; and
- A Landfill, which is used for the disposal of ash from the Facility and the disposal of materials that cannot be recycled or processed at the Facility.

The County's solid waste master plan also requires that the System must be financially and environmentally responsible.

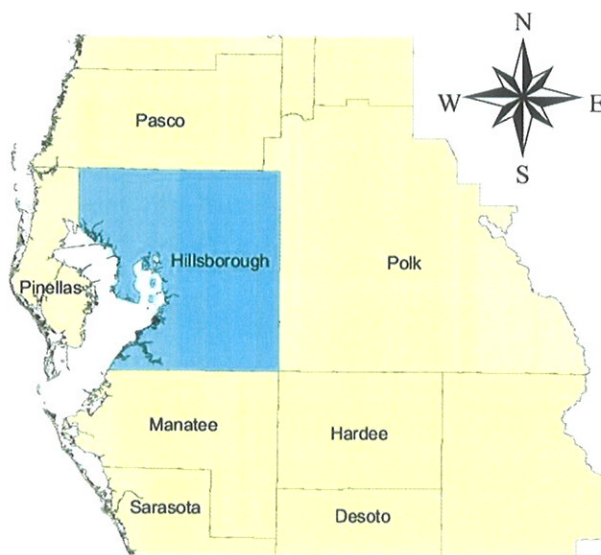
Section 2 of this document describes the County's solid waste management system in more detail. Section 3 describes the components of the County's materials separation plan (Plan) and the anticipated additions to the Plan. Section 4 describes alternative disposal options.

Section 2

Solid Waste Management System

2.1 Service Area

Hillsborough County has provided residential and commercial solid waste collection and disposal services since 1955. The County provides solid waste collection service twice each week to all of the unincorporated residential areas in the County. Garbage collection is mandatory. The County's three franchise haulers provide the County's collection service to the County's residents. Businesses also must use one of the County's three franchise haulers for their collection needs. The County's service area also includes all of the areas that were annexed into the cities of Tampa and Temple Terrace after June 1983. **Figure 2-1** shows the general location of Hillsborough

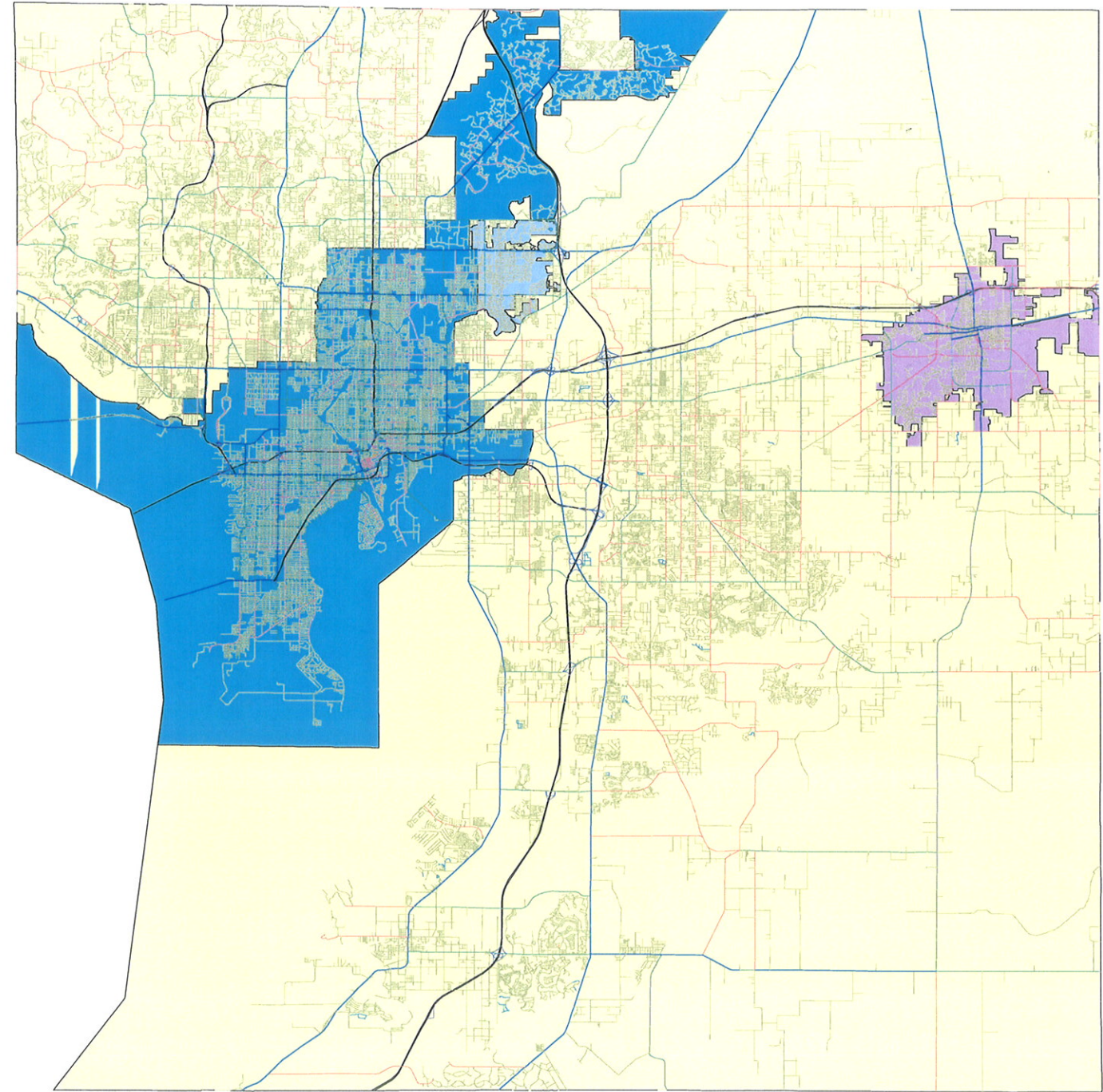


County. **Figure 2-2** shows the County and the city limits of the Cities of Tampa, Plant City and Temple Terrace.

2.2 Facilities and Components

The County operates an integrated solid waste management system. The System includes the following:

- Figure 2-1**
Hillsborough County and Neighboring Counties
- Southeast County Landfill, Tire Processing and Leachate Treatment Facility – This facility contains a Class I landfill and encompasses 175 acres. Ash from the Resource Recovery Facility, non-processible waste, and bypass waste are disposed in the landfill. The landfill also accepts solid waste from the Cities of Temple Terrace and Plant City, as well as ash and MSW from the City of Tampa.
 - Hillsborough County Resource Recovery Facility – The Facility processes approximately 1,200 tons of MSW daily. The Facility is composed of three combustion units, and each unit has the capacity to process approximately 400 tons of MSW each day. The combustion units generate enough steam to produce approximately 29 MW of electricity in a steam turbine generator.
 - Northwest Transfer Station, Community Collection Center and Yard Waste Processing Facility – This transfer station has the capacity to handle approximately 600 tons of MSW per day. MSW delivered to the transfer station is taken to the



- Hillsborough County
- City of Tampa
- City of Plant City
- Temple Terrace



Resource Recovery Facility for processing. The transfer station also has collection bins for scrap metal, tires, motor oil, lead-acid batteries, and other recyclables.

- Hillsborough County Yard and Wood Waste Processing Facility – This 16-acre site produces wood chips, fuel, mulch, and compost from yard waste and wood waste. This site is permitted as a composting facility by the FDEP. It is adjacent to the Hillsborough County Resource Recovery Facility. The County also collects yard and wood waste at the South County and Northwest County Transfer Stations.
- Hillsborough Heights Community Collection Center – This is a community collection center where residents can drop-off MSW, scrap metal, tires, lead-acid batteries and recyclables.
- Alderman Ford Community Collection Center – This is a community collection center, which accepts MSW from County residents, as well as scrap metal, tires, lead-acid batteries and recyclables.
- Wimauma Community Collection Center - This community collection center also accepts MSW from County residents, as well as scrap metal, tires, lead-acid batteries and recyclables. One Saturday each month, this facility collects household hazardous waste, including cleaners, paint, pool chemicals, lawn and garden chemicals, and similar materials.
- Sheldon Road Household Chemical Collection Center – Household hazardous wastes are collected at this facility once per month. The facility collects cleaners, paint, pool chemicals, lawn and garden chemicals, and other similar household hazardous wastes.
- South County Transfer Station, Community Collection Center and Yard Waste Processing Facility – This facility collects MSW from commercial haulers, as well as yard waste and recyclables from County residents.
- Waste Tire Processing Facility – This facility receives waste tires from licensed waste tire haulers and the County's transfer stations. Tires are shredded into 2-inch chips for use as cover at the County's landfill.

2.3 Solid Waste Agreements

To provide economical, efficient, and environmentally responsible solid waste service, the County has entered into agreements with multiple organizations. These agreements include:

- Facility operating agreement – The County has entered into a 20-year agreement for the operation of the County's Resource Recovery Facility. This contract has been extended through 2027 subject to certain conditions. Under this contract, the

Facility currently is operated by Covanta (formerly Ogden Martin Systems of Hillsborough, Inc.).

- Electrical power purchase agreement – Power generated at the Facility is sold to Tampa Electric Company (TECO) pursuant to this agreement.
- Franchise hauler agreements – Franchised haulers collect MSW at the residential curbside twice each week pursuant to these franchise agreements. The haulers collect recyclable materials and yard waste once per week. The County currently holds agreements with three waste haulers: East Bay Sanitation, Kimmins Recycling and Waste Management of Tampa.

2.4 Waste Quantities and Projections

2.4.1 Population Projections

Hillsborough County is experiencing rapid growth, as is the majority of the State of Florida. **Figure 2-3** shows historical population estimates and population projections for Hillsborough County. Historical population estimates are taken from the data collected by the United States Bureau of Census. Future population estimates were obtained from the Bureau of Economic and Business Development Research (BEBR) at the University of Florida.

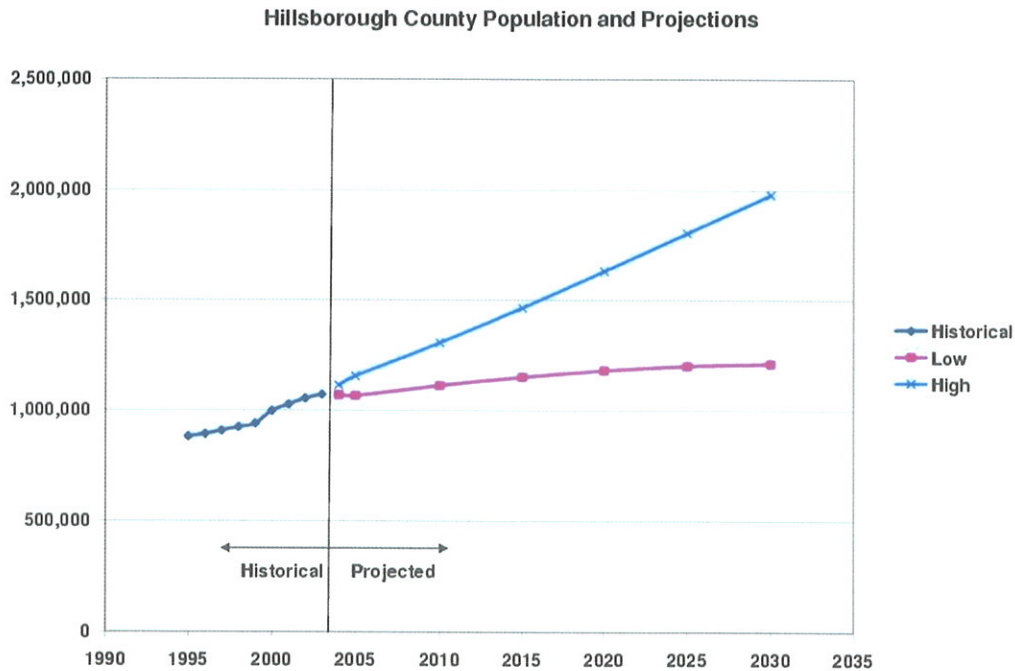


Figure 2-3
Hillsborough County Population Projections

2.4.2 Municipal Solid Waste

The County receives municipal solid waste at its transfer stations, resource recovery facility, and landfill. **Figure 2-4** shows historical tonnages and future projections. The projections in **Figure 2-3** assume that MSW production will increase at the same rate as the County's population¹. These projections include the MSW generated in the entire county, including the Cities of Tampa, Temple Terrace, and Plant City. The County operates all of the solid waste processing facilities within the incorporated and unincorporated areas of Hillsborough County, except for those facilities operated by the City of Tampa, such as the McKay Bay Waste-to-Energy facility.

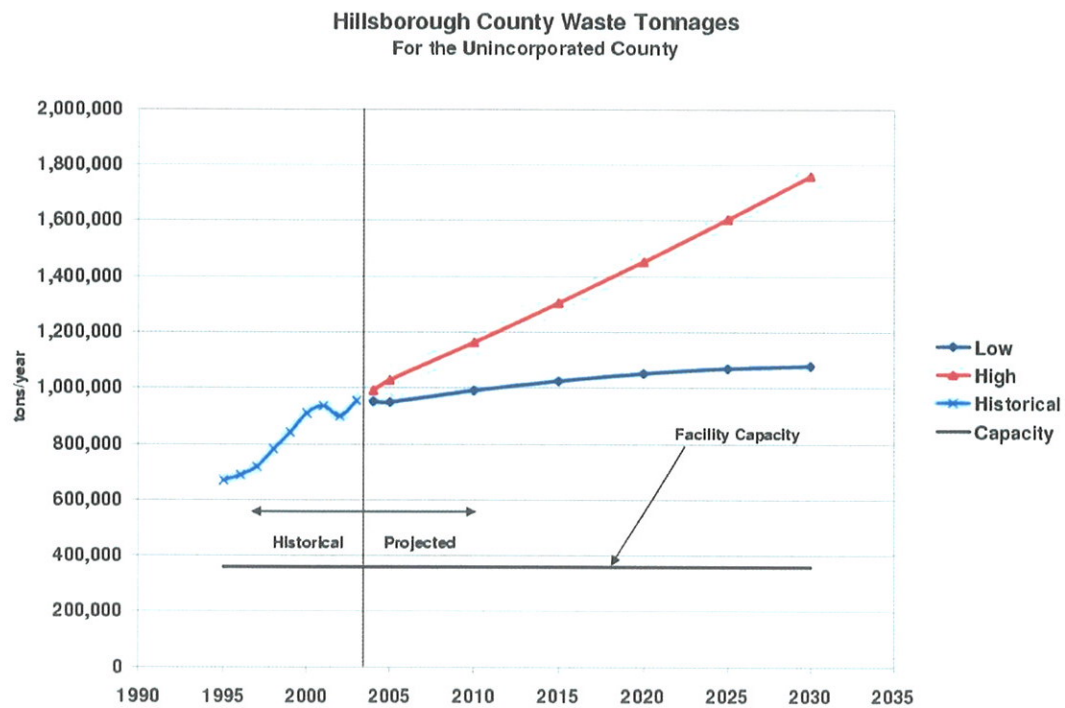


Figure 2-4
Hillsborough County Projected Solid Waste Tonnages

The Resource Recovery Facility processes approximately 360,000 tons of MSW each year. The unincorporated portion of the County generates approximately 1,000,000 tons of MSW each year. Currently, the amount of MSW generated in the County exceeds the Facility's capacity. Waste generation is expected to increase within the "high" and "low" projections as shown in **Figure 2-4**.

2.4.3 Recycling

Hillsborough County intends to continue meeting or exceeding the State of Florida's recycling goal of 30 percent. **Figure 2-5** shows historical recycled materials for the

¹ The observed "spike" in delivered tonnages in the late 1990's is the result of a change in solid waste accounting practices as relates to yard waste, which is not processed at the resource recovery facility.

unincorporated sections of the County. This shows that the County has consistently recycled 30 percent of its generated MSW.

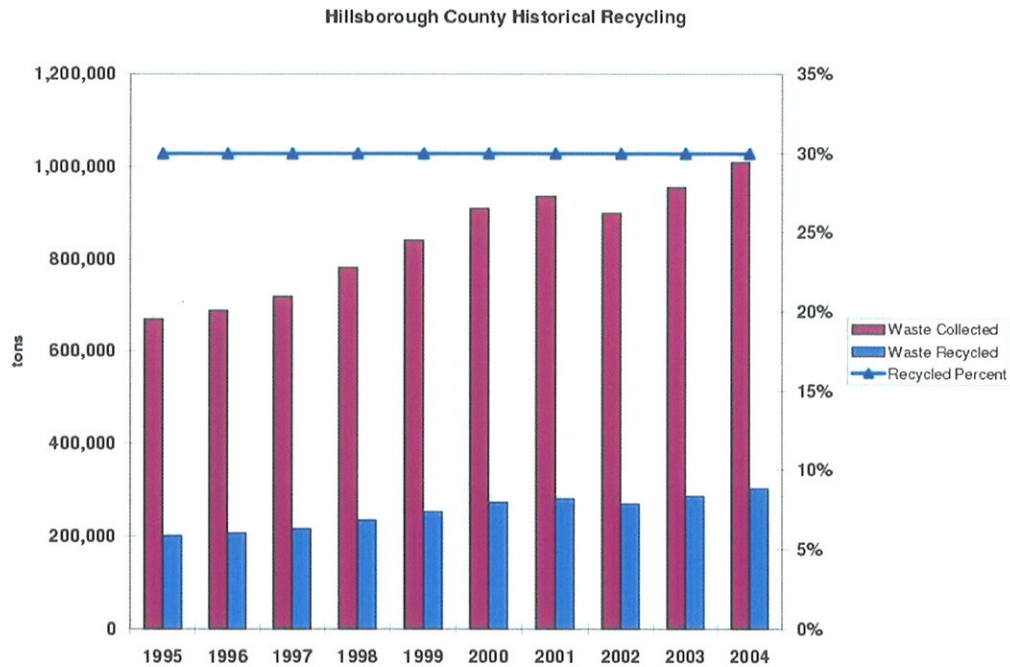


Figure 2-5
Hillsborough County Historical Recycling

As discussed above in Section 1, the amount of solid waste remaining after recycling and source reduction exceeds the current capacity of the Resource Recovery Facility. This excess tonnage is diverted to the County's Southeast Landfill for disposal.

Section 3

Materials Separation Plan

3.1 Objectives

Hillsborough County intends to meet or exceed the 30 percent recycling goal set by the State of Florida. The County has been successful in achieving this goal each year since the late 1990's. Recycling is a crucial component of the County's integrated waste management system. This section provides a summary of the County's recycling program, including improvements the County is planning to make to enhance its program.

3.2 Materials Separation Strategy

The County is committed to increasing waste recycling and waste reduction activities in the County. Part of the County's strategy involves providing public education and increasing public awareness of the County's recycling programs.

As indicated above, the County already has facilities to recycle the following materials:

- Yard Waste;
- White Goods;
- Waste Tires;
- Household Hazardous Waste;
- Electronic Waste;
- Ferrous Metals;
- Recyclable Materials from Commercial Property;
- Recyclable Materials from Residential Property;
- Recyclable Materials from County Offices.

The County's plan for recycling each of these materials is discussed in more detail below.

3.3 Materials Separation Program

The County achieves a considerable portion of its materials diversion and recycling success by providing for the collection of certain recyclable materials that have been separated by the resident or business. The County mandates the separation of yard waste from MSW. Franchise haulers collect recycled materials curbside in residential

areas of the unincorporated portion of the County. The County also maintains collection facilities where County residents and business can drop off many types of recyclable items, including glass, paper, plastic, cardboard, motor oil, white goods, household hazardous waste, and electronic waste.

3.3.1 Curbside Recycling

The County provides weekly, curbside pickup of recyclables to all residents in the unincorporated portion of the County through private franchise contractors. The County also provides recycling bins to residents for easy separation of paper, glass, metal and plastic. Two privately owned materials recovery facilities accept and process these materials. These two facilities will accept a variety of recyclable material, including aluminum cans, glass bottles and jars, multiple types of paper, wood waste, tin cans, cardboard, plastic bottles, Christmas trees, and some yard waste. The curbside recycling program collects approximately 30,000 to 40,000 tons of recyclables each year from the unincorporated areas in the County.

3.3.2 Yard Waste

In 1997, the County mandated that all yard waste must be separated from garbage and other types of MSW. Yard waste may be isolated in plastic bags or containers. Yard waste, other than grass clippings and leaves, may also be left curbside in bundles or boxes. Yard waste is collected weekly. Residents may also deliver yard waste directly to processing facilities. The yard waste is processed and sold as mulch, soil amendment and biomass fuel.

3.3.4 Household Hazardous Waste

Household hazardous waste includes a variety of items, such as chemical cleaners, paint, solvents, pool chemicals, lawn and garden chemicals, and similar materials. The County maintains three facilities to collect household hazardous waste. Each facility accepts waste on one Saturday per month, resulting in 36 collections per year. The County collects about 120,000 tons per year of household hazardous waste. Most of the collected materials are used by the County or recycled. Materials that are not used or recycled are taken to licensed disposal facilities.

3.3.5 Tires

The County receives about 22,000 tons of tires annually. Tires are transferred to the Waste Tire Processing Facility (WTPF) and shredded into 2-inch chips. These chips are then used for landfill cover or disposed of in the South County Landfill.

3.3.6 Commercial Recycling

Commercial recycling is voluntary in Hillsborough County. Currently, businesses are responsible for delivering their own recyclables to the appropriate facilities.

3.3.7 Electronics

The County currently collects electronic waste at the household hazardous waste collection sites, along with other household hazardous waste. The County plans to increase the frequency of collection in the near future. Collected items include computer monitors, cell phones, CD and tape players, televisions, etc.

3.3.8 Ferrous Materials Recovery

Unlike other recyclables, most ferrous material is recovered after being processed at the Resource Recovery Facility. Ferrous material is collected, post-combustion, from the ash. A large magnet separates ferrous material from the ash. The County recycled over 130,000 tons of ferrous material in 2002.

3.3.9 Public Education and Interaction

The County recognizes that recycling is a joint project between the County and its citizens. As a result, the County has multiple programs to educate its citizens about the County's recycling and waste reduction programs. Citizens have become involved in recycling programs and, in cooperation with the County, have formed a Recycling Task Force and Keep Hillsborough County Beautiful.

The Recycling Task Force is a volunteer organization made up of citizens representing each district in the County. This organization develops educational publications and organizes special events and media campaigns to promote recycling and waste reduction. In particular, the Task Force sponsors the "Art of Recycling" program in Hillsborough County schools.

The County also creates publications and education programs. The County releases a quarterly newsletter/report on solid waste management in the County called "The Recycling Planet". This report is readily available to the public on the County's website. The County also provides funding to the Hillsborough County Cooperative Extension Service so that they can hold composting workshops, "Enviroshopping" seminars, a compost and mulch demonstration site, and 4-H recycling education programs.

3.4 New Programs

Previously, e-waste was collected four times each year. Beginning in January 2005, the County started collecting e-waste at the household hazardous waste collection sites, when these sites were open to collect household hazardous waste. This increased e-waste collection to 36 times per year.

In order to increase the recycling efforts of small business, the County plans to provide pick-up service to small business. Hauling recyclables can be cost prohibitive for small businesses. The County will provide this service with the same haulers that provide residential collection services.

Section 4

Alternative Disposal Options

As previously noted herein, the County has a comprehensive and successful recycling and materials separation program. The County's program continues to grow and improve, but the County's program cannot handle all of the additional materials that are expected to be generated within the County's service area in the future. There also are no demonstrated, cost-effective technologies available to recycle all of the additional waste materials that are projected to be generated in the County in the future.

The County's Resource Recovery Facility can process some, but not all, of the non-recyclable materials that are currently generated in the County. The excess materials are taken to the County's landfill for disposal. At this time, there are only two practical and demonstrated options available for the future disposal of the materials that cannot be handled by the County's materials separation program: (1) expansion of the Resource Recovery Facility and/or (2) taking the material to a landfill.

The County has evaluated these options carefully and determined that expansion of the Facility is the County's preferred option. This choice is consistent with the County's decision in the 1980's to pursue the use of a resource recovery facility as one of the cornerstones of the County's solid waste management system. The County's decision to expand the Facility also is consistent with the Florida Legislature's declaration in Section 377.709(1), Florida Statutes, that "the combustion of refuse by solid waste facilities to supplement the electricity supply not only represents an effective conservation effort but also represents an environmentally preferred alternative to conventional solid waste disposal in this state."

Appendix 4

Requirements for New Waste to-Energy Facility Capacity

Appendix 4

Section 403.7061 Requirements for New Waste-to-Energy Facility Capacity

4.1 Purpose

Hillsborough County (County) proposes to expand its existing solid waste resource recovery facility (SWRRF). This document addresses the requirements set forth in Section 403.7061(3), Florida Statutes.

4.2 Background

The County planned construction and applied for a permit for the SWRRF in 1984. Prior to then, the County relied entirely on landfills for solid waste disposal. The City of Tampa operated a refuse incinerator until 1980. The SWRRF was constructed with three boilers units. Each unit is capable of processing 400 tons per day of refuse. The construction plans included space to install a fourth unit anticipating that the County would require extra capacity in the future.

In 1999, the County, in conjunction with the Cities of Tampa, Plant City, and Temple Terrace, developed a comprehensive master plan. This comprehensive plan contained a solid waste element designed to plan for solid waste management in a growing county. The solid waste portion of the master plan called for an integrated waste management system.

In following this plan, the County maintains an integrated waste management system that includes recycling, waste-to-energy, and landfill. The County also collects household hazardous waste, construction and demolition debris, electronic waste and other types of waste to increase recycling and provide proper disposal for many different types of items that could be hazardous. One underlying goal in the master plan is to achieve a recycling rate of 30 percent. The County has consistently met this goal.

In the last 5 years, the County has grown 16 percent with respect to population. According to the Bureau of Economic and Business Research (BEBR), the County will experience 4 to 13 percent population growth in the next five years and between 8 and 27 percent growth in the next ten years. Due to these population projections, the County cannot depend on recycling and waste reduction efforts alone to handle the expected increase in solid waste production.

The facility currently operates at or above its guarantee capacity of 372,300 tons per year. The only waste-handling facility in the County that is not owned by the County is the City of Tampa's McKay Bay Refuse-to-Energy Facility. This facility processes 328,500 tons per year, assuming 90 percent availability. The total annual waste combustion capacity for the County is 700,800. This is well below the two million tons of waste collected in 2003. About 600,000 tons per year are recycled in the County (including recycling efforts in the Cities of Tampa, Temple Terrace, and Plant City).

This leaves approximately 700,000 tons per year that must be diverted to the South County Landfill (Landfill). The amount of waste diverted to the Landfill will grow as the population grows.

In addition, the average heating value of the municipal solid waste (MSW) in Hillsborough County has been slowly increasing over the last five years. As the refuse heating value rises above the design heating value, the capacity of the facility decreases. As the County is collecting more garbage, the capacity of the SWRRF may continue to decrease.

4.3 System Description

4.3.1 Service Area

Residents in the unincorporated portion of Hillsborough County pay an annual assessment along with their property tax for solid waste collection and disposal. This practice began in 1997 along with the mandate that all residents and businesses within the unincorporated sections of the County (including sections annexed into cities after June 1983) must make arrangements with the contract haulers to have their waste collected. Waste is collected twice per week. Separated recyclables are collected once per week.

4.3.2 Solid Waste Generation Projections

Hillsborough County, along with Florida in general, is experiencing rapid population growth. The County population is expected to increase between 8 and 27 percent. **Figure 4-1** shows historical and projected population estimates for the County. The historical estimates are based on data provided by the United States Bureau of Census. The population projections are from BEBR. **Figure 4-2** shows the corresponding waste generation assuming that it increases proportionally as population increases. The waste projections correspond to the low, medium, and high population projections from BEBR.

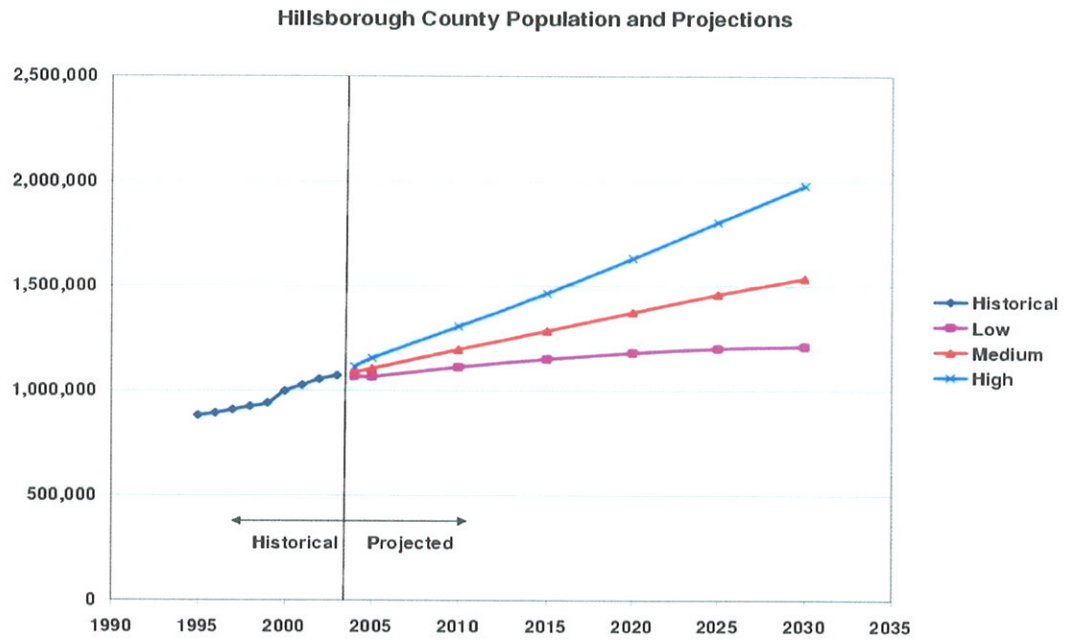


Figure 4-1
Hillsborough County Population Projections

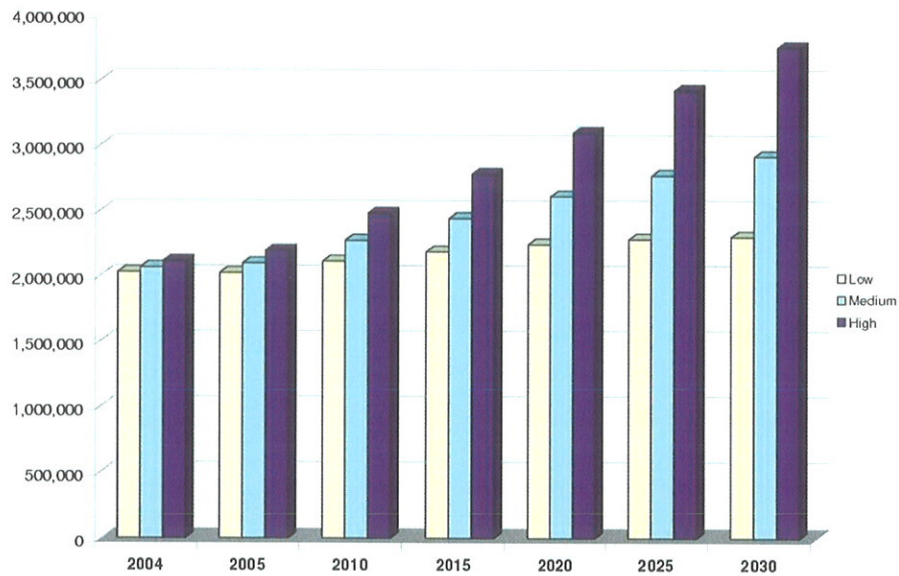


Figure 4-2
Hillsborough County Waste Tonnage Projections

4.3.3 Flow Control

Hillsborough County has consistently recycled 30 percent of its generated waste during the past years. In the future, it intends to continue meeting or exceeding the State of Florida's recycling goal of 30 percent.

As discussed in Section 4.2, the amount of solid waste remaining after recycling and source reduction exceeds the current capacity of the Resource Recovery Facility. This excess tonnage is diverted to the County's Southeast Landfill for disposal.

4.3.4 Agreements

To provide economical, efficient, and environmentally responsible solid waste service, the County has entered into agreements with multiple organizations. These agreements include:

- Covanta operating service agreement – This agreement, originally with Ogden Martin Systems of Hillsborough, Inc., is a 20-year agreement to operate the resource recovery facility. The contract is due to be renegotiated in 2005.
- Electrical power purchase agreement – Power generated at the resource recovery facility is sold to Tampa Electric Company (TECO)
- Franchise hauler agreements – Franchise haulers provide curbside waste collection twice a week. They collect recyclables and yard waste once per week. The County currently holds agreements with three waste haulers: East Bay Sanitation, Liberty Waste & Recycling and Waste Management.

4.3.5 System Components

The County operates an integrated solid waste management system. The system includes the:

- Southeast County Landfill, Tire Processing and Leachate Treatment Facility – This facility contains a Class I landfill and encompasses 175 acres. It stores ash from the resource recovery facility, non-processable waste and bypass waste. The facility also accepts waste from the Cities of Temple Terrace and Plant City as well as ash and bypass waste from the City of Tampa.
- Hillsborough County Resource Recovery Facility – The resource recovery facility processes approximately 1,200 tons of garbage daily. The facility is composed of three boilers, each with a 400 ton per day capacity. The combustion units generate enough steam to produce 29 megawatts through a turbine generator.
- Northwest Transfer Station, Community Collection Center and Yard Waste Processing Facility – This transfer station has a capacity of 600 tons per day. This waste is transferred to the resource recovery facility for processing. This facility also has collection bins for scrap metal, tires, motor oil, lead-acid batteries, and other recyclables.

- Hillsborough County Yard and Wood Waste Processing Facility – This 16-acre site produces fuel, mulch, and soil amendment materials from yard and wood waste. This site is also permitted as a composting facility by the FDEP.
- Hillsborough Heights Community Collection Center – This is a community drop-off center that collects general waste, scrap metal, tires, motor oil, lead-acid batteries and recyclables.
- Alderman Ford Community Collection Center – This facility accepts general waste from tax-paying citizens as well as scrap metal, tires, motor oil, lead-acid batteries and recyclables.
- Apollo Beach Household Chemical Collection Center – [Not sure if this is still in use. Confirm]
- Wimauma Community Collection Center - This facility accepts general waste from tax-paying citizens as well as scrap metal, tires, motor oil, lead-acid batteries and recyclables. One Saturday each month, this facility collects household hazardous waste including, cleaners, paint, pool chemicals, lawn and garden chemicals, etc.
- Sheldon Road Household Chemical Collection Center – Collections are held at this facility once per month. The facility collects cleaners, paint, pool chemicals, lawn and garden chemicals, etc.

4.4 Requirements in Section 403.7061(3), Florida Statutes

4.4.1 Requirements in 403.7061(3)(a)

Section 403.7061(3)(a), Florida Statutes (FS) states:

The facility is a necessary part of the local government's integrated solid waste management program in the jurisdiction where the facility is located and cannot be avoided through feasible and practical efforts to use recycling or waste reduction.

In 1999, the County and the Cities of Tampa, Temple Terrace, and Plant City (the Cities) put into effect a comprehensive master plan (Plan). The Plan included a solid waste element to plan for future industrial, commercial, and residential growth and solid waste services demand. The solid waste element of the Plan outlines an integrated system for waste management. The Plan includes recycling, the SWRRF, and landfill. The County has incorporated the following programs into the Plan:

- Construction and Demolition Debris Program
- Yard Waste Separation (Mandatory)
- County Offices Recycling Program
- White Goods Separation

- Waste Tire Separation and Landfill Cover Use
- Household Hazardous Waste Collection Program
- Electronic Waste Collection Program
- Ferrous Metals Recovery Program
- Commercial Recycling Program
- Residential Recycling Program

The County has consistently met the state mandated recycling goal of 30 percent. **Exhibit A** shows the most recent assessment of the County's recycling program as included in the Florida Department of Environmental Protection's (FDEP) 2001 Annual Report. The County is planning to provide curbside pickup of recyclables for small businesses and increase electronic waste collection to increase recycling.

Figure 4-2 shows projected waste tonnages based on BEBR population estimates. These projections show an increase of up to 27 percent over the next ten years. The County must plan for 27 percent growth as a conservative estimate. The SWRRF is already operating at its full capacity and rejecting some waste that must be sent to the South County Landfill. Any additional waste due to population growth will be above and beyond the capacity of the SWRRF. The County cannot reasonably rely on recycling and waste reduction efforts alone to handle increased waste tonnages.

The SWRRF has a guaranteed throughput of 85 percent of boiler plate rating. Historically, the facility has operated above this guarantee. **Table 4-1** shows the projected shortfall in waste-to-energy capacity based on high population projections.

Year	Expected Capacity	Projected Waste to be Processed or Landfilled	SWRRF Capacity Shortfall
2004	354,780	517,731	-162,951
2005	354,780	536,979	-182,199
2006	354,780	551,040	-196,260
2007	354,780	565,102	-210,322
2008	341,135	579,164	-238,030
2009	341,135	593,226	-252,091
2010	341,135	607,288	-266,153
2011	341,135	622,065	-280,930
2012	341,135	636,842	-295,707
2013	341,135	651,619	-310,484
2014	341,135	666,396	-325,261
2015	341,135	681,173	-340,038

These shortfall projections include the assumption that 30 percent of the waste collected in the County will be recycled. Thus, the excess waste must be landfilled.

Table 4-1 illustrates that expanded the facility is a necessary part of maintaining the County's integrated waste management system.

4.4.2 Requirements in 403.7061(3)(b)

Section 403.7061(3)(b), FS states:

The use of capacity at existing waste-to-energy facilities within reasonable transportation distance of the proposed facility must have been evaluated and found not to be economically feasible when compared to the use of the proposed facility for the expected life of the proposed facility.

Several other municipalities operate waste-to-energy facilities in western Florida. Pinellas and Pasco County each operate a mass burn facility. The City of Tampa operates the McKay Bay Refuse to Energy facility. Although these facilities are nearby, they do not have additional capacity to offer the County, as these facilities are fully utilized providing waste management to their respective municipalities.

The McKay Bay facility operates at or above full capacity while diverting waste to the County's South County Landfill. The Pinellas County Waste to Energy facility also operates at full capacity. The Pasco County facility operates above its rated capacity. Pasco County is considering expanding its facility in the next 5 years. As a result, Hillsborough County cannot reasonably rely on these facilities to ease its refuse processing burden.

4.2.3 Requirements in 403.7061(3)(c)

Section 403.7061(3)(c), FS states:

The County in which the facility is located will achieve the 30-percent waste reduction goal set forth in s. 403.706(4) by the time the facility begins operation.

The County has consistently met the state mandated waste reduction goal of 30 percent. The County plans to meet or exceed this goal in the future, even after the fourth combustion unit is constructed.

Exhibit A shows the most recent assessment of the County's recycling program as included in the FDEP's 2001 Annual Report. **Exhibit B** contains historical documents from other FDEP annual reports. These report excerpts confirm that the County met the 30 percent recycling goal in the past. **Figure 4-3** shows historical recycling percentages for the County, as reported to the FDEP.

The County has multiple drop-off facilities for recyclables and provides curbside pickup to residents. In an effort to increase recycling participation, the County will soon be providing curbside pickup of recyclables for small business. The County also plans to increase its recycling of electronics.

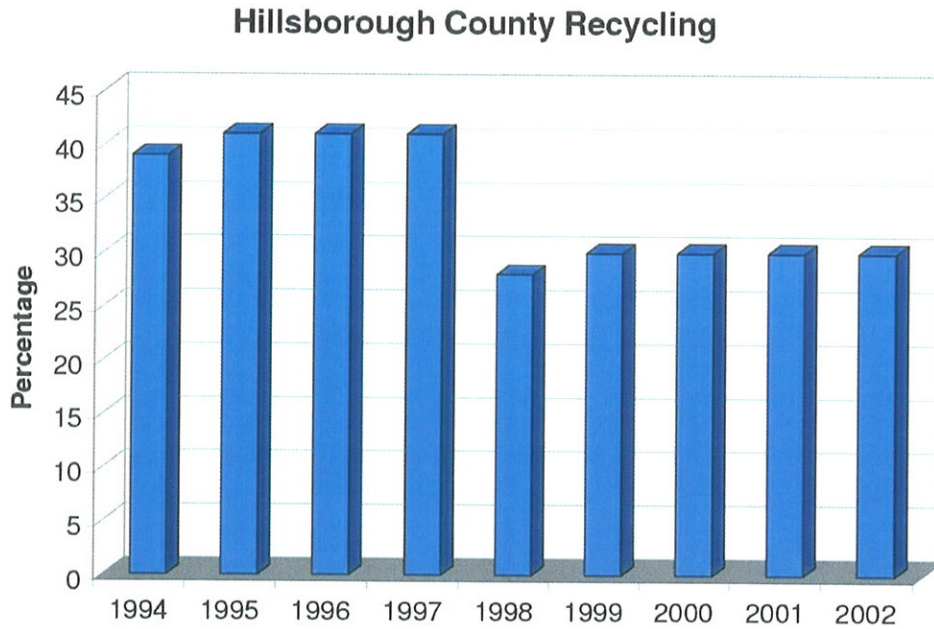


Figure 4-3
Hillsborough County Recycling Percentages

4.4.4 Requirements in 403.7061(3)(d)

Section 403.7061(3)(d), FS states:

The local government in which the facility is located has implemented a mulching, composting or other waste reduction program for yard waste.

In 1997, the County mandated that all yard waste must be separated. It may be isolated in plastic bags or containers. Yard waste other than grass clippings and leaves may also be left curbside in bundles or boxes. Yard waste is collected weekly. Residents may also deliver yard waste directly to processing facilities. Plant material is processed and sold as mulch, soil amendment and fuel. On average, the County collects about 80,000 tons of yard waste each year.

4.4.5 Requirements in 403.7061(3)(e)

Section 403.7061(3)(e), FS states:

The local government served by the facility will have implemented or participated in a separation program designed to removal small-quantity generator and household hazardous waste, mercury containing devices, and mercuric-oxide batteries from the waste stream prior to incineration, by the time the facility begins operation.

The County maintains three facilities to collect household hazardous waste. Collections are held on three Saturdays each month, alternating between two

facilities. These collections are for County residents, not commercial entities. Most of the collected materials are used by the County or recycled. The County collects about 120,000 tons per year of household hazardous waste. Household hazardous waste covers a variety of items including chemical cleaners, paint, solvents, pool chemicals, lawn and garden chemicals, etc. Materials that are not recycled are taken to licensed disposal facilities.

The County currently collects electronic waste (e-waste) four times per year at one of the community collection centers. The County plans to increase the frequency of collection in the near future. Collected items include computer monitors, cell phones, CD and tape players, televisions, etc.

The County also collects other household hazardous waste such as the lead acid batteries, paints, and other recyclables at the community collection centers. All the collected materials are sent to recycling.

The County also has a pollution prevention program that focuses on educating the public and other small quantity generators (businesses and institutions) about pollution prevention program that focuses on educating the citizens about pollution prevention and compliance issues, including recycling and disposal options for a variety of hazardous materials. Citizens have become involved in recycling programs and, in cooperation with the County, have formed a Recycling Task Force and Keep Hillsborough County Beautiful.

4.4.6 Requirements in 403.7061(3)(f)

Section 403.7061(3)(f), FS states:

The local government in which the facility is located has implemented a program to procure products or materials with recycled content, pursuant to s. 403.7065.

Hillsborough County has implemented a program to procure products and materials with recycled content, pursuant to s.403.7065, F.S. The County's policy states that 75% of the paper products purchased by the County's offices must contain recycled content, and janitorial paper products must have at least 50% recycled content. All printed materials are to indicate that they are printed on recycled paper. The County's policy requires the purchase of recycled content materials when available and requires that the County's bid specifications request recycled content materials. The County's policy also limits the purchase of non-recyclable paper products.

4.4.7 Requirements in 403.7061(3)(g)

Section 403.7061(3)(g), FS states:

A program will exist in the local government in which the facility is located for collecting and recycling recovered materials from the institutional, commercial, and industrial sectors by the time the facility begins operation.

The County currently has in place a commercial recycling program. This program is voluntary. Individual commercial entities may negotiate with any of the three franchise haulers available in the County for collection. All three have the exclusive right to compete for collection contracts anywhere within the service area. (The service area includes unincorporated sections of the County, and areas incorporated after June 1983.

Commercial entities that voluntarily participate in the program deliver their recyclables to County facilities or other privately operated recycling facilities. To increase recycling participation, the County plans to provide curbside pickup for small businesses, as it does for residents within the service area.

4.4.8 Requirements in 403.7061(3)(h)

Section 403.7061(3)(h), FS states:

The facility will be in compliance with applicable ordinances and with the approved state and local comprehensive plans required by Chapter 163.

In 1999, the County, in cooperation with the Cities of Tampa, Temple Terrace and Plant City, developed a comprehensive master plan. The plan, in compliance with Chapter 163, FS, contained a solid waste element. The solid waste element of the plan outlines an integrated solid waste management system including recycling, landfill, and resource recovery.

In addition, the SWRRF complies with all applicable local ordinances and state and local comprehensive plans. Applicable land use and zoning ordinances were addressed before the original facility was constructed. The facility complies with the requirements of the Florida Electrical Power Plant Siting Act and will continue to do so.

4.4.9 Requirements in 403.7061(3)(i)

Section 403.7061(3)(i), FS states:

The facility is in substantial compliance with its permit, conditions of certification, and any agreements or orders resulting from environmental enforcement actions by state agencies.

Hillsborough County Facility is in compliance with its permit conditions and conditions of certification. The Facility has not had any environmental enforcement actions by federal, state or local agencies. The County's Facility is equipped with extensive, state-of-the art air-pollution control equipment systems and considered one of the best operational waste-to-energy facilities in the United States.

Hillsborough County

(Jan. 1, 2001 - Dec. 31, 2001)

1. Population ¹ 1,025,794

2. MSW Management (tons) ²

A. Landfilled	735,766
B. Combusted	440,544
C. Recycled	499,447
D. Total	1,675,757
E. Total Pounds per Capita Per Day ¹	8.95

3. MSW Collected & Recycled

A. Minimum Five Wastes ³	Collected (tons)	Recycled (%)
1. Newspaper	93,887	41
2. Glass	41,914	33
3. Aluminum Cans	5,030	29
4. Plastic Bottles	23,471	7
5. Steel Cans	16,766	36

B. Special Wastes ⁵	Collected (tons)	Recycled (%)
1. C&D Debris	293,170	21
2. Yard Trash	135,166	54
3. White Goods	40,237	38
4. Tires	23,472	9
5. Process Fuel	52,908	100

C. Other Wastes 1,002,644 23

D. Total Recycling Rate (%) 30

E. Adjusted Recycling Rate (%) ^{5,6} 30

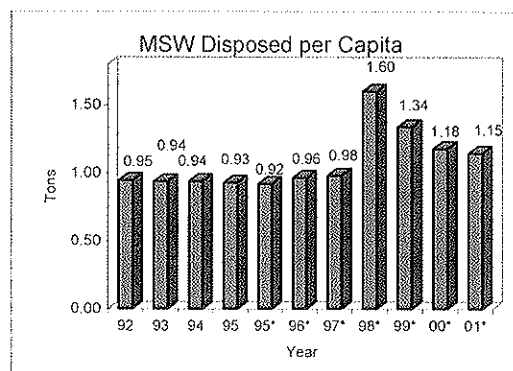
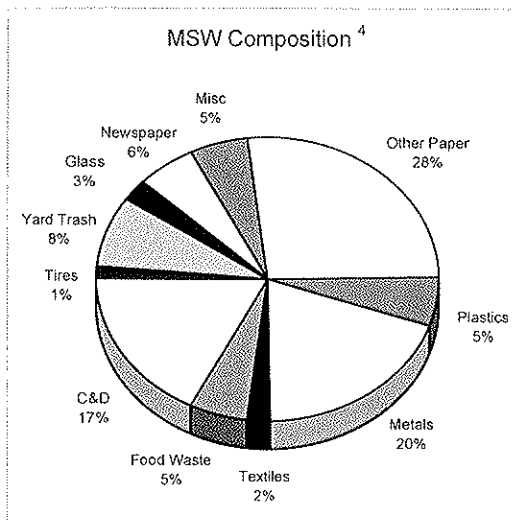
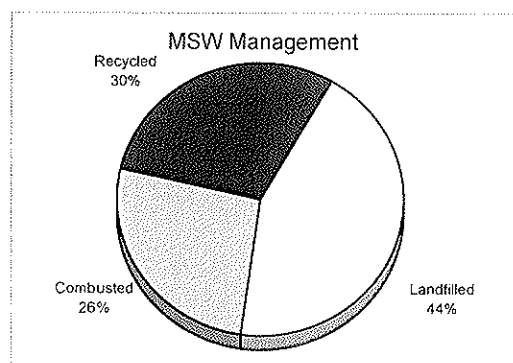
F. Waste Reduction Per Capita (%)

(A negative number indicates an increase in the MSW disposal rate per capita.)

1. Base Year: July 1988-June 1989	-2
2. Base Year: July 1989-June 1990	-8
3. Base Year: July 1990-June 1991	-18
4. Base Year: July 1991-June 1992	-22
5. Base Year: July 1992-June 1993	-23
6. Base Year: July 1993-June 1994	-23

G. Participation in Recycling ⁷ Units Percent⁸

1. Single-family Curbside	309,629	70
2. Multi-family Curbside ⁹	127,574	12
3. Commercial ¹⁰	49,140	
a) Scheduled collection		15
b) On call collection		4



Hillsborough County

(Jan. 1, 2000 - Dec. 31, 2000)

1. Population ¹ 998,948

2. MSW Management (tons) ²

A. Landfilled	757,890
B. Combusted	418,015
C. Recycled	556,550
D. Total	1,732,455
E. Total Pounds per Capita Per Day ¹	9.50

3. MSW Collected & Recycled

A. Minimum Five Wastes ³	Collected (tons)	Recycled (%)
1. Newspaper	94,364	40
2. Glass	42,893	28
3. Aluminum Cans	5,147	36
4. Plastic Bottles	15,441	29
5. Steel Cans	17,157	52

B. Special Wastes ⁵	Collected (tons)	Recycled (%)
1. C&D Debris	320,190	16
2. Yard Trash	137,256	37
3. White Goods	41,177	52
4. Tires	24,020	9
5. Process Fuel	67,015	100

C. Other Wastes 1,034,810 29

D. Total Recycling Rate (%) 32

E. Adjusted Recycling Rate (%) ^{5,6} 32

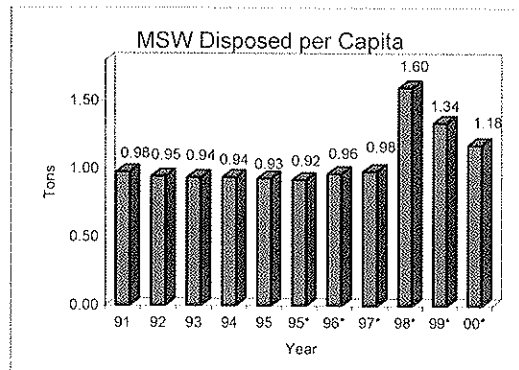
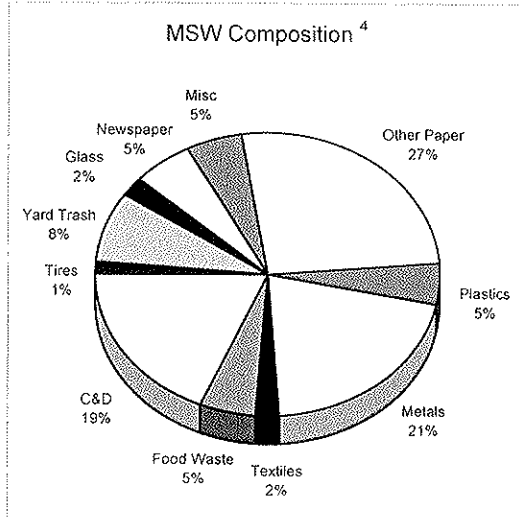
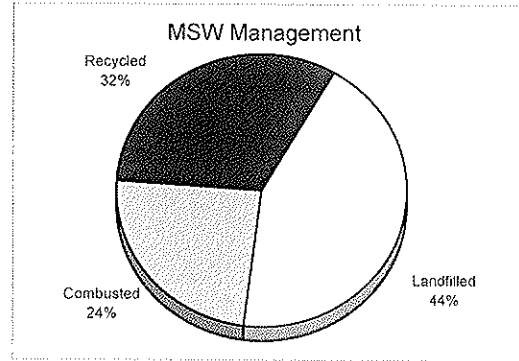
F. Waste Reduction Per Capita (%)

(A negative number indicates an increase in the MSW disposal rate per capita.)

1. Base Year: July 1988-June 1989	-3
2. Base Year: July 1989-June 1990	-10
3. Base Year: July 1990-June 1991	-21
4. Base Year: July 1991-June 1992	-24
5. Base Year: July 1992-June 1993	-26
6. Base Year: July 1993-June 1994	-25

G. Participation in Recycling ⁷ Units Percent ⁸

1. Single-family Curbside	304,980	290
2. Multi-family Curbside ⁹	123,220	36
3. Commercial ¹⁰	48,240	
a) Scheduled collection		138
b) On call collection		37



Appendix 5

State Permit Applications and Approvals

Appendix 5-1

Revised Stormwater Calculations

PRE-DEVELOPMENT CONDITIONS

The entire site is divided into 3 drainage areas: West, North-1, and North-2.

Pre-Development Conditions

Drainage area	Path	Slope, %	Length, ft	Runoff Coeff	Time of concentration (tc), min			
West	1A	3.9	570	0.30	22			
	2A		30		1			
	2B		81		1			
	2C	0.7	70	0.95	3			
	2D	1.4	50	0.95	2			
	2E	0.5	60	0.95	3			
	2F	3.1	290	0.30	17			
					25			
	3A	9.0	210	0.30	10		Max tc	43 minutes
	3B	0.7	420	0.30	33		~45	minutes
				43				
North -2	4A	8.5	200	0.30	10			
					10		Max tc	57 minutes
					10		~60	minutes
	6A	0.3	680	0.30	57			
					57			
	7A	0.6	495	0.85	11			
				11				
North -1	5A		10		0.4			
	5B		32		0.7			
	5C		45.5		0.8		Max tc	9 minutes
	5D	16.5	170	0.3	7		~10	minutes
					9.3			

Pre-Development Peak Discharge

Storm	Drainage Area	Acreage	Time of Concentration, min	Rainfall Intensity, inches/hr	Runoff Coefficient	Peak Discharge, cfs
		'A'		'I'	'C'	Q=CIA
25 year	West	21.5	45	4.2	0.68	61.7
	North 1	7.8	10	8.0	0.73	45.8
	North 2	8.8	60	3.6	0.86	27.4
10 year	West	21.5	45	3.7	0.56	45.3
	North 1	7.8	10	7.0	0.61	33.4
	North 2	8.8	60	3.2	0.72	20.3

Runoff was computed for 3 drainage areas separately.

West Drainage Area

Time of Concentration 45 min
Percent impervious 41 %
Percent pervious 59 %
Initial abstraction for pervious area 0.29 inches
Soil Group D
Curve Number = $(0.41 \times 98 + 0.59 \times 80)$ 87 Note: Good condition (grass cover >75%) 0.8
Impervious (directly connected) 0.98

$$\text{Max storage of water } S' = \frac{1000}{CN} - 10 = 1.45$$

$$\text{Rainfall volume for 24 hr 25 year rainfall from SFWMD Atlas } P = 8.5$$

$$\text{Total volume of run-off } R = \frac{(P - 0.2 \times S')^2}{(P + 0.8 \times S')} = 6.98 \text{ INCHES}$$

North 1 Drainage Area

Time of Concentration 10 min
Percent impervious 47 %
Percent pervious 53 %
Initial abstraction for pervious area 0.26 inches
Soil Group D
Curve Number = $(0.47 \times 98 + 0.53 \times 80)$ 88 Note: Good condition (grass cover >75%) 0.8
Impervious (directly connected) 0.98

Max storage of water	S'	$\frac{1000}{CN}$	=	1.30
Rainfall volume for 24 hr 25 year rainfall from SFWMD Atlas			P	= 8.5
Total volume of run-off	R	=	$\frac{(P-0.2 \times S')^2}{(P+0.8 \times S')}$	= 7.11 INCHES

North 2 Drainage Area

Time of Concentration	60 min
Percent impervious	64 %
Percent pervious	36 %
Initial abstraction for pervious area	0.18 inches
Soil Group	D
Curve Number	= (0.64x98+0.36x80)
	92
	Note: Good condition (grass cover >75%)
	Impervious (directly connected)
	0.8
	0.98

Max storage of water	S'	$\frac{1000}{CN}$	-10	=	0.92
Rainfall volume for 24 hr 25 year rainfall from SFWMD Atlas				P	= 8.5
Total volume of run-off	R	=	$\frac{(P-0.2 \times S')^2}{(P+0.8 \times S')}$	=	7.49 INCHES

POST-DEVELOPMENT CONDITIONS

The entire site is again divided into 3 drainage areas: West, North-1, and North-2.

Drainage area	Path	Slope, %	Length, ft	Runoff Coeff	Time of concentration (tc), min			
West	1A	3.9	570	0.30	22			
	2A		30		1			
	2B		81		1			
	2C	0.7	70	0.95	3			
	2D	1.4	50	0.95	2			
	2E	0.5	60	0.95	3			
	2F	3.1	290	0.30	17			
					25			
	3A	9.0	210	0.30	10			
	3B	0.7	420	0.30	33			
					43	Max tc	43 ~45	minutes minutes
North -2	4A	8.5	200	0.30	10			
					10			
	6A	0.3	680	0.30	57			
					57			
	7A	0.6	495	0.85	11			
					11	Max tc	57 ~60	minutes minutes
North -1	5A		10		0.4			
	5B		32		0.7			
	5C		45.5		0.8			
	5D	16.5	170	0.3	7			
					9.3	Max tc	9 ~10	minutes minutes

Post-development Peak Discharge

Storm	Drainage Area	Acreage	Time of Concentration, min	Rainfall Intensity, inches/hr	Runoff Coefficient	Peak Discharge, cfs
		'A'		'I'	'C'	Q=CIA
25 year	West	21.5	45	4.2	0.7	63.0
	North 1	7.8	10	8.0	0.73	45.9
	North 2	8.8	60	3.6	0.86	27.4
10 year	West	21.5	45	3.7	0.58	46.2
	North 1	7.8	10	7.0	0.61	33.5
	North 2	8.8	60	3.2	0.72	20.3

Runoff was computed for 3 drainage areas separately.

West Drainage Area

Time of Concentration 45 min
Percent impervious 43 %
Percent pervious 57 %
Initial abstraction for pervious area 0.28 inches
Soil Group D
Curve Number = (0.43x98+0.57x80) 88 Note: Good condition (grass cover >75%) 0.80
Impervious (directly connected) 0.98

Max storage of water $S' = \frac{1000}{CN} - 10 = 1.41$

Rainfall volume for 24 hr 25 year rainfall from SFWMD Atlas $P = 8.5$

Total volume of run-off $R = \frac{(P-0.2xS')^2}{(P+0.8xS')} = 7.02 \text{ INCHES}$

North 1 Drainage Area

Time of Concentration 10 min
Percent impervious 47 %
Percent pervious 53 %
Initial abstraction for pervious area 0.26 inches

Soil Group		D		
Curve Number	=	(0.47x98+0.53x80)	89 Note: Good condition (grass cover >75%)	0.80
			Impervious (directly connected)	0.98

Max storage of water	S'	$\frac{1000}{CN}$	-10	=	1.29
----------------------	----	-------------------	-----	---	------

Rainfall volume for 24 hr 25 year rainfall from SFWMD Atlas	P	=	8.5
---	---	---	-----

Total volume of run-off	R	=	$\frac{(P-0.2xS')^2}{(P+0.8xS')}$	=	7.12 INCHES
-------------------------	---	---	-----------------------------------	---	--------------------

North 2 Drainage Area

Time of Concentration	60 min
Percent impervious	64 %
Percent pervious	36 %
Initial abstraction for pervious area	0.18 inches

Soil Group		D		
Curve Number	=	(0.64x98+0.36x80)	92 Note: Good condition (grass cover >75%)	0.80
			Impervious (directly connected)	0.98

Max storage of water	S'	$\frac{1000}{CN}$	-10	=	0.92
----------------------	----	-------------------	-----	---	------

Rainfall volume for 24 hr 25 year rainfall from SFWMD Atlas	P	=	8.5
---	---	---	-----

Total volume of run-off	R	=	$\frac{(P-0.2xS')^2}{(P+0.8xS')}$	=	7.49 INCHES
-------------------------	---	---	-----------------------------------	---	--------------------

STORAGE VOLUME CALCULATIONS

Basin	Discharge Location	Acreage Drained	Percent of Total Acreage Drained	Discharge Limit, cfs	Limiting Discharge, cfs
North 1	North Ditch	7.8	47	25	12
North 2	North Ditch	8.8	53	25	13
West	West Channel	21.5	60	35	21

A) Calculation of Storage Required for Retention

Basin	Discharge Location	Watershed Area, acres	Runoff depth, inches	Runoff Volume, cu.ft
North 1	North Ditch	7.8	0.5	14,157
North 2	North Ditch	8.8	0.5	15,899
West	West Channel	21.5	0.5	39,023

B) Calculation of Storage Required for Peak Attenuation

Basin	Discharge Location	Watershed Area, acres	Runoff depth, inches	Runoff Volume, cu.ft
				Vr'
North 1	North Ditch	7.8	7.12	201,596
North 2	North Ditch	8.8	7.49	238,173
West	West Channel	21.5	7.02	547,876

C) Using TR-55 (Technical Resource Manual) formulae

C0	0.682
C1	-1.43
C2	1.64
C3	-0.804

$$\frac{V_s}{V_r} = C_0 + C_1 (q_0/q_i) + C_2 (q_0/q_i)^2 + C_3 (q_0/q_i)^3$$

Basin	Discharge Location	Limiting Discharge q0,cfs	qi	q0/qi	Vs/Vr'	Vr', ft^3	Vs, ft^3
North 1	North Ditch	12	45.9	0.3	0.4	201,596	81,259
North 2	North Ditch	13	27.4	0.5	0.3	238,173	69,059
West	West Channel	21	63.0	0.3	0.4	547,876	196,220

Details	Retention Pond	Watershed Area, acres	Storage required for Peak Attenuation, cu.ft	Storage reqd for retention, cu.ft	Total Storage Required, cu.ft	Total Storage Required, acre-ft	Total Storage Provided, cu.ft	Total Storage Provided, acre- ft
North 1	Retention Pond C	7.8	81,259	14,157	95,416	2.19	159,321	3.66
North 2	Retention Pond D	8.8	69,059	15,899	84,958	1.95	101,146	2.32
West	Retention Pond A and B	21.5	196,220	39,023	235,243	5.40	301,261	6.92

Appendix 5-2
Title V Air Operation Permit

NOTICE OF FINAL PERMIT

In the Matter of an
Application for Permit by:

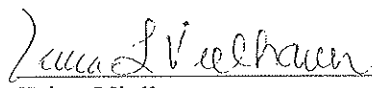
Mr. Daryl Smith
Hillsborough County Solid Waste
Management Department
601 East Kennedy Boulevard
Tampa, Florida 33602

FINAL Permit No.: 0570261-005-AV
Hillsborough County Resource Recovery Facility

Enclosed is FINAL Permit Revision Number 0570261-005-AV for the operation of the Hillsborough County Resource Recovery Facility located at 350 Falkenburg Road, Tampa, Hillsborough County, issued pursuant to Chapter 403, Florida Statutes (F.S.).

Any party to this order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, F.S., by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the permitting authority in the Legal Office; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 (thirty) days from the date this Notice is filed with the Clerk of the permitting authority.

Executed in Tallahassee, Florida.



Trina Vielhauer
Chief
Bureau of Air Regulation

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF FINAL PERMIT (including the FINAL permit) was sent by certified mail and copies were mailed by U.S. Mail before the close of business on 4/30/03 to the person(s) listed or as otherwise noted:

Daryl Smith, Director, Hillsborough County Solid Waste Management Department

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to Section 120.52(7), Florida Statutes, with the designated agency Clerk, receipt of which is hereby acknowledged.

Barbara J. Friday 4/30/03
(Clerk) (Date)

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF FINAL PERMIT was sent by U.S. Mail before the close of business on _____ to the person(s) listed or as otherwise noted:

Jason M. Gorrie, PE, Camp Dresser & McKee
Eric Peterson, PE, FDEP SWD
USEPA, Region 4 (INTERNET E-mail Memorandum)

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to Section 120.52(7), Florida Statutes, with the designated agency Clerk, receipt of which is hereby acknowledged.

Barbara J. Friday 4/30/03
(Clerk) (Date)

FINAL PERMIT DETERMINATION

FINAL Permit No.: 0570261-005-AV

Page 1 of 1

I. Comment(s).

No comments were received on the PROPOSED Title V Permit.

II. Conclusion.

Since no comments were received, the PROPOSED Title V Air Operation Permit becomes the FINAL Title V Air Operation Permit.

STATEMENT OF BASIS

Hillsborough County
Hillsborough County Resource Recovery Facility
Facility ID No.: 0570261
Hillsborough County

Title V Air Operation Permit Revision
FINAL Permit Project No.: 0570261-005-AV
Revision to Title V Air Operation Permit No.: 0570261-001-AV

The initial Title V Air Operation Permit, No. 0570261-001-AV, was issued/effective on October 24, 2000. This Title V Air Operation Permit Revision is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210 and 62-213. The above named permittee is hereby authorized to operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the permitting authority, in accordance with the terms and conditions of this permit.

This permit revision is being issued for the purpose of incorporating the terms and conditions of the air construction permit, No. 0570261-004-AC, for a Dolomitic Lime Storage Silo; incorporating the terms and conditions of administrative permit correction, No. 0570261-003-AV, correcting the rule language previously cited in Facility-wide Condition 10; deleting obsolete specific conditions which address plant operation prior to the implementation of 40 CFR 60, Subparts Cb and Eb; and, incorporating changes to 40 CFR 60, Subparts Cb and Eb allowing 15 hours of excess carbon monoxide emissions for specified malfunctions.

Several Specific Condition(s) established in Title V Air Operation Permit, No. 0570261-001-AV, are changed, as a result of this revision. The following Specific Conditions are changed as follows:

Facility-wide Conditions:

FROM: **10. Statement of Compliance.** The permittee shall submit a statement of compliance with all terms and conditions of the permit.

{See condition 51., APPENDIX TV-3, TITLE V CONDITIONS}

[Rule 62-213.440(3), F.A.C.]

TO: **10. Statement of Compliance.** The annual statement of compliance pursuant to Rule 62-213.440(3)(a)2., F.A.C., shall be submitted within 60 (sixty) days after the end of the calendar year using DEP Form number 62-213.900(7), F.A.C.

[Rule 62-213.440(3), F.A.C.]

DELETE: All Specific Conditions in Section III, Subsection A.

DELETE: All Specific Conditions in Section III, Subsection B.

Section III, Subsection C. Specific Condition C.34.:

FROM: C.34. Startup, Shutdown and Malfunction. The standards under 40 CFR 60, Subpart Cb apply at all times except during periods of startup, shutdown, or malfunction. Duration of startup or shutdown periods are limited to 3 hours per occurrence.

- (i) The startup period commences when the affected facility begins the continuous burning of municipal solid waste and does not include any warm-up period when the affected facility is combusting fossil fuel or other nonmunicipal solid waste fuel, and no municipal solid waste is being fed to the combustor.
- (ii) Continuous burning is the continuous, semicontinuous, or batch feeding of municipal solid waste for purposes of waste disposal, energy production, or providing heat to the combustion system in preparation for waste disposal or energy production. The use of municipal solid waste solely to provide thermal protection of the grate or hearth during the startup period when municipal solid waste is not being fed to the grate is not considered to be continuous burning.
[40 CFR 60.38b and 40 CFR 60.58b(a)]

TO: C.34.a. Startup, Shutdown and Malfunction. The standards under 40 CFR 60, Subpart Cb apply at all times except during periods of startup, shutdown, or malfunction. Duration of startup or shutdown periods are limited to 3 hours per occurrence.

- (i) The startup period commences when the affected facility begins the continuous burning of municipal solid waste and does not include any warm-up period when the affected facility is combusting fossil fuel or other nonmunicipal solid waste fuel, and no municipal solid waste is being fed to the combustor.
- (ii) Continuous burning is the continuous, semicontinuous, or batch feeding of municipal solid waste for purposes of waste disposal, energy production, or providing heat to the combustion system in preparation for waste disposal or energy production. The use of municipal solid waste solely to provide thermal protection of the grate or hearth during the startup period when municipal solid waste is not being fed to the grate is not considered to be continuous burning.
[40 CFR 60.38b and 40 CFR 60.58b(a)]

C.34.b. For the purpose of compliance with the carbon monoxide emission limits in 40 CFR 60.53b(a), if a loss of boiler water level control (e.g., loss of combustion air fan, induced draft fan, combustion grate bar failure) is determined to be a malfunction, the duration of the malfunction period is limited to 15 hours per occurrence.
[40 CFR 60.58b(a)(1)iii]

Section III, Subsection E. Specific Conditions E.2. and E.3.:

FROM: E.2. Particulate Matter. Particulate matter emissions shall not exceed 0.015 grains per dry standard cubic foot, front-half catch.
[PSD-FL-121(B)]

E.3. Visible Emissions. Visible emissions shall not exceed five (5) percent opacity.
[PSD-FL-121(B)]

TO: E.2. Particulate Matter. Particulate matter emissions shall not exceed:
Emissions unit -101: 0.015 grains per dry standard cubic foot, front-half catch.
Emissions unit -106: 6.32 pounds per hour and 0.39 tons per year.
[PSD-FL-121(B) and 0570261-004-AC]

E.3. Visible Emissions.
Emissions unit -101: Visible emissions shall not exceed five (5) percent opacity.
Emissions unit -106: Visible emissions shall not be equal to or greater than 20 percent opacity.
[PSD-FL-121(B); 0570261-004-AC; and, Rule 62-296.320(4)(b)1., F.A.C.]

CAM does not apply.

Also included in this permit are miscellaneous unregulated/insignificant emissions units and/or activities.

Based on the initial Title V permit application received June 17, 1996, this facility is a major source of hazardous air pollutants (HAPs).

Hillsborough County
Hillsborough County Resource Recovery Facility
Facility ID No.: 0570261
Hillsborough County

Title V Air Operation Permit Revision
Revision to Title V Air Operation Permit No.: 0570261-001-AV

FINAL Permit No.: 0570261-005-AV

Permitting Authority:
State of Florida
Department of Environmental Protection
Division of Air Resource Management
Bureau of Air Regulation
Title V Section

Mail Station #5505
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Telephone: 850/488-0114
Fax: 850/922-6979

Compliance Authority:
Department of Environmental Protection
Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619-8218
Telephone: 813/744-6100
Fax: 813/744-6084

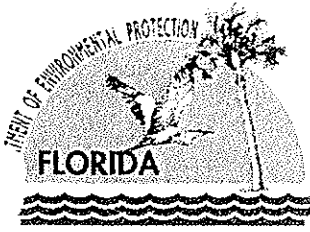
Title V Air Operation Permit Revision

FINAL Permit No.: 0570261-005-AV

Revision to Title V Air Operation Permit No.: 0570261-001-AV

Table of Contents

<u>Section</u>	<u>Page Number</u>
Placard Page	1
I. Facility Information	2 - 3
A. Facility Description.	
B. Summary of Emissions Unit ID No(s). and Brief Description(s).	
C. Relevant Documents.	
II. Facility-wide Conditions	4 - 6
III. Emissions Unit(s) and Conditions	
A. (RESERVED)	7
B. (RESERVED)	8
C. Emissions Unit -001 150 MMBtu/hr (nom) MWC & Auxiliary Burners - Unit 1.....	9 - 54
-002 150 MMBtu/hr (nom) MWC & Auxiliary Burners - Unit 2	
-003 150 MMBtu/hr (nom) MWC & Auxiliary Burners - Unit 3	
D. Emissions Unit -100 Ash Building and Handling System	55 - 64
E. Emissions Unit -101 Lime Storage Silo	65 - 70
-106 Lime Storage Silo	
F. Emissions Unit -102 Activated Carbon Storage Silo	71 - 76



Jeb Bush
Governor

Department of Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

Permittee:
Hillsborough County
601 East Kennedy Boulevard
Tampa, Florida 33602

FINAL Permit No.: 0570261-005-AV
Facility ID No.: 0570261
SIC Nos.: 4953
Project: Title V Air Operation Permit Revision

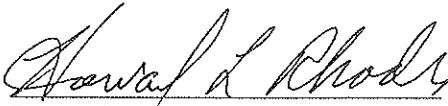
This permit revision is being issued for the purpose of incorporating the terms and conditions of the air construction permit, No. 0570261-004-AC, for a Dolomitic Lime Storage Silo; incorporating the terms and conditions of administrative permit correction, No. 0570261-003-AV, correcting the rule language previously cited in Facility-wide Condition 10; deleting obsolete specific conditions which address plant operation prior to the implementation of 40 CFR 60, Subparts Cb and Eb; and, incorporating changes to 40 CFR 60, Subparts Cb and Eb, allowing 15 hours of excess carbon monoxide emissions for specified malfunctions. The Hillsborough County Resource Recovery Facility is located at 350 Falkenburg Road, Tampa, Hillsborough County; UTM Coordinates: Zone 17, 368.2 km East and 3092.7 km North; Latitude: 27° 57' 14" North and Longitude: 82° 40' 22" West.

This Title V air operation permit revision is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210, and 62-213. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the permitting authority, in accordance with the terms and conditions of this permit.

Referenced attachments made a part of this permit:

Appendix U-1, List of Unregulated Emissions Units and/or Activities
Appendix I-1, List of Insignificant Emissions Units and/or Activities
APPENDIX TV-4, TITLE V CONDITIONS version dated 02/12/02
APPENDIX SS-1, STACK SAMPLING FACILITIES version dated 10/07/96
TABLE 297.310-1, CALIBRATION SCHEDULE version dated 10/07/96
FIGURE 1 - SUMMARY REPORT-GASEOUS AND OPACITY EXCESS
EMISSION AND MONITORING SYSTEM PERFORMANCE REPORT version dated 07/96

Effective Date: October 24, 2000
Revision Effective Date: April 30, 2003
Renewal Application Due Date: April 29, 2005
Expiration Date: October 24, 2005


Howard L. Rhodes, Director
Division of Air Resource
Management

HLR/sms/ejs

"More Protection, Less Process"

Printed on recycled paper.

Section I. Facility Information.

Subsection A. Facility Description.

The facility consists of three municipal waste combustors (MWCs) having a nominal design rate capacity of 400 tons MSW per day, 150 MMBtu per hour (excluding 9.9 MMBtu/hr from the combustion air preheaters) and 94,270 pounds steam per hour with MSW having a heating value of 4,500 Btu per pound. The "operating window" of 115 percent (%) over the nominal design rate of 150 MMBtu heat input corresponds to 172.5 MMBtu/hr heat input and 102,000 lbs steam/hour per each boiler. By letter dated March 17, 1998, D.B Riley, Inc. (boilers' manufacturer) indicated that it performed an evaluation of each boiler's ability to operate at the proposed increase steam flow of 102,000 lbs steam/hr and concluded that each boiler can safely operate at an increased continuous steam generation rate of 103,700 lbs steam/hr. Short-term capacity is limited by limiting steam production (102,000 lbs/hr), which effectively limits heat input. The facility has a design net steam energy of 1158 Btu/lb. Natural gas fired auxiliary burners and combustion control systems, with continuous monitoring devices for combustion and process parameters and SO₂, NO_x and CO, will be installed to improve combustion efficiency and control. The air pollution control equipment consists of a spray dryer absorber, a fabric filter, and activated carbon injection system. A selective non-catalytic reduction system (SNCR) and auxiliary gas burners are installed in the furnaces. The facility will also have an ash building and handling system; two lime storage silos; and, an activated carbon storage silo.

Also included in this permit are miscellaneous unregulated/insignificant emissions units and/or activities.

Based on the initial Title V permit application received June 17, 1996, this facility is a major source of hazardous air pollutants (HAPs).

Subsection B. Summary of Emissions Unit ID No(s). and Brief Description(s).

The facility consists of the following regulated emissions units:

E.U.

<u>ID No.</u>	<u>Brief Description</u>
-001	150 MMBtu/hr (nominal) Municipal Waste Combustor & Auxiliary Burners - Unit 1
-002	150 MMBtu/hr (nominal) Municipal Waste Combustor & Auxiliary Burners - Unit 2
-003	150 MMBtu/hr (nominal) Municipal Waste Combustor & Auxiliary Burners - Unit 3
-100	Ash Building and Handling System
-101	Lime Storage Silo
-102	Activated Carbon Storage Silo
-106	Dolomitic Lime Storage Silo

Unregulated Emissions Units and/or Activities

-103	Cooling Tower
-104	Wastewater Treatment Facility
-105	NaOH Storage Tank

Please reference the Permit No., Facility ID No., and appropriate Emissions Unit(s) ID No(s). on all correspondence, test report submittals, applications, etc.

Subsection C. Relevant Documents.

The documents listed below are not a part of this permit; however, they are specifically related to this permitting action.

These documents are provided to the permittee for information purposes only:

Table 1-1, Summary of Air Pollutant Standards and Terms

Table 2-1, Summary of Compliance Requirements

Appendix A-1, Abbreviations, Acronyms, Citations, and Identification Numbers

Appendix H-1: Permit History

Statement of Basis

Appendix BW, Biomedical Waste Definitions

These documents are on file with the permitting authority:

Initial Title V Air Operation Permit issued October 24, 2000

Application for a Title V Air Operation Permit Revision received October 1, 2002

Section II. Facility-wide Conditions.

The following conditions apply facility-wide:

1. APPENDIX TV-4, TITLE V CONDITIONS, is a part of this permit.

{Permitting note: APPENDIX TV-4, TITLE V CONDITIONS, is distributed to the permittee only. Other persons requesting copies of these conditions shall be provided a copy when requested or otherwise appropriate.}

2. General Pollutant Emission Limiting Standards. Objectionable Odor Prohibited. No person shall cause, suffer, allow, or permit the discharge of air pollutants which cause or contribute to an objectionable odor. The truck access doors to the facility shall remain closed except during normal working shifts when MSW is being received at the storage pit area. To minimize odors at the facility, a negative pressure shall be maintained on the tipping floor and air from within the building will be used as combustion air.

[Rule 62-296.320(2), F.A.C.; and, PSD-FL-121(B)]

3. General Particulate Emission Limiting Standards. General Visible Emissions Standard.

Except for emissions units that are subject to a particulate matter or opacity limit set forth or established by rule and reflected by conditions in this permit, no person shall cause, let, permit, suffer or allow to be discharged into the atmosphere the emissions of air pollutants from any activity, the density of which is equal to or greater than that designated as Number 1 on the Ringelmann Chart (20 percent opacity). EPA Method 9 is the method of compliance pursuant to Chapter 62-297, F.A.C.

[Rules 62-296.320(4)(b)1. & 4., F.A.C.]

4. Prevention of Accidental Releases (Section 112(r) of CAA).

a. The permittee shall submit its Risk Management Plan (RMP) to the Chemical Emergency Preparedness and Prevention Office (CEPPO) RMP Reporting Center when, and if, such requirement becomes applicable. Any Risk Management Plans, original submittals, revisions or updates to submittals, should be sent to:

RMP Reporting Center
Post Office Box 3346
Merrifield, VA 22116-3346
Telephone: 703/816-4434

and,

b. The permittee shall submit to the permitting authority Title V certification forms or a compliance schedule in accordance with Rule 62-213.440(2), F.A.C.

[40 CFR 68]

5. Unregulated Emissions Units and/or Activities. Appendix U-1, List of Unregulated Emissions Units and/or Activities, is a part of this permit.

[Rule 62-213.440(1), F.A.C.]

6. Insignificant Emissions Units and/or Activities. Appendix I-1, List of Insignificant Emissions Units and/or Activities, is a part of this permit.

[Rules 62-213.440(1), 62-213.430(6) and 62-4.040(1)(b), F.A.C.]

7. General Pollutant Emission Limiting Standards. Volatile Organic Compounds Emissions or Organic Solvents Emissions. The permittee shall allow no person to store, pump, handle, process, load, unload or use in any process or installation, volatile organic compounds or organic solvents without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department.

Nothing was deemed necessary and ordered at this time.

[Rule 62-296.320(1)(a), F.A.C.]

8. Emissions of Unconfined Particulate Matter. Pursuant to Rules 62-296.320(4)(c)1., 3. & 4., F.A.C., reasonable precautions to prevent emissions of unconfined particulate matter at this facility include the following requirements (see Condition 57. of APPENDIX TV-4, TITLE V CONDITIONS): All roads shall be adequately paved, and vacuum swept if appropriate, to minimize accumulations of ash and dust. The unpaved areas of the facility are maintained and either sodded or landscaped. Hoods, fans, filters, or similar equipment is used to contain, capture, and/or vent particulate matter. The conveyor systems of the facility are enclosed or covered. The ash is wetted before being stored in the ash handling building. Speed limit signs shall be posted. Unprocessed refuse storage areas which must be open for operational purposes (e.g., tipping floor or the refuse bunker while trucks are entering or leaving) shall be under negative air pressure.

[Rule 62-296.320(4)(c)2., F.A.C.; PSD-FL-121(B); and, proposed in initial Title V permit application]

9. When appropriate, any recording, monitoring, or reporting requirements that are time-specific shall be in accordance with the effective date of the permit, which defines day one.

[Rule 62-213.440, F.A.C.]

10. Statement of Compliance. The annual statement of compliance pursuant to Rule 62-213.440(3)(a)2., F.A.C., shall be submitted within 60 (sixty) days after the end of the calendar year using DEP Form number 62-213.900(7), F.A.C.

[Rule 62-213.440(3), F.A.C.]

11. The permittee shall submit all compliance related notifications and reports required of this permit to the Department's Southwest District office.

Department of Environmental Protection
Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619-8218
Telephone: 813/744-6100, Fax: 813/744-6084

12. Any reports; data, notifications; certifications; and, requests, required to be sent to the United States Environmental Protection Agency, Region 4, should be sent to:

United States Environmental Protection Agency
Region 4
Air, Pesticides & Toxics Management Division
Air and EPCRA Enforcement Branch
Air Enforcement Section
61 Forsyth Street
Atlanta, Georgia 30303-8960
Telephone: 404/562-9155; Fax: 404/562-9163

13. Certification by Responsible Official (RO). In addition to the professional engineering certification required for applications by Rule 62-4.050(3), F.A.C., any application form, report, compliance statement, compliance plan and compliance schedule submitted pursuant to Chapter 62-213, F.A.C., shall contain a certification signed by a responsible official that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. Any responsible official who fails to submit any required information or who has submitted incorrect information shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary information or correct information.

[Rule 62-213.420(4), F.A.C.]

Section III. Emissions Unit(s) and Conditions.

Subsection A. This section addresses the following emissions unit(s).

(RESERVED)

Section III. Emissions Unit(s) and Conditions.

Subsection B. This section addresses the following emissions unit(s).

(RESERVED)

Section III. Emissions Unit(s) and Conditions.

Subsection C. This section addresses the following emissions unit(s).

E.U.

ID No. Brief Description

- | | |
|------|---|
| -001 | 150 MMBtu/hr (nominal) Municipal Waste Combustor & Auxiliary Burners - Unit 1 |
| -002 | 150 MMBtu/hr (nominal) Municipal Waste Combustor & Auxiliary Burners - Unit 2 |
| -003 | 150 MMBtu/hr (nominal) Municipal Waste Combustor & Auxiliary Burners - Unit 3 |

Each of the three municipal waste combustor (MWCs) shall have a nominal design rate capacity of 400 tons MSW per day, 150 MMBtu per hour (excluding 9.9 MMBtu/hr from the combustion air preheaters) and 94,270 pounds steam per hour with MSW having a heating value of 4,500 Btu per pound. The "operating window" of 115 percent (%) over the nominal design rate of 150 MMBtu heat input corresponds to 172.5 MMBtu/hr heat input and 102,000 lbs steam/hour per each boiler. By letter dated March 17, 1998, D.B Riley, Inc. (the boilers' manufacturer) indicated that it performed an evaluation of each boiler's ability to operate at the proposed increase steam flow of 102,000 lbs steam/hr and concluded that each boiler can safely operate at an increased continuous steam generation rate of 103,700 lbs steam/hr. Short-term capacity is limited by limiting steam production (102,000 lb/hr), which effectively limits heat input. The units have a designed net steam energy of 1,158 Btu/lb (1378.86 Btu/lb steam enthalpy – 220 Btu/lb feed water enthalpy). Natural gas fired auxiliary burners and combustion control systems, with continuous monitoring devices for combustion and process parameters and SO₂, NO_x and CO, will be installed to improve combustion efficiency and control. The air pollution control equipment consists of a spray dryer absorber, a fabric filter, and activated carbon injection system. A selective non-catalytic reduction system (SNCR) and auxiliary gas burners are installed in the furnaces. Emissions exhaust through a 220 feet tall stack.

{Permitting note(s): These emissions units are regulated under NSPS - 40 CFR 60, Subpart Cb, Emissions Guidelines and Compliance Times for Large Municipal Waste Combustors That Are Constructed on or Before September 20, 1994, adopted and incorporated by reference, subject to provisions in Rule 62-204.800(8)(b), F.A.C.; NSPS - 40 CFR 60, Subpart E, Standards of Performance for Incinerators, adopted and incorporated by reference in Rule 62-204.800(7), F.A.C.; Rule 62-212.400(5), F.A.C., Prevention of Significant Deterioration (PSD); Rule 62-212.400(6), F.A.C., Best Available Control Technology (BACT); Rule 62-296.401(2), F.A.C., Incinerators; and, Rule 62-296.416, F.A.C., Waste-to-Energy Facilities. Note: This project is subject to the requirements of 40 CFR 60, Subpart Cb. This permit may refer to the requirements of 40 CFR 60, Subpart Eb, where these requirements are referenced by Subpart Cb.}

The following conditions apply to the emissions unit(s) listed above:

Essential Potential to Emit (PTE) Parameters

C.1. Capacity. The maximum individual MWC throughput shall not exceed 460 tons MSW per day (1380 tons per day entire facility), and, 102,000 pounds steam per hour (on a 4-hour block arithmetic average). The incinerators/boilers shall not be loaded in excess of their maximum operating capacity, equivalent to 1380 tons MSW per day total, but no more than 1200 tons MSW per day on an annual (52 week rolling average) average basis for the entire facility.

[Rules 62-4.160(2) and 62-210.200(PTE), F.A.C.; and, PSD-FL-121(C)]

C.2. Capacity. The procedures specified in paragraphs (1) and (2) shall be used for calculating municipal waste combustor unit capacity as defined under 40 CFR 60.51b.

(1) For municipal waste combustor units capable of combusting municipal solid waste continuously for a 24-hour period, municipal waste combustor unit capacity shall be calculated based on 24 hours of operation at the maximum charging rate. The maximum charging rate shall be determined as specified in paragraphs (i) and(ii) as applicable.

(i) For combustors that are designed based on heat capacity, the maximum charging rate shall be calculated based on the maximum design heat input capacity of the unit and a heating value of 12,800 kilojoules per kilogram for combustors firing refuse-derived fuel and a heating value of 10,500 kilojoules per kilogram for combustors firing municipal solid waste that is not refuse-derived fuel.

(ii) For combustors that are not designed based on heat capacity, the maximum charging rate shall be the maximum design charging rate.

[40 CFR 60.31b and 40 CFR 60.58b(j)]

C.3. Emissions Unit Operating Rate Limitation After Testing. See specific condition **C.51**.

[Rule 62-297.310(2), F.A.C.]

C.4. Maximum Demonstrated Municipal Waste Combustor Unit Load. Unit load means the steam load of the municipal waste combustor measured as specified in 40 CFR 60.58b(I)(6). Each unit shall not operate at a load level greater than 110 percent of the unit's "maximum demonstrated unit load."

Maximum demonstrated municipal waste combustor unit load means the highest 4-hour arithmetic average municipal waste combustor unit load achieved during four consecutive hours during the most recent dioxin/furan performance test demonstrating compliance with the applicable limit for municipal waste combustor organics specified in specific condition **C.25**. Higher loads are allowed for testing purposes as specified in 40 CFR 60.53b(b).

[40 CFR 60.34b(b) and 40 CFR 60.51b; and, PSD-FL-121(C)]

C.5. Maximum Demonstrated Particulate Matter Control Device Temperature. Maximum demonstrated particulate matter control device temperature means the highest 4-hour arithmetic average flue gas temperature measured at the particulate matter control device inlet during four consecutive hours during the most recent dioxin/furan performance test demonstrating compliance with the applicable limit for municipal waste combustor organics specified in specific condition **C.25.**

[40 CFR 60.34b(b) and 40 CFR 60.51b]

C.6.0. Methods of Operation - Fuels. The primary fuel for the facility is municipal solid waste (MSW), including the items and materials that fit within the definition of MSW contained in either 40 CFR 60.51b or Section 403.706(5), Florida Statutes (1995).

C.6.1. Subject to the limitations contained in this permit, the authorized fuels for the facility also include the other solid wastes that are not MSW which are described below. However, the facility shall not knowingly burn:

- (a) those materials that are prohibited by state or federal law;
- (b) those materials that are prohibited by this permit;
- (c) lead acid batteries;
- (d) hazardous waste;
- (e) nuclear waste;
- (f) radioactive waste;
- (g) sewage sludge;
- (h) explosives;
- (i) beryllium-containing waste as defined in 40 CFR 61.31(g);
- (j) untreated biomedical waste from biomedical waste generators regulated pursuant to Chapter 64E-16, F.A.C., and from other similar generators (or sources);
- (k) segregated loads of biological waste.

C.6.2. The fuel may be received either as a mixture or as a single-item stream (segregated load) of discarded materials. If the facility intends to use an authorized fuel that is segregated non-MSW material, the fuel shall be either:

- (a) well mixed with MSW in the refuse pit; or
- (b) alternately charged with MSW in the hopper.

C.6.3. The facility operator shall prepare and maintain records concerning the description and quantities of all segregated loads of non-MSW material which are received and used as fuel at the facility, and subject to a percentage weight limitation, below (C.6.6. and C.6.7.). For the purposes of this permit, a segregated load is defined to mean a container or truck that is almost completely or exclusively filled with a single item or homogeneous composition of waste material, as determined by visual observation.

C.6.4. To ensure that the facility's fuel does not adversely affect the facility's combustion process or emissions, the facility operator shall:

- (a) comply with good combustion operating practices in accordance with 40 CFR 60.53b;
- (b) install, operate and maintain continuous emissions monitors (CEMS) for oxygen, carbon monoxide, sulfur dioxide, oxides of nitrogen and temperature in accordance with 40 CFR 60.58b; and
- (c) record and maintain the CEMS data in accordance with 40 CFR 60.59b.

These steps shall be used to ensure and verify continuous compliance with the emissions limitations in this permit.

Natural gas may be used as fuel during warm-up, startup, shutdown, and malfunction periods, and at other times when necessary and consistent with good combustion practices.

C.6.5. Subject to the conditions and limitations contained in this permit, the following other solid waste may be used as fuel at the facility:

- (a) Confidential, proprietary or special documents (including but not limited to business records, lottery tickets, event tickets, coupons and microfilm);
- (b) Contraband which is being destroyed at the request of appropriately authorized local, state or federal governmental agencies, provided that such material is not an explosive, a propellant, a hazardous waste, or otherwise prohibited at the facility. For the purposes of this section, contraband includes but is not limited to drugs, narcotics, fruits, vegetables, plants, counterfeit money, and counterfeit consumer goods;
- (c) Wood pallets, clean wood, and land clearing debris;
- (d) Packaging materials and containers;
- (e) Clothing, natural and synthetic fibers, fabric remnants, and similar debris, including but not limited to aprons and gloves; or
- (f) Rugs, carpets, and floor coverings, but not asbestos-containing materials or polyethylene or polyurethane vinyl floor coverings.

C.6.6. Subject to the conditions and limitations contained in this permit, waste tires may be used as fuel at the facility. The total quantity of waste tires received as segregated loads and burned at the facility shall not exceed 3%, by weight, of the facility's total fuel. Compliance with this limitation shall be determined on a calendar month basis in accordance with specific condition C.86. below.

C.6.7. Subject to the conditions and limitations contained in this permit, the following other solid waste materials may be used as fuel at the facility (i.e. the following are authorized fuels that are non-MSW material). The total quantity of the following non-MSW material received as segregated loads and burned at the facility shall not exceed 5%, by weight, of the facility's total fuel. Compliance with this limitation shall be determined on a calendar month basis in accordance with specific condition C.86. below.

- (a) Construction and demolition debris.
- (b) Oil spill debris from aquatic, coastal, estuarine or river environments. Such items or materials include but are not limited to rags, wipes, and absorbents.

(c) Items suitable for human, plant or domesticated animal use, consumption or application where the item's shelf-life has expired or the generator wishes to remove the items from the market. Such items or materials include but are not limited to off-specification or expired consumer products, pharmaceuticals, medications, health and personal care products, cosmetics, foodstuffs, nutritional supplements, returned goods, and controlled substances.

(d) Consumer-packaged products intended for human or domesticated animal use or application but not consumption. Such items or materials include but are not limited to carpet cleaners, household or bathroom cleaners, polishes, waxes and detergents.

(e) Waste materials that:

(i) are generated in the manufacture of items in categories (c) or (d), above and are functionally or commercially useless (expired, rejected or spent); or

(ii) are not yet formed or packaged for commercial distribution. Such items or materials must be substantially similar to other items or materials routinely found in MSW.

(f) Waste materials that contain oil from:

(i) the routine cleanup of industrial or commercial establishments and machinery; or

(ii) spills of virgin or used petroleum products. Such items or materials include but are not limited to rags, wipes, and absorbents.

(g) Used oil and used oil filters. Used oil containing a PCB concentration equal or greater than 50 ppm shall not be burned, pursuant to the limitations of 40 CFR 761.20(e).

{Permitting note: Waste materials specifically authorized above do not require Department approval.}

(h) Waste materials generated by manufacturing, industrial or agricultural activities, provided that these items or materials are substantially similar to items or materials that are found routinely in MSW, subject to prior approval of the Department.

C.6.8. Auxiliary Burners:

(a) Auxiliary burners for each unit shall be fired only by natural gas. The annual capacity factor for natural gas shall be 10 percent or less. Monthly records shall be maintained of the amount of natural gas used by the auxiliary burners in each unit; and, the equivalent gross heat input. On an annual basis (no later than 60 days after the end of the calendar year), a demonstration must be performed based on the monthly records showing that the capacity factor for natural gas in each unit was 10 percent or less. The annual capacity factor for natural gas is the ratio between the heat input to the unit from natural gas and the potential heat input to the unit had it been operated for 8760 hours during a calendar year at the maximum steady state design heat input capacity.

(b) During boiler startup, the auxiliary burners shall be operating at their maximum capacity prior to the introduction of municipal solid waste to the boilers, and shall remain in operation until the lime spray dryer and particulate control device are fully operational.

[Rules 62-4.160(2) and 62-213.440(1), F.A.C.; and, PSD-FL-121(C)]

C.7. Hours of Operation. This emissions unit is allowed to operate continuously, i.e., 8,760 hours/year.

[Rule 62-210.200(PTE), F.A.C.]

Operating Practices and Requirements

C.8. No owner or operator of an affected facility shall cause such facility to operate at a load level greater than 110 percent of the maximum demonstrated municipal waste combustor unit load as defined in specific condition **C.4.**, except as specified below. The averaging time is specified in specific condition **C.10.**

- (1) During the annual dioxin/furan performance test and the two weeks preceding the annual dioxin/furan performance test, no municipal waste combustor unit load limit is applicable.
- (2) The municipal waste combustor unit load limit may be waived in accordance with permission granted by the Administrator or delegated State regulatory authority for the purpose of evaluating system performance, testing new technology or control technologies, diagnostic testing, or related activities for the purpose of improving facility performance or advancing the state-of-the-art for controlling facility emissions.

[40 CFR 60.34b(b) and 40 CFR 60.53b(b)]

C.9. No owner or operator of an affected facility shall cause such facility to operate at a temperature, measured at the particulate matter control device inlet, exceeding 17°C above the maximum demonstrated particulate matter control device temperature as defined in specific condition **C.5.**, except as specified below. The averaging time is specified in specific condition **C.10.** These requirements apply to each particulate matter control device utilized at the affected facility.

- (1) During the annual dioxin/furan performance test and the two weeks preceding the annual dioxin/furan performance test, no particulate matter control device temperature limitations are applicable.
- (2) The particulate matter control device temperature limits may be waived in accordance with permission granted by the Administrator or delegated State regulatory authority for the purpose of evaluating system performance, testing new technology or control technologies, diagnostic testing, or related activities for the purpose of improving facility performance or advancing the state-of-the-art for controlling facility emissions.

[40 CFR 60.34b(b) and 40 CFR 60.53b(c)]

C.10. Operating Requirements. The procedures specified in paragraphs (1) through (12) shall be used for determining compliance with the operating requirements under 40 CFR 60.53b.

- (1) Compliance with the carbon monoxide emission limits in 40 CFR 60.53b(a) shall be determined using a 4-hour block arithmetic average for all types of affected facilities except mass burn rotary waterwall municipal waste combustors and refuse-derived fuel stokers.

(2) For affected mass burn rotary waterwall municipal waste combustors and refuse-derived fuel stokers, compliance with the carbon monoxide emission limits in 40 CFR 60.53b(a) shall be determined using a 24-hour daily arithmetic average.

(3) The owner or operator of an affected facility shall install, calibrate, maintain, and operate a continuous emission monitoring system for measuring carbon monoxide at the combustor outlet and record the output of the system and shall follow the procedures and methods specified in paragraphs(i) through(iii).

(i) The continuous emission monitoring system shall be operated according to Performance Specification 4A in appendix B of 40 CFR 60.

(ii) During each relative accuracy test run of the continuous emission monitoring system required by Performance Specification 4A in appendix B of 40 CFR 60, carbon monoxide and oxygen (or carbon dioxide) data shall be collected concurrently (or within a 30- to 60-minute period) by both the continuous emission monitors and the test methods specified in paragraphs (A) and (B).

(A) For carbon monoxide, EPA Reference Method 10, 10A, or 10B shall be used.

(B) For oxygen (or carbon dioxide), EPA Reference Method 3, 3A, or 3B, as applicable shall be used.

(iii) The span value of the continuous emission monitoring system shall be 125 percent of the maximum estimated hourly potential carbon monoxide emissions of the municipal waste combustor unit.

(4) The 4-hour block and 24-hour daily arithmetic averages specified in paragraphs (1) and (2) shall be calculated from 1-hour arithmetic averages expressed in parts per million by volume corrected to 7 percent oxygen (dry basis). The 1-hour arithmetic averages shall be calculated using the data points generated by the continuous emission monitoring system. At least two data points shall be used to calculate each 1-hour arithmetic average.

(5) The owner or operator of an affected facility may request that compliance with the carbon monoxide emission limit be determined using carbon dioxide measurements corrected to an equivalent of 7 percent oxygen. The relationship between oxygen and carbon dioxide levels for the affected facility shall be established as specified in 40 CFR 60.58b(b)(6).

(6) The procedures specified in paragraphs (i) through (v) shall be used to determine compliance with load level requirements under 40 CFR 60.53b(b).

(i) The owner or operator of an affected facility with steam generation capability shall install, calibrate, maintain, and operate a steam flow meter or a feed water flow meter; measure steam (or feed water) flow in kilograms per hour (or pounds per hour) on a continuous basis; and record the output of the monitor. Steam (or feed water) flow shall be calculated in 4-hour block arithmetic averages.

(ii) The method included in the "American Society of Mechanical Engineers Power Test Codes: Test Code for Steam Generating Units, Power Test Code 4.1-1964 (R1991)" section 4 (incorporated by reference, see 40 CFR 60.17) shall be used for calculating the steam (or feed water) flow required under paragraph (6)(i). The recommendations in "American Society of Mechanical Engineers Interim Supplement 19.5 on Instruments and Apparatus: Application, Part II of Fluid Meters, 6th edition (1971)," chapter 4 (incorporated by

reference-see 40 CFR 60.17) shall be followed for design, construction, installation, calibration, and use of nozzles and orifices except as specified in (iii).

(iii) Measurement devices such as flow nozzles and orifices are not required to be recalibrated after they are installed.

(iv) All signal conversion elements associated with steam (or feed water flow) measurements must be calibrated according to the manufacturer's instructions before each dioxin/furan performance test, and at least once per year.

(7) To determine compliance with the maximum particulate matter control device temperature requirements under 40 CFR 60.53b(c), the owner or operator of an affected facility shall install, calibrate, maintain, and operate a device for measuring on a continuous basis the temperature of the flue gas stream at the inlet to each particulate matter control device utilized by the affected facility. Temperature shall be calculated in 4-hour block arithmetic averages.

(8) The maximum demonstrated municipal waste combustor unit load shall be determined during the initial performance test for dioxins/furans and each subsequent performance test during which compliance with the dioxin/furan emission limit specified in 40 CFR 60.52b(c) is achieved. The maximum demonstrated municipal waste combustor unit load shall be the highest 4-hour arithmetic average load achieved during four consecutive hours during the most recent test during which compliance with the dioxin/furan emission limit was achieved.

(9) For each particulate matter control device employed at the affected facility, the maximum demonstrated particulate matter control device temperature shall be determined during the initial performance test for dioxins/furans and each subsequent performance test during which compliance with the dioxin/furan emission limit specified in 40 CFR 60.52b(c) is achieved. The maximum demonstrated particulate matter control device temperature shall be the highest 4-hour arithmetic average temperature achieved at the particulate matter control device inlet during four consecutive hours during the most recent test during which compliance with the dioxin/furan limit was achieved.

(10) At a minimum, valid continuous emission monitoring system hourly averages shall be obtained as specified in paragraphs(i) and(ii) for 75 percent of the operating hours per day for 90 percent of the operating days per calendar quarter that the affected facility is combusting municipal solid waste.

(i) At least two data points per hour shall be used to calculate each 1-hour arithmetic average.

(ii) At a minimum, each carbon monoxide 1-hour arithmetic average shall be corrected to 7 percent oxygen on an hourly basis using the 1-hour arithmetic average of the oxygen (or carbon dioxide) continuous emission monitoring system data.

(11) All valid continuous emission monitoring system data must be used in calculating the parameters specified under 40 CFR 60.58b(i) even if the minimum data requirements of paragraph (10) are not met. When carbon monoxide continuous emission data are not obtained because of continuous emission monitoring system breakdowns, repairs, calibration checks, and zero and span adjustments, emissions data shall be obtained using other monitoring systems as approved by the Administrator or EPA Reference Method 10 to provide, as necessary, the minimum valid emission data.

(12) Quarterly accuracy determinations and daily calibration drift tests for the carbon monoxide continuous emission monitoring system shall be performed in accordance with procedure 1 in appendix F of 40 CFR 60.

[40 CFR 60.38b and 40 CFR 60.58b(i)]

Operator Training and Certification

C.11. Standards for municipal waste combustor operator training and certification.

(a) No later than the date 6 months after the date of startup of an affected facility or 12 months after State plan approval [40 CFR 60.39b(c)(4)(ii)], whichever is later, each chief facility operator and shift supervisor shall obtain and maintain a current provisional operator certification from either the American Society of Mechanical Engineers [QRO-1-1994 (incorporated by reference - see 40 CFR 60.17 of Subpart A)] or a State certification program.

(b) No later than the date 6 months after the date of startup of an affected facility or 12 months after State plan approval [40 CFR 60.39b(c)(4)(ii)], whichever is later, each chief facility operator and shift supervisor shall have completed full certification or shall have scheduled a full certification exam with either the American Society of Mechanical Engineers [QRO-1-1994 (incorporated by reference - see 40 CFR 60.17 of Subpart A)] or a State certification program.

(c) No owner or operator of an affected facility shall allow the facility to be operated at any time unless one of the following persons is on duty and at the affected facility: A fully certified chief facility operator, a provisionally certified chief facility operator who is scheduled to take the full certification exam according to the schedule specified in paragraph (b), a fully certified shift supervisor, a provisionally certified shift supervisor who is scheduled to take the full certification exam according to the schedule specified in paragraph (b).

(1) The requirement specified in paragraph (c) shall take effect 6 months after the date of startup of the affected facility or 12 months after State plan approval [40 CFR 60.39b(c)(4)(ii)], whichever is later.

(2) If one of the persons listed in paragraph (c) must leave the affected facility during their operating shift, a provisionally certified control room operator who is onsite at the affected facility may fulfill the requirement in paragraph (c).

(d) All chief facility operators, shift supervisors, and control room operators at affected facilities must complete the EPA or State municipal waste combustor operator training course no later than the date 6 months after the date of startup of the affected facility, or by 12 months after State plan approval [40 CFR 60.39b(c)(4)(iii)], whichever is later.

(e) The owner or operator of an affected facility shall develop and update on a yearly basis a site-specific operating manual that shall, at a minimum, address the elements of municipal waste combustor unit operation specified in paragraphs (e)(1) through (e)(11).

(1) A summary of the applicable standards;

(2) A description of basic combustion theory applicable to a municipal waste combustor unit;

(3) Procedures for receiving, handling, and feeding municipal solid waste;

(4) Municipal waste combustor unit startup, shutdown, and malfunction procedures;

(5) Procedures for maintaining proper combustion air supply levels;

- (6) Procedures for operating the municipal waste combustor unit within the standards established;
 - (7) Procedures for responding to periodic upset or off-specification conditions;
 - (8) Procedures for minimizing particulate matter carryover;
 - (9) Procedures for handling ash;
 - (10) Procedures for monitoring municipal waste combustor unit emissions; and
 - (11) Reporting and recordkeeping procedures.
- (f) The owner or operator of an affected facility shall establish a training program to review the operating manual according to the schedule specified in paragraphs (f)(1) and (f)(2) with each person who has responsibilities affecting the operation of an affected facility including, but not limited to, chief facility operators, shift supervisors, control room operators, ash handlers, maintenance personnel, and crane/load handlers.
- (1) Each person specified in paragraph (f) shall undergo initial training no later than the date specified in paragraph (f)(1)(i), (f)(1)(ii), or (f)(1)(iii), whichever is later.
 - (i) The date 6 months after the date of startup of the affected facility;
 - (ii) The date prior to the day the person assumes responsibilities affecting municipal waste combustor unit operation; or
 - (iii) 12 months after State plan approval [40 CFR 60.39b(c)(4)(iii)].
 - (2) Annually, following the initial review required by paragraph (f)(1).
- (g) The operating manual required by paragraph (e) shall be kept in a readily accessible location for all persons required to undergo training under paragraph (f). The operating manual and records of training shall be available for inspection by the EPA or its delegated enforcement agency upon request.
[40 CFR 60.35b, 40 CFR 60.39b(c)(4)(ii) & (iii), and 40 CFR 60.54b]

C.12. The requirement specified in 40 CFR 60.54b(d) does not apply to chief operators, shift supervisors, and control room operators who have obtained full certification from the American Society of Mechanical Engineers on or before the date of State plan approval.
[40 CFR 60.39b(c)(4)(iii)(A)]

C.13. The owner or operator of a designated facility may request that the EPA Administrator waive the requirement specified in 40 CFR 60.54b(d) for chief operators, shift supervisors, and control room operators who have obtained provisional certification from the American Society of Mechanical Engineers on or before the date of State plan approval.
[40 CFR 60.39b(c)(4)(iii)(B)]

C.14. The initial training requirements specified in 40 CFR 60.54b(f)(1) shall be completed no later than the date specified in (1), (2), or (3), whichever is later.

- (1) The date six (6) months after the date of startup of the affected facility;
- (2) Twelve (12) months after State plan approval; or
- (3) The date prior to the day when the person assumes responsibilities affecting municipal waste combustor unit operation.

[40 CFR 60.39b(c)(4)(iii)(C)]

Emission Limitations and Standards

{Permitting note: Table 1-1, Summary of Air Pollutant Standards and Terms, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

{Permitting Note: Unless otherwise specified, the averaging times for Specific Conditions C.15. - C.18. and C.22. - C.31. are based on the specified averaging time of the applicable test method.}

{Permitting note: Equivalent emissions (pound per hour and pound per million Btu), where they appear, are listed for the purposes of providing information and to indicate the potential to emit and are not emission compliance standards.}

Particulate Matter

C.15. The emission limit for particulate matter contained in the gases discharged to the atmosphere from each MWC unit is 27 milligrams per dry standard cubic meter or 0.012 grain per dry standard cubic foot, corrected to 7 percent oxygen (equivalent to 0.024 lb/MMBtu, heat input and 4.1 lbs/hr) and 17.96 tons/yr.

[40 CFR 60.33b(a)(1)(i) and PSD-FL-121(C)]

Visible Emissions

C.16. The emission limit for opacity exhibited by the gases discharged to the atmosphere from each MWC unit is 10 percent (6-minute block average).

[40 CFR 60.33b(a)(1)(iii) and PSD-FL-121(C)]

Cadmium

C.17. The emission limit for cadmium contained in the gases discharged to the atmosphere from each MWC unit is 0.040 milligrams per dry standard cubic meter, corrected to 7 percent oxygen (equivalent to 3.47E-05 lb/MMBtu, heat input and 6.00E-03 lb/hr) and 0.026 ton/yr.

[40 CFR 60.33b(a)(2)(i) and PSD-FL-121(C)]

Mercury

C.18. The emission limit for mercury contained in the gases discharged to the atmosphere from each MWC unit is 0.070 milligrams per dry standard cubic meter or 15 percent of the potential mercury emission concentration (85-percent reduction by weight), corrected to 7 percent oxygen, whichever is less stringent (equivalent to $1.17\text{E-}04$ lb/MMBtu, heat input or 15 percent of the potential mercury emission concentration (85-percent reduction by weight), corrected to 7 percent oxygen, whichever is less stringent and 0.020 lb/hr or 15 percent of the potential mercury emission concentration (85-percent reduction by weight), corrected to 7 percent oxygen, whichever is less stringent) and 0.087 ton/yr. [40 CFR 60.33b(a)(3); Rule 62-296.416(3)(a)1., F.A.C.; and, PSD-FL-121(C)]

C.19. Facilities subject to the mercury emissions limiting standard of Rule 62-296.416(3)(a)1., F.A.C., shall demonstrate individual emissions unit compliance by the compliance date specified in Rule 62-296.416(3)(a)2., F.A.C., and annually thereafter. [Rule 62-296.416(3)(a)3., F.A.C.]

C.20. [reserved]

C.21. [reserved]

Lead

C.22. The emission limit for lead contained in the gases discharged to the atmosphere from each MWC unit is 0.44 milligrams per dry standard cubic meter, corrected to 7 percent oxygen (equivalent to $3.81\text{E-}04$ lb/MMBtu, heat input and 0.065 lb/hr) and 0.288 ton/yr. [40 CFR 60.33b(a)(4) and PSD-FL-121(C)]

Sulfur Dioxide

C.23. The emission limit for sulfur dioxide contained in the gases discharged to the atmosphere from each MWC unit is 29 parts per million by volume or 25 percent of the potential sulfur dioxide emission concentration (75-percent reduction by weight or volume), corrected to 7 percent oxygen (dry basis), whichever is less stringent (equivalent to 0.190 lb/MMBtu, heat input or 25 percent of the potential sulfur dioxide emission concentration (75-percent reduction by weight or volume), corrected to 7 percent oxygen (dry basis), whichever is less stringent and 32.86 lbs/hr or 25 percent of the potential sulfur dioxide emission concentration (75-percent reduction by weight or volume), corrected to 7 percent oxygen (dry basis), whichever is less stringent) and 143.9 tons/yr. Compliance with this emission limit is based on a 24-hour daily geometric mean. [40 CFR 60.33b(b)(3)(i) and PSD-FL-121(C)]

Hydrogen Chloride

C.24. The emission limit for hydrogen chloride contained in the gases discharged to the atmosphere from each MWC unit is 29 parts per million by volume or 5 percent of the potential hydrogen chloride emission concentration (95-percent reduction by weight or volume), corrected to 7 percent oxygen (dry basis), whichever is less stringent (0.099 lb/MMBtu, heat input or 5 percent of the potential hydrogen chloride emission concentration (95-percent reduction by weight or volume), corrected to 7 percent oxygen (dry basis), whichever is less stringent and 17.00 lbs/hr or 5 percent of the potential hydrogen chloride emission concentration (95-percent reduction by weight or volume), corrected to 7 percent oxygen (dry basis), whichever is less stringent) and 74.43 tons/yr. [40 CFR 60.33b(b)(3)(ii) and PSD-FL-121(C)]

Dioxins/Furans

C.25. The emission limit for dioxins/furans contained in the gases discharged to the atmosphere from each MWC unit that do not employ an electrostatic precipitator-based emission control system is 30 nanograms per dry standard cubic meter (total mass), corrected to 7 percent oxygen (equivalent to 2.60E-08 lb/MMBtu, heat input and 4.5E-06 lb/hr) and 1.96E-05 ton/yr. [40 CFR 60.33b(c)(1)(ii) and PSD-FL-121(C)]

Nitrogen Oxides

C.26. The emission limit for nitrogen oxides contained in the gases discharged to the atmosphere from each MWC unit is 205 parts per million by volume, corrected to 7 percent oxygen, dry basis (equivalent to 0.34 lb/MMBtu, heat input and 58.63 lbs/hr) and 256 tons/yr. Compliance with this emission limit is based on a 24-hour daily arithmetic mean.

Nitrogen oxide emissions from the auxiliary burners are approximately 3.45 lbs/hr and 15.1 tons/yr per unit. These emissions are part of, and not in addition to, combustor emissions. Allowable emissions for MSW combustors include auxiliary burners. This facility is limited to a 10 percent (0.10) or less, total annual gross heat input for natural gas consumption. Auxiliary burners for each MWC unit shall be fired only by natural gas, and consumption of natural gas shall not exceed 104,937,500 cubic feet per MWC unit in any calendar year (i.e., annual capacity factor for natural gas of 10% or less as determined by 40 CFR 60.44b(d)).

[40 CFR 60.33b(d) and PSD-FL-121(C)]

Carbon Monoxide

C.27. The emission limit for carbon monoxide contained in the gases discharged to the atmosphere from each MWC unit is 100 parts per million by volume, measured at the combustor outlet in conjunction with a measurement of oxygen concentration, corrected to 7 percent oxygen, dry basis (equivalent to 0.101 lb/MMBtu, heat input and 17.4 lbs/hr) and 76.26 tons/yr. Calculated as an arithmetic average. Averaging time is a 4-hour block average.

[40 CFR 60.34b(a); Rules 62-212.400(2)(g) and 62-212.400(5), F.A.C.; and, PSD-FL-121(C)]

Fluoride

C.28. The emission limit for fluoride contained in the gases discharged to the atmosphere from each MWC unit is 6.74 milligrams per dry standard cubic meter, corrected to 7 percent oxygen (equivalent to 0.0059 lb/MMBtu, heat input and 1.00 lbs/hr) and 4.43 tons/yr.

[PSD-FL-121(C)]

Beryllium

C.29. The emission limit for beryllium contained in the gases discharged to the atmosphere from each MWC unit is 1.48 micrograms per dry standard cubic meter, corrected to 7 percent oxygen (equivalent to 1.27E-06 lb/MMBtu, heat input and 2.18E-04 lbs/hr) and 9.6E-04 ton/yr.

[Rules 62-212.400(2)(g) and 62-212.400(5), F.A.C.; and, PSD-FL-121(C)]

Volatile Organic Compounds

C.30. The emission limit for volatile organic compounds contained in the gases discharged to the atmosphere from each MWC unit shall not exceed 0.01 grain per dry standard cubic foot, corrected to 12 percent carbon dioxide or 0.2 lb/ton, whichever is more restrictive, to be demonstrated during the initial compliance test, only.

[PSD-FL-104 and PSD-FL-121(C)]

Sulfuric Acid Mist

C.31. The emission limit for sulfuric acid mist contained in the gases discharged to the atmosphere from each MWC unit shall not exceed 0.072 grain per dry standard cubic foot, corrected to 12 percent carbon dioxide, to be demonstrated during the initial compliance test, only.

[PSD-FL-121(C)]

Excess Emissions

{Permitting note: The Excess Emissions Rule at Rule 62-210.700, F.A.C., cannot vary any requirement of an NSPS, NESHAP, or Acid Rain program provision.}

C.32. The opacity standards set forth in 40 CFR 60 shall apply at all times except during periods of startup, shutdown, malfunction, and as otherwise provided in the applicable standard.
[40 CFR 60.11(c)]

C.33. At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.
[40 CFR 60.11(d)]

C.34.a. Startup, Shutdown and Malfunction. The standards under 40 CFR 60, Subpart Cb apply at all times except during periods of startup, shutdown, or malfunction. Duration of startup or shutdown periods are limited to 3 hours per occurrence.

(i) The startup period commences when the affected facility begins the continuous burning of municipal solid waste and does not include any warm-up period when the affected facility is combusting fossil fuel or other nonmunicipal solid waste fuel, and no municipal solid waste is being fed to the combustor.

(ii) Continuous burning is the continuous, semicontinuous, or batch feeding of municipal solid waste for purposes of waste disposal, energy production, or providing heat to the combustion system in preparation for waste disposal or energy production. The use of municipal solid waste solely to provide thermal protection of the grate or hearth during the startup period when municipal solid waste is not being fed to the grate is not considered to be continuous burning.

[40 CFR 60.38b and 40 CFR 60.58b(a)]

C.34.b. For the purpose of compliance with the carbon monoxide emission limits in 40 CFR 60.53b(a), if a loss of boiler water level control (e.g., loss of combustion air fan, induced draft fan, combustion grate bar failure) is determined to be a malfunction, the duration of the malfunction period is limited to 15 hours per occurrence.

[40 CFR 60.58b(a)(1)iii]

C.35. Excess emissions resulting from malfunction shall be permitted provided that best operational practices to minimize emissions are adhered to and the duration of excess emissions shall be minimized but in no case exceed three hours per occurrence. A malfunction means any sudden and unavoidable failure of air pollution control equipment or process equipment to operate in a normal or usual manner.
[Rule 62-210.700(1), F.A.C.; and, PSD-FL-121(C)]

C.36. Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during malfunction shall be prohibited.

[Rule 62-210.700(4), F.A.C.]

Test Methods and Procedures

{Permitting note: Table 2-1, Summary of Compliance Requirements, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

C.37. Performance tests shall be conducted under such conditions as the Administrator shall specify to the plant operator based on representative performance of the affected facility. The owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of the performance tests. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test nor shall emissions in excess of the level of the applicable emission limit during periods of startup, shutdown, and malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard.

[40 CFR 60.8(c)]

Particulate Matter and Opacity

C.38. The procedures and test methods specified in paragraphs (1) through (11) shall be used to determine compliance with the emission limits for particulate matter and opacity.

(1) The EPA Reference Method 1 shall be used to select sampling site and number of traverse points.

(2) The EPA Reference Method 3, 3A, or 3B, as applicable shall be used for gas analysis.

(3) The EPA Reference Method 5 shall be used for determining compliance with the particulate matter emission limit. The minimum sample volume shall be 1.7 cubic meters. The probe and filter holder heating systems in the sample train shall be set to provide a gas temperature no greater than 160 ± 14 °C. An oxygen or carbon dioxide measurement shall be obtained simultaneously with each Method 5 run.

(4) The owner or operator of an affected facility may request that compliance with the particulate matter emission limit be determined using carbon dioxide measurements corrected to an equivalent of 7 percent oxygen. The relationship between oxygen and carbon dioxide levels for the affected facility shall be established as specified in paragraph (6).

(5) As specified under 40 CFR 60.8, all performance tests shall consist of three test runs. The average of the particulate matter emission concentrations from the three test runs is used to determine compliance.

(6) In accordance with paragraphs (7) and (11), EPA Reference Method 9 shall be used for determining compliance with the opacity limit except as provided under 40 CFR 60.11(e)

- (7) The owner or operator of an affected facility shall conduct an initial performance test for particulate matter emissions and opacity as required under 40 CFR 60.8.
- (8) The owner or operator of an affected facility shall install, calibrate, maintain, and operate a continuous opacity monitoring system for measuring opacity and shall follow the methods and procedures specified in paragraphs (8)(i) through (8)(iv).
- (i) The output of the continuous opacity monitoring system shall be recorded on a 6-minute average basis.
 - (ii) The continuous opacity monitoring system shall be installed, evaluated, and operated in accordance with 40 CFR 60.13.
 - (iii) The continuous opacity monitoring system shall conform to Performance Specification 1 in appendix B of 40 CFR 60.
 - (iv) The initial performance evaluation shall be completed no later than 180 days after the date of the initial startup of the municipal waste combustor unit, as specified under 40 CFR 60.8.
- (9) Following the date that the initial performance test for particulate matter is completed or is required to be completed under 40 CFR 60.8 for an affected facility, the owner or operator shall conduct a performance test for particulate matter on an annual basis (no more than 12 calendar months following the previous performance test).
- (10) [reserved]
- (11) Following the date that the initial performance test for opacity is completed or is required to be completed under 40 CFR 60.8 for an affected facility, the owner or operator shall conduct a performance test for opacity on an annual basis (no more than 12 calendar months following the previous performance test) using the test method specified in paragraph (6).
[40 CFR 60.38b and 40 CFR 60.58b(c)]

Cadmium, Lead and Mercury

C.39. The procedures and test methods specified in paragraphs (1) and (2) shall be used to determine compliance with the emission limits for cadmium, lead, and mercury.

- (1) The procedures and test methods specified in paragraphs (1)(i) through (1)(ix) shall be used to determine compliance with the emission limits for cadmium and lead.
- (i) The EPA Reference Method 1 shall be used for determining the location and number of sampling points.
 - (ii) The EPA Reference Method 3, 3A, or 3B, as applicable, shall be used for flue gas analysis.
 - (iii) The EPA Reference Method 29 shall be used for determining compliance with the cadmium and lead emission limits.
 - (iv) An oxygen or carbon dioxide measurement shall be obtained simultaneously with each Method 29 test run for cadmium and lead required under paragraph (1)(iii).
 - (v) The owner or operator of an affected facility may request that compliance with the cadmium or lead emission limit be determined using carbon dioxide measurements corrected to an equivalent of 7 percent oxygen. The relationship between oxygen and carbon dioxide levels for the affected facility shall be established as specified in paragraph 40 CFR 60.58b(b)(6).

- (vi) All performance tests shall consist of a minimum of three test runs conducted under representative full load operating conditions. The average of the cadmium or lead emission concentrations from three test runs or more shall be used to determine compliance.
- (vii) Following the date of the initial performance test or the date on which the initial performance test is required to be completed under 40 CFR 60.8, the owner or operator of an affected facility shall conduct a performance test for compliance with the emission limits for cadmium and lead on an annual basis (no more than 12 calendar months following the previous performance test).
- (viii) [reserved]
- (ix) [reserved]
- (2) The procedures and test methods specified in paragraphs (2)(i) through (2)(xi) shall be used to determine compliance with the mercury emission limit.
 - (i) The EPA Reference Method 1 shall be used for determining the location and number of sampling points.
 - (ii) The EPA Reference Method 3, 3A, or 3B, as applicable, shall be used for flue gas analysis.
 - (iii) The EPA Reference Method 29 shall be used to determine the mercury emission concentration. The minimum sample volume when using Method 29 for mercury shall be 1.7 cubic meters.
 - (iv) An oxygen (or carbon dioxide) measurement shall be obtained simultaneously with each Method 29 test run for mercury required under paragraph (2)(iii).
 - (v) The percent reduction in the potential mercury emissions (%PHg) is computed using equation 1:

$$[\%PHg] = \left[\frac{E_i - E_o}{E_i} \right] \times 100 \quad (\text{equation 1})$$

where:

%PHg = percent reduction of the potential mercury emissions achieved.

E_i = potential mercury emission concentration measured at the control device inlet, corrected to 7 percent oxygen (dry basis).

E_o = controlled mercury emission concentration measured at the mercury control device outlet, corrected to 7 percent oxygen (dry basis).

- (vi) All performance tests shall consist of a minimum of three test runs conducted under representative full load operating conditions. The average of the mercury emission concentrations or percent reductions from three test runs or more is used to determine compliance.
- (vii) The owner or operator of an affected facility may request that compliance with the mercury emission limit be determined using carbon dioxide measurements corrected to an

equivalent of 7 percent oxygen. The relationship between oxygen and carbon dioxide levels for the affected facility shall be established as specified in paragraph 40 CFR 60.58b(b)(6).

(viii) The owner or operator of an affected facility shall conduct an initial performance test for mercury emissions as required under 40 CFR 60.8.

(ix) Following the date that the initial performance test for mercury is completed or is required to be completed under 40 CFR 60.8, the owner or operator of an affected facility shall conduct a performance test for mercury emissions on an annual basis (no more than 12 calendar months from the previous performance test).

(x) [reserved]

(xi) The owner or operator of an affected facility where activated carbon injection is used to comply with the mercury emission limit shall follow the procedures specified in 40 CFR 60.58b(m) for measuring and calculating carbon usage. See specific condition C.81.

[40 CFR 60.38b and 40 CFR 60.58b(d)]

C.40. Mercury Emissions Test Method and Procedures. All mercury emissions tests performed pursuant to the requirements of this rule shall comply with the following provisions.

1. The test method for mercury shall be EPA Method 29 adopted in Chapter 62-297, F.A.C.

2. Test procedures shall meet all applicable requirements of Chapter 62-297, F.A.C.

(4) Flue Gas Temperature Standard. Waste-to-energy facilities choosing to control mercury emissions through the use of post-combustion control equipment designed to remove mercury from flue gases shall comply with the flue gas temperature standard of Rule 62-296.416(4)(a), F.A.C.

(a) Temperature Standard. The flue gas temperature standard set forth in 40 CFR 60.53b(c), incorporated by reference in Rule 62-04.800, F.A.C., shall apply.

(b) Temperature Monitoring. The temperature monitoring requirements set forth in 40 CFR 60.58b(i), incorporated by reference in Rule 62-204.800, F.A.C., shall apply.

(5) Carbon Usage Rate. The carbon injection rate operating standard and monitoring requirements set forth in 40 CFR 60.58b(m), incorporated by reference in Rule 62-204.800, F.A.C., shall apply.

See specific condition C.81.

[Rule 62-296.416(3)(d), F.A.C.]

Sulfur Dioxide

C.41. The procedures and test methods specified in paragraphs (1) through (14) shall be used for determining compliance with the sulfur dioxide emission.

(1) The EPA Reference Method 19, section 4.3, shall be used to calculate the daily geometric average sulfur dioxide emission concentration.

(2) The EPA Reference Method 19, section 5.4, shall be used to determine the daily geometric average percent reduction in the potential sulfur dioxide emission concentration.

(3) The owner or operator of an affected facility may request that compliance with the sulfur dioxide emission limit be determined using carbon dioxide measurements corrected to an equivalent of 7 percent oxygen. The relationship between oxygen and carbon dioxide levels for the affected facility shall be established as specified in 40 CFR 60.58b(b)(6).

(4) The owner or operator of an affected facility shall conduct an initial performance test for sulfur dioxide emissions as required under 40 CFR 60.8. Compliance with the sulfur dioxide emission limit (concentration or percent reduction) shall be determined by using the continuous emission monitoring system specified in paragraph (5) to measure sulfur dioxide and calculating a 24-hour daily geometric average emission concentration or a 24-hour daily geometric average percent reduction using EPA Reference Method 19, sections 4.3 and 5.4, as applicable.

(5) The owner or operator of an affected facility shall install, calibrate, maintain, and operate a continuous emission monitoring system for measuring sulfur dioxide emissions discharged to the atmosphere and record the output of the system.

(6) Following the date that the initial performance test for sulfur dioxide is completed or is required to be completed under 40 CFR 60.8, compliance with the sulfur dioxide emission limit shall be determined based on the 24-hour daily geometric average of the hourly arithmetic average emission concentrations using continuous emission monitoring system outlet data if compliance is based on an emission concentration, or continuous emission monitoring system inlet and outlet data if compliance is based on a percent reduction.

(7) At a minimum, valid continuous monitoring system hourly averages shall be obtained as specified in paragraphs (7)(i) and (7)(ii) for 75 percent of the operating hours per day for 90 percent of the operating days per calendar quarter that the affected facility is combusting municipal solid waste.

(i) At least two data points per hour shall be used to calculate each 1-hour arithmetic average.

(ii) Each sulfur dioxide 1-hour arithmetic average shall be corrected to 7 percent oxygen on an hourly basis using the 1-hour arithmetic average of the oxygen (or carbon dioxide) continuous emission monitoring system data.

(8) The 1-hour arithmetic averages required under paragraph (6) shall be expressed in parts per million corrected to 7 percent oxygen (dry basis) and used to calculate the 24-hour daily geometric average emission concentrations and daily geometric average emission percent reductions. The 1-hour arithmetic averages shall be calculated using the data points required under 40 CFR 60.13(e)(2).

(9) All valid continuous emission monitoring system data shall be used in calculating average emission concentrations and percent reductions even if the minimum continuous emission monitoring system data requirements of paragraph (7) are not met.

(10) The procedures under 40 CFR 60.13 shall be followed for installation, evaluation, and operation of the continuous emission monitoring system.

(11) The initial performance evaluation shall be completed no later than 180 days after the date of initial startup of the municipal waste combustor as specified under 40 CFR 60.8.

(12) The continuous emission monitoring system shall be operated according to Performance Specification 2 in 40 CFR 60 appendix B.

(i) During each relative accuracy test run of the continuous emission monitoring system required by Performance Specification 2 in 40 CFR 60 appendix B, sulfur dioxide and oxygen (or carbon dioxide) data shall be collected concurrently (or within a 30- to 60-minute period) by both the continuous emission monitors and the test methods specified in paragraphs (A) and (B).

(A) For sulfur dioxide, EPA Reference Method 6, 6A, or 6C shall be used.

(B) For oxygen (or carbon dioxide), EPA Reference Method 3, 3A, or 3B, as applicable shall be used.

(ii) The span value of the continuous emissions monitoring system at the inlet to the sulfur dioxide control device shall be 125 percent of the maximum estimated hourly potential sulfur dioxide emissions of the municipal waste combustor unit. The span value of the continuous emission monitoring system at the outlet of the sulfur dioxide control device shall be 50 percent of the maximum estimated hourly potential sulfur dioxide emissions of the municipal waste combustor unit.

(13) Quarterly accuracy determinations and daily calibration drift tests shall be performed in accordance with procedure 1 in appendix F of 40 CFR 60.

(14) When sulfur dioxide emissions data are not obtained because of continuous emission monitoring system breakdowns, repairs, calibration checks, and zero and span adjustments, emissions data shall be obtained by using other monitoring systems as approved by the Administrator or EPA Reference Method 19 to provide, as necessary, valid emissions data for a minimum of 75 percent of the hours per day that the affected facility is operated and combusting municipal solid waste for 90 percent of the days per calendar quarter that the affected facility is operated and combusting municipal solid waste.

[40 CFR 60.38b and 40 CFR 60.58b(e)]

Hydrogen Chloride

C.42. The procedures and test methods specified in paragraphs (1) through (8) shall be used for determining compliance with the hydrogen chloride emission limit.

(1) The EPA Reference Method 26 or 26A, as applicable, shall be used to determine the hydrogen chloride emission concentration. The minimum sampling time for Method 26 shall be 1 hour.

(2) An oxygen (or carbon dioxide) measurement shall be obtained simultaneously with each Method 26 test run for hydrogen chloride required by paragraph (1).

(3) The percent reduction in potential hydrogen chloride emissions (% PHCl) is computed using equation 2:

$$[\%PHCl] = \left[\frac{E_i - E_o}{E_i} \right] \times 100 \quad (\text{equation 2})$$

where:

%PHCl = percent reduction of the potential hydrogen chloride emissions achieved.

EI = potential hydrogen chloride emission concentration measured at the control device inlet, corrected to 7 percent oxygen (dry basis).

E_o = controlled hydrogen chloride emission concentration measured at the control device outlet, corrected to 7 percent oxygen (dry basis).

(4) The owner or operator of an affected facility may request that compliance with the hydrogen chloride emission limit be determined using carbon dioxide measurements corrected to an equivalent of 7 percent oxygen. The relationship between oxygen and carbon dioxide levels for the affected facility shall be established as specified in 40 CFR 60.58b(b)(6).

(5) As specified under 40 CFR 60.8, all performance tests shall consist of three test runs. The average of the hydrogen chloride emission concentrations or percent reductions from the three test runs is used to determine compliance.

(6) The owner or operator of an affected facility shall conduct an initial performance test for hydrogen chloride as required under 40 CFR 60.8.

(7) Following the date that the initial performance test for hydrogen chloride is completed or is required to be completed under 40 CFR 60.8, the owner or operator of an affected facility shall conduct a performance test for hydrogen chloride emissions on an annual basis (no more than 12 calendar months following the previous performance test).

(8) [reserved]

[40 CFR 60.38b and 40 CFR 60.58b(f)]

Dioxin/Furan

C.43. The procedures and test methods specified in paragraphs (1) through (9) shall be used to determine compliance with the limits for dioxin/furan emissions.

(1) The EPA Reference Method 1 shall be used for determining the location and number of sampling points.

(2) The EPA Reference Method 3, 3A, or 3B, as applicable, shall be used for flue gas analysis.

(3) The EPA Reference Method 23 shall be used for determining the dioxin/furan emission concentration.

(i) The minimum sample time shall be 4 hours per test run.

(ii) An oxygen (or carbon dioxide) measurement shall be obtained simultaneously with each Method 23 test run for dioxins/furans.

(4) The owner or operator of an affected facility shall conduct an initial performance test for dioxin/furan emissions in accordance with paragraph (3), as required under 40 CFR 60.8.

(5) Following the date that the initial performance test for dioxins/furans is completed or is required to be completed under 40 CFR 60.8, the owner or operator of an affected facility shall conduct performance tests for dioxin/furan emissions in accordance with paragraph (3), according to one of the schedules specified in paragraphs (i) through (iii).

(i) For affected facilities, performance tests shall be conducted on an annual basis (no more than 12 calendar months following the previous performance test.)

(ii) [reserved]

(iii) Where all performance tests over a 2-year period indicate that dioxin/furan emissions are less than or equal to 15 nanograms per dry standard cubic meter (total mass) for all affected facilities located within a municipal waste combustor plant, the owner or operator of the municipal waste combustor plant may elect to conduct annual performance tests for one affected facility (i.e., unit) per year at the municipal waste combustor plant. At a minimum, a performance test for dioxin/furan emissions shall be conducted annually (no more than 12 months following the previous performance test) for one affected facility at the municipal waste combustor plant. Each year a different affected facility at the municipal waste combustor plant shall be tested, and the affected facilities at the plant shall be tested in sequence (e.g., unit 1, unit 2, unit 3, unit 4, as applicable). If each annual performance test continues to indicate a dioxin/furan emission level less than or equal to 15 nanograms per dry standard cubic meter (total mass), the owner or operator may continue conducting a performance test on only one affected facility per year. If any annual performance test indicates a dioxin/furan emission level greater than 15 nanograms per dry standard cubic meter (total mass), performance tests thereafter shall be conducted annually on all affected facilities at the plant until and unless all annual performance tests for all affected facilities at the plant over a 2-year period indicate a dioxin/furan emission level less than or equal to 15 nanograms per dry standard cubic meter (total mass).

(6) The owner or operator of an affected facility that selects to follow the performance testing schedule specified in paragraph (5)(iii) shall follow the procedures specified in 40 CFR 60.59b(g)(4) for reporting the selection of this schedule.

(7) The owner or operator of an affected facility where activated carbon is used to comply with the dioxin/furan emission limits specified in 40 CFR 60.52b(c) or the dioxin/furan emission level specified in paragraph (5)(iii) shall follow the procedures specified in 40 CFR 60.58b(m) for measuring and calculating the carbon usage rate.

(8) The owner or operator of an affected facility may request that compliance with the dioxin/furan emission limit be determined using carbon dioxide measurements corrected to an equivalent of 7 percent oxygen. The relationship between oxygen and carbon dioxide levels for the affected facility shall be established as specified in 40 CFR 60.58b(b)(6).

(9) As specified under 40 CFR 60.8, all performance tests shall consist of three test runs. The average of the dioxin/furan emission concentrations from the three test runs is used to determine compliance. [40 CFR 60.38b and 40 CFR 60.58b(g)]

Nitrogen Oxides

C.44. The procedures and test methods specified in paragraphs (1) through (12) shall be used to determine compliance with the nitrogen oxides emission limit for affected facilities under Sec. 60.52b(d).

(1) The EPA Reference Method 19, section 4.1, shall be used for determining the daily arithmetic average nitrogen oxides emission concentration.

(2) The owner or operator of an affected facility may request that compliance with the nitrogen oxides emission limit be determined using carbon dioxide measurements corrected to an

equivalent of 7 percent oxygen. The relationship between oxygen and carbon dioxide levels for the affected facility shall be established as specified in 40 CFR 60.58b(b)(6).

(3) The owner or operator of an affected facility subject to the nitrogen oxides limit shall conduct an initial performance test for nitrogen oxides as required under 40 CFR 60.8. Compliance with the nitrogen oxides emission limit shall be determined by using the continuous emission monitoring system specified in paragraph (4) for measuring nitrogen oxides and calculating a 24-hour daily arithmetic average emission concentration using EPA Reference Method 19, section 4.1.

(4) The owner or operator of an affected facility subject to the nitrogen oxides emission shall install, calibrate, maintain, and operate a continuous emission monitoring system for measuring nitrogen oxides discharged to the atmosphere, and record the output of the system.

(5) Following the date that the initial performance test for nitrogen oxides is completed or is required to be completed under 40 CFR 60.8, compliance with the emission limit for nitrogen oxides shall be determined based on the 24-hour daily arithmetic average of the hourly emission concentrations using continuous emission monitoring system outlet data.

(6) At a minimum, valid continuous emission monitoring system hourly averages shall be obtained as specified in paragraphs (i) and (ii) for 75 percent of the operating hours per day for 90 percent of the operating days per calendar quarter that the affected facility is combusting municipal solid waste.

(i) At least 2 data points per hour shall be used to calculate each 1-hour arithmetic average.

(ii) Each nitrogen oxides 1-hour arithmetic average shall be corrected to 7 percent oxygen on an hourly basis using the 1-hour arithmetic average of the oxygen (or carbon dioxide) continuous emission monitoring system data.

(7) The 1-hour arithmetic averages required by paragraph (5) shall be expressed in parts per million by volume (dry basis) and used to calculate the 24-hour daily arithmetic average concentrations. The 1-hour arithmetic averages shall be calculated using the data points required under 40 CFR 60.13(e)(2).

(8) All valid continuous emission monitoring system data must be used in calculating emission averages even if the minimum continuous emission monitoring system data requirements of paragraph (6) are not met.

(9) The procedures under 40 CFR 60.13 shall be followed for installation, evaluation, and operation of the continuous emission monitoring system. The initial performance evaluation shall be completed no later than 180 days after the date of initial startup of the municipal waste combustor unit, as specified under 40 CFR 60.8.

(10) The owner or operator of an affected facility shall operate the continuous emission monitoring system according to Performance Specification 2 in appendix B of 40 CFR 60 and shall follow the procedures and methods specified in paragraphs (i) and (ii).

(i) During each relative accuracy test run of the continuous emission monitoring system required by Performance Specification 2 of appendix B of 40 CFR 60, nitrogen oxides and oxygen (or carbon dioxide) data shall be collected concurrently (or within a 30- to 60-minute period) by both the continuous emission monitors and the test methods specified in paragraphs (A) and (B).

(A) For nitrogen oxides, EPA Reference Method 7, 7A, 7C, 7D, or 7E shall be used.

(B) For oxygen (or carbon dioxide), EPA Reference Method 3, 3A, or 3B, as applicable shall be used.

(ii) The span value of the continuous emission monitoring system shall be 125 percent of the maximum estimated hourly potential nitrogen oxide emissions of the municipal waste combustor unit.

(11) Quarterly accuracy determinations and daily calibration drift tests shall be performed in accordance with procedure 1 in appendix F of 40 CFR 60.

(12) When nitrogen oxides continuous emissions data are not obtained because of continuous emission monitoring system breakdowns, repairs, calibration checks, and zero and span adjustments, emissions data shall be obtained using other monitoring systems as approved by the Administrator or EPA Reference Method 19 to provide, as necessary, valid emissions data for a minimum of 75 percent of the hours per day for 90 percent of the days per calendar quarter the unit is operated and combusting municipal solid waste.

[40 CFR 60.38b and 40 CFR 60.58b(h)]

Fluoride

C.45. Compliance with the fluoride limits shall be demonstrated using EPA Method 13A or 13B during the initial compliance test and annually thereafter.

[PSD-FL-121(B)]

Beryllium

C.46. Compliance with the beryllium limits shall be demonstrated using EPA Method 29 during the initial compliance test and annually thereafter.

[PSD-FL-121(B)]

Carbon Monoxide

C.47. See Specific Condition C.10.

Volatile Organic Compounds

C.48. Compliance with the volatile organic compounds limits shall be demonstrated using EPA Method 18, 25 or 25A. This is an initial compliance test requirement and once satisfied, no further tests are required.

[PSD-FL-121(B)]

Sulfuric Acid Mist

C.49. Compliance with the sulfuric acid mist limits shall be demonstrated using EPA Method 8. This is an initial compliance test requirement and once satisfied, no further tests are required.

[PSD-FL-121(B)]

C.50. Required Number of Test Runs. For mass emission limitations, a compliance test shall consist of three complete and separate determinations of the total air pollutant emission rate through the test section of the stack or duct and three complete and separate determinations of any applicable process variables corresponding to the three distinct time periods during which the stack emission rate was measured provided, however, that three complete and separate determinations shall not be required if the process variables are not subject to variation during a compliance test, or if three determinations are not necessary in order to calculate the unit's emission rate. The three required test runs shall be completed within one consecutive five day period. In the event that a sample is lost or one of the three runs must be discontinued because of circumstances beyond the control of the owner or operator, and a valid third run cannot be obtained within the five day period allowed for the test, the Secretary or his or her designee may accept the results of the two complete runs as proof of compliance, provided that the arithmetic mean of the results of the two complete runs is at least 20 percent below the allowable emission limiting standards.

[Rule 62-297.310(1), F.A.C.]

C.51. Operating Rate During Testing. Testing of emissions shall be conducted with the emissions unit operation at permitted capacity, which is defined as 90 to 100 percent of the maximum operation rate allowed by the permit. If it is impracticable to test at permitted capacity, an emissions unit may be tested at less than the minimum permitted capacity; in this case, subsequent emissions unit operation is limited to 110 percent of the test load until a new test is conducted. Once the emissions unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purpose of additional compliance testing to regain the authority to operate at the permitted capacity. Higher loads are allowed for testing purposes as specified at 40 CFR 60.53b(b).

[Rules 62-297.310(2) & (2)(b), F.A.C.; and, PSD-FL-121(B)]

C.52. Calculation of Emission Rate. The indicated emission rate or concentration shall be the arithmetic average of the emission rate or concentration determined by each of the three separate test runs unless otherwise specified in a particular test method or applicable rule.

[Rule 62-297.310(3), F.A.C.]

C.53. Applicable Test Procedures.

(a) Required Sampling Time.

1. Unless otherwise specified in the applicable rule, the required sampling time for each test run shall be no less than one hour and no greater than four hours, and the sampling time at each sampling point shall be of equal intervals of at least two minutes.
2. Opacity Compliance Tests. When either EPA Method 9 or DEP Method 9 is specified as the applicable opacity test method, the required minimum period of observation for a compliance test shall be sixty (60) minutes for emissions units which emit or have the potential to emit 100 tons per year or more of particulate matter, and thirty (30) minutes for emissions units which have potential emissions less than 100 tons per year of particulate matter and are not subject to a multiple-valued opacity standard. The opacity test

observation period shall include the period during which the highest opacity emissions can reasonably be expected to occur. Exceptions to these requirements are as follows:

- a. For batch, cyclical processes, or other operations which are normally completed within less than the minimum observation period and do not recur within that time, the period of observation shall be equal to the duration of the batch cycle or operation completion time.
- b. The observation period for special opacity tests that are conducted to provide data to establish a surrogate standard pursuant to Rule 62-297.310(5)(k), F.A.C., Waiver of Compliance Test Requirements, shall be established as necessary to properly establish the relationship between a proposed surrogate standard and an existing mass emission limiting standard.
- c. The minimum observation period for opacity tests conducted by employees or agents of the Department to verify the day-to-day continuing compliance of a unit or activity with an applicable opacity standard shall be twelve minutes.

(b) Minimum Sample Volume. Unless otherwise specified in the applicable rule, the minimum sample volume per run shall be 25 dry standard cubic feet.

(c) Required Flow Rate Range. For EPA Method 5 particulate sampling, acid mist/sulfur dioxide, and fluoride sampling which uses Greenburg Smith type impingers, the sampling nozzle and sampling time shall be selected such that the average sampling rate will be between 0.5 and 1.0 actual cubic feet per minute, and the required minimum sampling volume will be obtained.

(d) Calibration of Sampling Equipment. Calibration of the sampling train equipment shall be conducted in accordance with the schedule shown in Table 297.310-1, attached as part of this permit.

(e) Allowed Modification to EPA Method 5. When EPA Method 5 is required, the following modification is allowed: the heated filter may be separated from the impingers by a flexible tube. [Rule 62-297.310(4), F.A.C.]

C.54. Required Stack Sampling Facilities. When a mass emissions stack test is required, the permittee shall comply with the requirements contained in Appendix SS-1, Stack Sampling Facilities, attached to this permit.

[Rule 62-297.310(6), F.A.C.]

C.55. Frequency of Compliance Tests. The following provisions apply only to those emissions units that are subject to an emissions limiting standard for which compliance testing is required.

(a) General Compliance Testing.

3. The owner or operator of an emissions unit that is subject to any emission limiting standard shall conduct a compliance test that demonstrates compliance with the applicable emission limiting standard prior to obtaining a renewed operation permit. Emissions units

that are required to conduct an annual compliance test may submit the most recent annual compliance test to satisfy the requirements of this provision. In renewing an air operation permit pursuant to Rule 62-210.300(2)(a)3.b., c., or d., F.A.C., the Department shall not require submission of emission compliance test results for any emissions unit that, during the year prior to renewal:

a. Did not operate; or

b. In the case of a fuel burning emissions unit, burned liquid and/or solid fuel for a total of no more than 400 hours.

4. During each federal fiscal year (October 1 - September 30), unless otherwise specified by rule, order, or permit, the owner or operator of each emissions unit shall have a formal compliance test conducted for:

a. Visible emissions, if there is an applicable standard;

b. Each of the following pollutants, if there is an applicable standard, and if the emissions unit emits or has the potential to emit: 5 tons per year or more of lead or lead compounds measured as elemental lead; 30 tons per year or more of acrylonitrile; or 100 tons per year or more of any other regulated air pollutant; and

c. Each NESHAP pollutant, if there is an applicable emission standard.

5. An annual compliance test for particulate matter emissions shall not be required for any fuel burning emissions unit that, in a federal fiscal year, does not burn liquid and/or solid fuel, other than during startup, for a total of more than 400 hours.

9. The owner or operator shall notify the Department, at least 15 days prior to the date on which each formal compliance test is to begin, of the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted for the owner or operator.

(b) Special Compliance Tests. When the Department, after investigation, has good reason (such as complaints, increased visible emissions or questionable maintenance of control equipment) to believe that any applicable emission standard contained in a Department rule or in a permit issued pursuant to those rules is being violated, it may require the owner or operator of the emissions unit to conduct compliance tests which identify the nature and quantity of pollutant emissions from the emissions unit and to provide a report on the results of said tests to the Department.

(c) Waiver of Compliance Test Requirements. If the owner or operator of an emissions unit that is subject to a compliance test requirement demonstrates to the Department, pursuant to the procedure established in Rule 62-297.620, F.A.C., that the compliance of the emissions unit with an applicable weight emission limiting standard can be adequately determined by means other than the designated test procedure, such as specifying a surrogate standard of no visible emissions for particulate matter sources equipped with a bag house or specifying a fuel analysis for sulfur dioxide emissions, the Department shall waive the compliance test requirements for such emissions units and order that the alternate means of determining compliance be used, provided, however, the provisions of Rule 62-297.310(7)(b), F.A.C., shall apply.

[Rule 62-297.310(7), F.A.C.; and, SIP approved]

Compliance With Standards and Maintenance Requirements

C.56. Compliance with standards in 40 CFR 60, other than opacity standards, shall be determined by performance tests established by 40 CFR 60.8, unless otherwise specified in the applicable standard.
[40 CFR 60.11(a)]

C.57. Compliance with opacity standards in 40 CFR 60 shall be determined by conducting observations in accordance with Reference Method 9 in Appendix A of 40 CFR 60, any alternative method that is approved by the Administrator, or as provided in 40 CFR 60.11(e)(5).
[40 CFR 60.11(b)]

C.58. The owner or operator of an affected facility subject to an opacity standard may submit, for compliance purposes, continuous opacity monitoring system (COMS) data results produced during any performance test required under 40 CFR 60.8 in lieu of EPA Method 9 observation data. If an owner or operator elects to submit COMS data for compliance with the opacity standard, he or she shall notify the Administrator of that decision, in writing, at least 30 days before any performance test required under 40 CFR 60.8 is conducted. Once the owner or operator of an affected facility has notified the Administrator to that effect, the COMS data results will be used to determine opacity compliance during subsequent tests required under 40 CFR 60.8 until the owner or operator notifies the Administrator, in writing, to the contrary. For the purpose of determining compliance with the opacity standard during a performance test required under 40 CFR 60.8 using COMS data, the minimum total time of COMS data collection shall be averages of all 6-minute continuous periods within the duration of the mass emission performance test. Results of the COMS opacity determinations shall be submitted along with the results of the performance test required under 60.8. The owner or operator of an affected facility using a COMS for compliance purposes is responsible for demonstrating that the COMS meets the requirements specified in 40 CFR 60.13(c), that the COMS has been properly maintained and operated, and that the resulting data have not been altered in any way. If COMS data results are submitted for compliance with the opacity standard for a period of time during which EPA Method 9 data indicates noncompliance, the EPA Method 9 data will be used to determine opacity compliance.
[40 CFR 60.11(e)(5)]

Monitoring Requirements

C.59. For the purposes of 40 CFR 60.13, all continuous monitoring systems (CMS) required under applicable subparts shall be subject to the provisions of 40 CFR 60.13 upon promulgation of performance specifications for continuous monitoring systems under Appendix B of 40 CFR 60 and, if the continuous monitoring system is used to demonstrate compliance with emission limits on a continuous basis, Appendix F of 40 CFR 60, unless otherwise specified in an applicable subpart or by the Administrator. Appendix F is applicable December 4, 1987.
[40 CFR 60.13(a)]

C.60. If the owner or operator of an affected facility elects to submit continuous opacity monitoring system (COMS) data for compliance with the opacity standard as provided under 40 CFR 60.11(e)(5), he shall conduct a performance evaluation of the COMS as specified in Performance Specification 1, Appendix B, of 40 CFR 60 before the performance test required under 40 CFR 60.8 is conducted. Otherwise, the owner or operator of an affected facility shall conduct a performance evaluation of the COMS or continuous emission monitoring system (CEMS) during any performance test required under 40 CFR 60.8 or within 30 days thereafter in accordance with the applicable performance specification in Appendix B of 40 CFR 60. The owner or operator of an affected facility shall conduct COMS or CEMS performance evaluations at such other times as may be required by the Administrator under section 114 of the Act.

(1) The owner or operator of an affected facility using a COMS to determine opacity compliance during any performance test required under 60.8 and as described in 40 CFR 60.11(e)(5) shall furnish the Administrator two or, upon request, more copies of a written report of the results of the COMS performance evaluation described in 40 CFR 60.13(c) at least 10 days before the performance test required under 60.8 is conducted.
[40 CFR 60.13(c)(1)]

C.61. (1) Owners and operators of all continuous emission monitoring systems (CEMS) installed in accordance with the provisions of this part shall check the zero (or low-level value between 0 and 20 percent of span value) and span (50 to 100 percent of span value) calibration drifts at least once daily in accordance with a written procedure. The zero and span shall, as a minimum, be adjusted whenever the 24-hour zero drift or 24-hour span drift exceeds two times the limits of the applicable performance specifications in Appendix B. The system must allow the amount of excess zero and span drift measured at the 24-hour interval checks to be recorded and quantified, whenever specified. For continuous monitoring systems measuring opacity of emissions, the optical surfaces exposed to the effluent gases shall be cleaned prior to performing the zero and span drift adjustments except that for systems using automatic zero adjustments. The optical surfaces shall be cleaned when the cumulative automatic zero compensation exceeds 4 percent opacity.

(2) Unless otherwise approved by the Administrator, the following procedures shall be followed for continuous monitoring systems measuring opacity of emissions. Minimum procedures shall include a method for producing a simulated zero opacity condition and an upscale (span) opacity condition using a certified neutral density filter or other related technique to produce a known obscuration of the light beam. Such procedures shall provide a system check of the analyzer internal optical surfaces and all electronic circuitry including the lamp and photo detector assembly.

[40 CFR 60.13(d)(1) and (2)]

C.62. Except for system breakdowns, repairs, calibration checks, and zero and span adjustments required under 40 CFR 60.13(d), all continuous monitoring systems (CMS) shall be in continuous operation and shall meet minimum frequency of operation requirements as follows:

(1) All continuous monitoring systems referenced by 40 CFR 60.13(c) for measuring opacity of emissions shall complete a minimum of one cycle of sampling and analyzing for each successive 10-second period and one cycle of data recording for each successive 6-minute period.

(2) All continuous monitoring systems referenced by 40 CFR 60.13(c) for measuring emissions, except opacity, shall complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period.

[40 CFR 60.13(e)(1) and (2)]

C.63. All continuous monitoring systems (CMS) or monitoring devices shall be installed such that representative measurements of emissions or process parameters from the affected facility are obtained. Additional procedures for location of continuous monitoring systems contained in the applicable Performance Specifications of Appendix B of 40 CFR 60 shall be used.

[40 CFR 60.13(f)]

C.64. [reserved]

C.65. Owners or operators of all continuous monitoring systems for measurement of opacity shall reduce all data to 6-minute averages and for continuous monitoring systems other than opacity to 1-hour averages for time periods as defined in 40 CFR 60.2. Six-minute opacity averages shall be calculated from 36 or more data points equally spaced over each 6-minute

period. For continuous monitoring systems other than opacity, 1-hour averages shall be computed from four or more data points equally spaced over each 1-hour period. Data recorded during periods of continuous monitoring system breakdowns, repairs, calibration checks, and zero and span adjustments shall not be included in the data averages computed under this paragraph. An arithmetic or integrated average of all data may be used. The data may be recorded in reduced or nonreduced form (e.g., ppm pollutant and percent O₂ or ng/J of pollutant). All excess emissions shall be converted into units of the standard using the applicable conversion procedures specified in subparts. After conversion into units of the standard, the data may be rounded to the same number of significant digits as used in the applicable subparts to specify the emission limit (e.g., rounded to the nearest 1 percent opacity).
[40 CFR 60.13(h)]

C.66. Determination of Process Variables.

(a) Required Equipment. The owner or operator of an emissions unit for which compliance tests are required shall install, operate, and maintain equipment or instruments necessary to determine process variables, such as process weight input or heat input, when such data are needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards.

(b) Accuracy of Equipment. Equipment or instruments used to directly or indirectly determine process variables, including devices such as belt scales, weight hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value.
[Rule 62-297.310(5), F.A.C.]

CEMS for Oxygen or Carbon Dioxide

C.67. The owner or operator of an affected facility shall install, calibrate, maintain, and operate a continuous emission monitoring system and record the output of the system for measuring the oxygen or carbon dioxide content of the flue gas at each location where carbon monoxide, sulfur dioxide, or nitrogen oxides emissions are monitored and shall comply with the test procedures and test methods specified in paragraphs (1) through (7).

(1) The span value of the oxygen (or carbon dioxide) monitor shall be 25 percent oxygen (or carbon dioxide).

(2) The monitor shall be installed, evaluated, and operated in accordance with 40 CFR 60.13.

(3) The initial performance evaluation shall be completed no later than 180 days after the date of initial startup of the affected facility, as specified under 40 CFR 60.8.

(4) The monitor shall conform to Performance Specification 3 in appendix B of 40 CFR 60 except for section 2.3 (relative accuracy requirement).

(5) The quality assurance procedures of appendix F of 40 CFR 60 except for section 5.1.1 (relative accuracy test audit) shall apply to the monitor.

(6) If carbon dioxide is selected for use in diluent corrections, the relationship between oxygen and carbon dioxide levels shall be established during the initial performance test according to the procedures and methods specified in paragraphs (i) through (iv). This relationship may be reestablished during performance compliance tests.

(i) The fuel factor equation in Method 3B shall be used to determine the relationship between oxygen and carbon dioxide at a sampling location. Method 3, 3A, or 3B, as applicable, shall be used to determine the oxygen concentration at the same location as the carbon dioxide monitor.

(ii) Samples shall be taken for at least 30 minutes in each hour.

(iii) Each sample shall represent a 1-hour average.

(iv) A minimum of three runs shall be performed.

(7) The relationship between carbon dioxide and oxygen concentrations that is established in accordance with paragraph (6) shall be submitted to the EPA Administrator as part of the initial performance test report and, if applicable, as part of the annual test report if the relationship is reestablished during the annual performance test.

[40 CFR 60.38b and 40 CFR 60.58b(b)]

Recordkeeping and Reporting Requirements

C.68. The owner or operator subject to the provisions of 40 CFR 60 shall furnish the Administrator written notification as follows:

(4) A notification of any physical or operational change to an existing facility which may increase the emission rate of any air pollutant to which a standard applies, unless that change is specifically exempted under an applicable subpart or in 40 CFR 60.14(e). This notice shall be postmarked 60 days or as soon as practicable before the change is commenced and shall include information describing the precise nature of the change, present and proposed emission control systems, productive capacity of the facility before and after the change, and the expected completion date of the change. The Administrator may request additional relevant information subsequent to this notice.

[40 CFR 60.7(a)(4)]

C.69. The owner or operator subject to the provisions of 40 CFR 60 shall maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of an affected facility; any malfunction of the air pollution control equipment; or, any periods during which a continuous monitoring system or monitoring device is inoperative.

[40 CFR 60.7(b)]

C.70. Each owner or operator required to install a continuous monitoring system (CMS) or monitoring device shall submit an excess emissions and monitoring systems performance report (excess emissions are defined in applicable subparts) and/or a summary report form [see 40 CFR 60.7(d)] to the Administrator semiannually, except when: more frequent reporting is specifically required by an applicable subpart; or, the CMS data are to be used directly for compliance

determination, in which case quarterly reports shall be submitted; or, the Administrator, on a case-by-case basis, determines that more frequent reporting is necessary to accurately assess the compliance status of the source. All reports shall be postmarked by the 30th day following the end of each calendar half (or quarter, as appropriate). Written reports of excess emissions shall include the following information:

- (1) The magnitude of excess emissions computed in accordance with 40 CFR 60.13(h), any conversion factor(s) used, and the date and time of commencement and completion of each time period of excess emissions. The process operating time during the reporting period.
 - (2) Specific identification of each period of excess emissions that occurs during startups, shutdowns, and malfunctions of the affected facility. The nature and cause of any malfunction (if known), the corrective action taken or preventative measures adopted.
 - (3) The date and time identifying each period during which the continuous monitoring system was inoperative except for zero and span checks and the nature of the system repairs or adjustments.
 - (4) When no excess emissions have occurred or the continuous monitoring system(s) have not been inoperative, repaired, or adjusted, such information shall be stated in the report.
- [40 CFR 60.7(c)(1), (2), (3), and (4)]

C.71. The summary report form shall contain the information and be in the format shown in Figure 1 (attached) unless otherwise specified by the Administrator. One summary report form shall be submitted for each pollutant monitored at each affected facility.

- (1) If the total duration of excess emissions for the reporting period is less than 1 percent of the total operating time for the reporting period and CMS downtime for the reporting period is less than 5 percent of the total operating time for the reporting period, only the summary report form shall be submitted and the excess emission report described in 40 CFR 60.7(c) need not be submitted unless requested by the Administrator.
 - (2) If the total duration of excess emissions for the reporting period is 1 percent or greater of the total operating time for the reporting period or the total CMS downtime for the reporting period is 5 percent or greater of the total operating time for the reporting period, the summary report form and the excess emission report described in 40 CFR 60.7(c) shall both be submitted.
- [40 CFR 60.7(d)(1) and (2)]

{See attached Figure 1: Summary Report-Gaseous and Opacity Excess Emission and Monitoring System Performance}

C.72. (1) Notwithstanding the frequency of reporting requirements specified in 40 CFR 60.7(c), an owner or operator who is required by an applicable subpart to submit excess emissions and monitoring systems performance reports (and summary reports) on a quarterly (or more frequent) basis may reduce the frequency of reporting for that standard to semiannual if the following conditions are met:

- (i) For 1 full year (e.g., 4 quarterly or 12 monthly reporting periods) the affected facility's excess emissions and monitoring systems reports submitted to comply with a standard under this part continually demonstrate that the facility is in compliance with the applicable standard;

(ii) The owner or operator continues to comply with all recordkeeping and monitoring requirements specified in 40 CFR 60, Subpart A, and the applicable standard; and

(iii) The Administrator does not object to a reduced frequency of reporting for the affected facility, as provided in 40 CFR 60.7(e)(2).

(2) The frequency of reporting of excess emissions and monitoring systems performance (and summary) reports may be reduced only after the owner or operator notifies the Administrator in writing of his or her intention to make such a change and the Administrator does not object to the intended change. In deciding whether to approve a reduced frequency of reporting, the Administrator may review information concerning the source's entire previous performance history during the required recordkeeping period prior to the intended change, including performance test results, monitoring data, and evaluations of an owner or operator's conformance with operation and maintenance requirements. Such information may be used by the Administrator to make a judgment about the source's potential for noncompliance in the future. If the Administrator disapproves the owner or operator's request to reduce the frequency of reporting, the Administrator will notify the owner or operator in writing within 45 days after receiving notice of the owner or operator's intention. The notification from the Administrator to the owner or operator will specify the grounds on which the disapproval is based. In the absence of a notice of disapproval within 45 days, approval is automatically granted.

(3) As soon as monitoring data indicate that the affected facility is not in compliance with any emission limitation or operating parameter specified in the applicable standard, the frequency of reporting shall revert to the frequency specified in the applicable standard, and the owner or operator shall submit an excess emissions and monitoring systems performance report (and summary report, if required) at the next appropriate reporting period following the noncomplying event. After demonstrating compliance with the applicable standard for another full year, the owner or operator may again request approval from the Administrator to reduce the frequency of reporting for that standard as provided for in 40 CFR 60.7(e)(1) and (e)(2).

[40 CFR 60.7(e)(1)]

C.73. Any owner or operator subject to the provisions of 40 CFR 60 shall maintain a file of all measurements, including continuous monitoring system, monitoring device, and performance testing measurements; all continuous monitoring system performance evaluations; all continuous monitoring system or monitoring device calibration checks; adjustments and maintenance performed on these systems or devices; and, all other information required by 40 CFR 60 recorded in a permanent form suitable for inspection. The file shall be retained for at least **five (5)** years following the date of such measurements, maintenance, reports, and records.

[40 CFR 60.7(f) and Rule 62-213.440(1)(b)2.b., F.A.C.]

C.74. Notification of Construction or Reconstruction. The owner or operator of an affected facility with a capacity to combust greater than 250 tons per day shall submit a notification of construction, which includes the information specified in paragraphs (1) through (4).

(1) Intent to construct.

- (2) Planned initial startup date.
 - (3) The types of fuels that the owner or operator plans to combust in the affected facility.
 - (4) The municipal waste combustor unit capacity and supporting capacity calculations prepared in accordance with 40 CFR 60.58b(j).
- [40 CFR 60.39b and 40 CFR 60.59b(b)]

C.75. The owner or operator of an affected facility subject to the standards under 40 CFR. 60.53b, 60.54b, and 60.55b shall maintain records of the information specified in paragraphs (1) through (15), as applicable, for each affected facility for a period of at least 5 years.

- (1) The calendar date of each record.
- (2) The emission concentrations and parameters measured using continuous monitoring systems as specified under paragraphs (i) and (ii).
 - (i) The measurements specified in paragraphs (A) through (D) shall be recorded and be available for submittal to the Administrator or review onsite by an inspector.
 - (A) All 6-minute average opacity levels as specified under 40 CFR 60.58b(c).
 - (B) All 1-hour average sulfur dioxide emission concentrations as specified under 40 CFR 60.58b(e).
 - (C) All 1-hour average nitrogen oxides emission concentrations as specified under 40 CFR 60.58b(h).
 - (D) All 1-hour average carbon monoxide emission concentrations, municipal waste combustor unit load measurements, and particulate matter control device inlet temperatures as specified under 40 CFR 60.58b(i).
 - (ii) The average concentrations and percent reductions, as applicable, specified in paragraphs (2)(ii)(A) through (2)(ii)(D) shall be computed and recorded, and shall be available for submittal to the Administrator or review on-site by an inspector.
 - (A) All 24-hour daily geometric average sulfur dioxide emission concentrations and all 24-hour daily geometric average percent reductions in sulfur dioxide emissions as specified under 40 CFR 60.58b(e).
 - (B) All 24-hour daily arithmetic average nitrogen oxides emission concentrations as specified under 40 CFR 60.58b(h).
 - (C) All 4-hour block or 24-hour daily arithmetic average carbon monoxide emission concentrations, as applicable, as specified under 40 CFR 60.58b(i).
- (3) Identification of the calendar dates when any of the average emission concentrations, percent reductions, or operating parameters recorded under paragraphs (2)(ii)(A) through (2)(ii)(D), or the opacity levels recorded under paragraph (2)(i)(A) are above the applicable limits, with reasons for such exceedances and a description of corrective actions taken.
- (4) For affected facilities that apply activated carbon for mercury or dioxin/furan control, the records specified in paragraphs (i) through (v).
 - (i) The average carbon mass feed rate (in kilograms per hour or pounds per hour) estimated as required under 40 CFR 60.58b(m)(1)(i) during the initial mercury performance test and all subsequent annual performance tests, with supporting calculations.

- (ii) The average carbon mass feed rate (in kilograms per hour or pounds per hour) estimated as required under 40 CFR 60.58b(m)(1)(ii) during the initial dioxin/furan performance test and all subsequent annual performance tests, with supporting calculations.
 - (iii) The average carbon mass feed rate (in kilograms per hour or pounds per hour) estimated for each hour of operation as required under 40 CFR 60.58b(m)(3)(ii), with supporting calculations.
 - (iv) The total carbon usage for each calendar quarter estimated as specified by 40 CFR 60.58b(m)(3), with supporting calculations.
 - (v) Carbon injection system operating parameter data for the parameter(s) that are the primary indicator(s) of carbon feed rate (e.g., screw feeder speed).
- (5) [reserved]
- (6) Identification of the calendar dates for which the minimum number of hours of any of the data specified in paragraphs (i) through (v) have not been obtained including reasons for not obtaining sufficient data and a description of corrective actions taken.
- (i) Sulfur dioxide emissions data;
 - (ii) Nitrogen oxides emissions data;
 - (iii) Carbon monoxide emissions data;
 - (iv) Municipal waste combustor unit load data; and
 - (v) Particulate matter control device temperature data.
- (7) Identification of each occurrence that sulfur dioxide emissions data, nitrogen oxides emissions data (large municipal waste combustors only), or operational data (i.e., carbon monoxide emissions, unit load, and particulate matter control device temperature) have been excluded from the calculation of average emission concentrations or parameters, and the reasons for excluding the data.
- (8) The results of daily drift tests and quarterly accuracy determinations for sulfur dioxide, nitrogen oxides, and carbon monoxide continuous emission monitoring systems, as required under appendix F of this part, procedure 1.
- (9) The test reports documenting the results of the initial performance test and all annual performance tests listed in paragraphs (i) and (ii) shall be recorded along with supporting calculations.
- (i) The results of the initial performance test and all annual performance tests conducted to determine compliance with the particulate matter, opacity, cadmium, lead, mercury, dioxins/furans, hydrogen chloride, and fugitive ash emission limits.
 - (ii) For the initial dioxin/furan performance test and all subsequent dioxin/furan performance tests recorded under paragraph (9)(i), the maximum demonstrated municipal waste combustor unit load and maximum demonstrated particulate matter control device temperature (for each particulate matter control device).
- (10) [reserved]
- (12) The records specified in paragraphs (i) through (iii).
- (i) Records showing the names of the municipal waste combustor chief facility operator, shift supervisors, and control room operators who have been provisionally certified by the American Society of Mechanical Engineers or an equivalent State-approved certification

program as required by 40 CFR 60.54b(a) including the dates of initial and renewal certifications and documentation of current certification.

(ii) Records showing the names of the municipal waste combustor chief facility operator, shift supervisors, and control room operators who have been fully certified by the American Society of Mechanical Engineers or an equivalent State-approved certification program as required by 40 CFR 60.54b(b) including the dates of initial and renewal certifications and documentation of current certification.

(iii) Records showing the names of the municipal waste combustor chief facility operator, shift supervisors, and control room operators who have completed the EPA municipal waste combustor operator training course or a State-approved equivalent course as required by 40 CFR 60.54b(d) including documentation of training completion.

(13) Records showing the names of persons who have completed a review of the operating manual as required by 40 CFR 60.54b(f) including the date of the initial review and subsequent annual reviews.

(14) For affected facilities that apply activated carbon for mercury or dioxin/furan control, identification of the calendar dates when the average carbon mass feed rates recorded under (4)(iii) were less than either of the hourly carbon feed rates estimated during performance tests for mercury or dioxin/furan emissions and recorded under paragraphs (4)(i) and (4)(ii), respectively, with reasons for such feed rates and a description of corrective actions taken.

(15) For affected facilities that apply activated carbon for mercury or dioxin/furan control, identification of the calendar dates when the carbon injection system operating parameter(s) that are the primary indicator(s) of carbon mass feed rate (e.g., screw feeder speed) recorded under paragraph (4)(v) are below the level(s) estimated during the performance tests as specified in 40 CFR 60.58b(m)(1)(i) and 40 CFR 60.58b(m)(1)(ii), with reasons for such occurrences and a description of corrective actions taken.
[40 CFR 60.39b and 40 CFR 60.59b(d)]

C.76. The owner or operator of an affected facility shall submit the information specified in paragraphs (1) through (6) in the initial performance test report.

(1) The initial performance test data as recorded under 40 CFR 60.59b(d)(2)(ii)(A) through (d)(2)(ii)(D) for the initial performance test for sulfur dioxide, nitrogen oxides, carbon monoxide, municipal waste combustor unit load level, and particulate matter control device inlet temperature.

(2) The test report documenting the initial performance test recorded under 40 CFR 60.59b(d)(9) for particulate matter, opacity, cadmium, lead, mercury, dioxins/furans, hydrogen chloride, and fugitive ash emissions.

(3) The performance evaluation of the continuous emission monitoring system using the applicable performance specifications in appendix B of this part.

(4) The maximum demonstrated municipal waste combustor unit load and maximum demonstrated particulate matter control device inlet temperature(s) established during the initial dioxin/furan performance test as recorded under 40 CFR 60.59b(d)(9).

(5) For affected facilities that apply activated carbon injection for mercury control, the owner or operator shall submit the average carbon mass feed rate recorded under 40 CFR 60.59b(d)(4)(i).

(6) For those affected facilities that apply activated carbon injection for dioxin/furan control, the owner or operator shall submit the average carbon mass feed rate recorded under 40 CFR 60.59b(d)(4)(ii).
[40 CFR 60.39b and 40 CFR 60.59b(f)]

C.77. Following the first year of municipal combustor operation, the owner or operator of an affected facility shall submit an annual report including the information specified in paragraphs (1) through (4), as applicable, no later than February 1 of each year following the calendar year in which the data were collected (once the unit is subject to permitting requirements under Title V of the Act, the owner or operator of an affected facility must submit these reports semiannually).

(1) A summary of data collected for all pollutants and parameters regulated under this subpart, which includes the information specified in paragraphs (i) through (v).

(i) A list of the particulate matter, opacity, cadmium, lead, mercury, dioxins/furans, hydrogen chloride, and fugitive ash emission levels achieved during the performance tests recorded under 40 CFR 60.59b (d)(9).

(ii) A list of the highest emission level recorded for sulfur dioxide, nitrogen oxides, carbon monoxide, municipal waste combustor unit load level, and particulate matter control device inlet temperature based on the data recorded under 40 CFR 60.59b(d)(2)(ii)(A) through (d)(2)(ii)(D).

(iii) List the highest opacity level measured, based on the data recorded under 40 CFR 60.59b(d)(2)(i)(A).

(iv) The total number of days that the minimum number of hours of data for sulfur dioxide, nitrogen oxides, carbon monoxide, municipal waste combustor unit load, and particulate matter control device temperature data were not obtained based on the data recorded under 40 CFR 60.59b(d)(6).

(v) The total number of hours that data for sulfur dioxide, nitrogen oxides, carbon monoxide, municipal waste combustor unit load, and particulate matter control device temperature were excluded from the calculation of average emission concentrations or parameters based on the data recorded under 40 CFR 60.59b(d)(7).

(2) The summary of data reported under paragraph (1) shall also provide the types of data specified in paragraphs (1)(i) through (1)(vi) for the calendar year preceding the year being reported, in order to provide the Administrator with a summary of the performance of the affected facility over a 2-year period.

(3) The summary of data including the information specified in paragraphs (1) and (2) shall highlight any emission or parameter levels that did not achieve the emission or parameter limits specified under this subpart.

(4) A notification of intent to begin the reduced dioxin/furan performance testing schedule specified in 40 CFR 60.58b(g)(5)(iii) during the following calendar year.

[40 CFR 60.39b and 40 CFR 60.59b(g)]

C.78. The owner or operator of an affected facility shall submit a semiannual report that includes the information specified in paragraphs (1) through (5) for any recorded pollutant or parameter that does not comply with the pollutant or parameter limit specified under this subpart, according to the schedule specified under paragraph (6).

(1) The semiannual report shall include information recorded under 40 CFR 60.59b(d)(3) for sulfur dioxide, nitrogen oxides, carbon monoxide, municipal waste combustor unit load level, particulate matter control device inlet temperature, and opacity.

(2) For each date recorded as required by 40 CFR 60.59b(d)(3) and reported as required by paragraph (1), the semiannual report shall include the sulfur dioxide, nitrogen oxides, carbon monoxide, municipal waste combustor unit load level, particulate matter control device inlet temperature, or opacity data, as applicable, recorded under 40 CFR 60.59b(d)(2)(ii)(A) through (d)(2)(ii)(D) and (d)(2)(i)(A), as applicable.

(3) If the test reports recorded under 40 CFR 56.59b(d)(9) document any particulate matter, opacity, cadmium, lead, mercury, dioxins/furans, hydrogen chloride, and fugitive ash emission levels that were above the applicable pollutant limits, the semiannual report shall include a copy of the test report documenting the emission levels and the corrective actions taken.

(4) The semiannual report shall include the information recorded under 40 CFR 60.59b(d)(15) for the carbon injection system operating parameter(s) that are the primary indicator(s) of carbon mass feed rate.

(5) For each operating date reported as required by paragraph (4), the semiannual report shall include the carbon feed rate data recorded under 40 CFR 60.59b(d)(4)(iii).

(6) Semiannual reports required by this condition shall be submitted according to the schedule specified in paragraphs (i) and (ii).

(i) If the data reported in accordance with paragraphs (1) through (5) were collected during the first calendar half, then the report shall be submitted by August 1 following the first calendar half.

(ii) If the data reported in accordance with paragraphs (1) through (5) were collected during the second calendar half, then the report shall be submitted by February 1 following the second calendar half.

[40 CFR 60.39b and 40 CFR 60.59b(h)]

C.79. All reports specified under 40 CFR 60.59b(a), (b), (c), (f), (g), (h), and (i) shall be submitted as a paper copy, postmarked on or before the submittal dates specified under these paragraphs, and maintained onsite as a paper copy for a period of 5 years.

[40 CFR 60.39b and 40 CFR 60.59b(j)]

C.80. All records specified under 40 CFR 60.59b(d) and (e) shall be maintained onsite in either paper copy or computer-readable format, unless an alternative format is approved by the Administrator.

[40 CFR 60.39b and 40 CFR 60.59b(k)]

C.81. The Permittee shall maintain a central file containing all measurements, records, and other data that are required to be collected pursuant to the various specific conditions of this permit. This file shall include but not be limited to:

- (a) Data collected from monitoring instruments, including CEM/COM systems, steam or feed water flow measurements and PM control device temperatures;
- (b) Continuous steam flow or feed water flow records on 4-hour block average basis;
- (c) Records on daily solid waste charging rates and hours of operation derived from monthly truck scale data, refuse pit inventory, and operational records.
- (d) Amount of natural gas burned for each unit each month; the equivalent heat input from natural gas for each unit each month, calculated using the heat value for natural gas provided by the natural gas supplier; and the annual records of the natural gas capacity factor for each unit;
- (e) Results of all source tests or performance tests; and records of the maximum demonstrated unit load specified by this permit.
- (f) Amounts of activated carbon used for mercury control;
- (g) Calibration logs for all instruments subject to this permit;
- (h) Maintenance/repair logs for any work performed which is subject to this permit;
- (i) Records showing the names of facility personnel who have been provisionally or fully certified, and who have completed the MWC operator training course, and who have completed reviews of the operating manual, including the dates and documentation of certification/review.
- (j) Records demonstrating compliance with the percentage limitations on segregated solid wastes required by this permit.

[PSD-FL-121(B)]

C.82. If the owner or operator of an affected facility would prefer a different annual or semiannual date for submitting the periodic reports required by 40 CFR 60.59b(g), (h) and (i), then the dates may be changed by mutual agreement between the owner or operator and the Administrator according to the procedures specified in 40 CFR 60.19(c) of subpart A of this part.

[40 CFR 60.39b and 40 CFR 60.59b(l)]

C.83. In the case of excess emissions resulting from malfunctions, each owner or operator shall notify the Department in accordance with Rule 62-4.130, F.A.C. A full written report on the malfunctions shall be submitted in a quarterly report, if requested by the Department.

[Rule 62-210.700(6), F.A.C.]

C.84. Submit to the Department a written report of emissions in excess of emission limiting for each calendar quarter. The nature and cause of the excess emissions shall be explained. This report does not relieve the owner or operator of the legal liability for violations. All recorded data shall be maintained on file by the Source for a period of five years.

[Rule 62-213.440, F.A.C.]

C.85. Test Reports.

- (a) The owner or operator of an emissions unit for which a compliance test is required shall file a report with the Department on the results of each such test.
- (b) The required test report shall be filed with the Department as soon as practical but no later than 45 days after the last sampling run of each test is completed.
- (c) The test report shall provide sufficient detail on the emissions unit tested and the test procedures used to allow the Department to determine if the test was properly conducted and the test results properly computed. As a minimum, the test report, other than for an EPA or DEP Method 9 test, shall provide the following information:
 - 1. The type, location, and designation of the emissions unit tested.
 - 2. The facility at which the emissions unit is located.
 - 3. The owner or operator of the emissions unit.
 - 4. The normal type and amount of fuels used and materials processed, and the types and amounts of fuels used and material processed during each test run.
 - 5. The means, raw data and computations used to determine the amount of fuels used and materials processed, if necessary to determine compliance with an applicable emission limiting standard.
 - 6. The type of air pollution control devices installed on the emissions unit, their general condition, their normal operating parameters (pressure drops, total operating current and GPM scrubber water), and their operating parameters during each test run.
 - 7. A sketch of the duct within 8 stack diameters upstream and 2 stack diameters downstream of the sampling ports, including the distance to any upstream and downstream bends or other flow disturbances.
 - 8. The date, starting time and duration of each sampling run.
 - 9. The test procedures used, including any alternative procedures authorized pursuant to Rule 62-297.620, F.A.C. Where optional procedures are authorized in this chapter, indicate which option was used.
 - 10. The number of points sampled and configuration and location of the sampling plane.
 - 11. For each sampling point for each run, the dry gas meter reading, velocity head, pressure drop across the stack, temperatures, average meter temperatures and sample time per point.
 - 12. The type, manufacturer and configuration of the sampling equipment used.
 - 13. Data related to the required calibration of the test equipment.
 - 14. Data on the identification, processing and weights of all filters used.
 - 15. Data on the types and amounts of any chemical solutions used.
 - 16. Data on the amount of pollutant collected from each sampling probe, the filters, and the impingers, are reported separately for the compliance test.
 - 17. The names of individuals who furnished the process variable data, conducted the test, analyzed the samples and prepared the report.
 - 18. All measured and calculated data required to be determined by each applicable test procedure for each run.

19. The detailed calculations for one run that relate the collected data to the calculated emission rate.

20. The applicable emission standard, and the resulting maximum allowable emission rate for the emissions unit, plus the test result in the same form and unit of measure.

21. A certification that, to the knowledge of the owner or his authorized agent, all data submitted are true and correct. When a compliance test is conducted for the Department or its agent, the person who conducts the test shall provide the certification with respect to the test procedures used. The owner or his authorized agent shall certify that all data required and provided to the person conducting the test are true and correct to his knowledge.

[Rule 62-297.310(8), F.A.C.]

C.86. Segregated Solid Waste Record Keeping: The following records shall be made and kept to demonstrate compliance with the segregated non-MSW percentage limitations of specific conditions C.6.6. and C.6.7.:

Each segregated load of non-MSW materials, that is subject to the percentage weight limitations of specific conditions C.6.6. and C.6.7., which is received for processing shall be documented as to waste description and weight. The weight of all waste materials received for processing shall be measured using the facility truck scale and recorded.

Each day the total weight of segregated tires received shall be computed, and the daily total shall be added to the sum of the daily totals from the previous days in the current calendar month. At the end of each calendar month, the resultant monthly total weight of tires shall be divided by the total weight of all waste materials received in the same calendar month, and the resultant number shall be multiplied by 100 to express the ratio in percentage terms. The percentage computed shall be compared to the 3% limitation.

Each day the total weight of segregated non-MSW materials received that are subject to the 5% restriction shall be computed, and the daily total shall be added to the sum of the daily totals from the previous days in the current calendar month. At the end of each calendar month, the resultant monthly total weight of segregated non-MSW materials subject to the 5% restriction shall be divided by the total weight of all waste materials received in the same calendar month, and the resultant number shall be multiplied by 100 to express the ratio in percentage terms. The percentage computed shall be compared to the 5% limitation.

[PSD-FL-121(C)]

C.87. Charging Rate Monitoring: The average daily solid waste charging rate shall be determined on a monthly basis and recorded for each MWC unit. The daily charging rate shall be determined each month on an average daily basis for each MWC unit using the Facility's truck scale weight data, refuse pit inventory data and MWC operating data for the preceding calendar month. Monthly truck scale weight records of the weight of solid waste received and processed at the Facility, and refuse pit inventory data, shall be used to determine the amount of solid waste charged during the preceding calendar month on an average daily basis. The MWC load level measurements or other operating data shall be used to determine the number of operating hours per MWC unit for each day during the preceding calendar month.

[Rules 62-204.800(8) and 62-4.070(3), F.A.C.; 40 CFR 60.53(a); and, PSD-FL-121(B)]

Miscellaneous Requirements.

C.88. Definitions. For the purposes of Rules 62-204.800(7), (8), and (9), F.A.C., the definitions contained in the various provisions of 40 CFR Parts 60 and 61, adopted herein shall apply except that the term "Administrator" when used in 40 CFR Parts 60 and 61, shall mean the Secretary or the Secretary's designee except as noted in 40 CFR 61.157.

[40 CFR 60.2; and, Rules 62-204.800(7)(a), (8)(a)2. and (9)(a), F.A.C.]

C.89. Circumvention. No owner or operator subject to the provisions of 40 CFR 60 shall build, erect, install, or use any article, machine, equipment or process, the use of which conceals an emission which would otherwise constitute a violation of an applicable standard. Such concealment includes, but is not limited to, the use of gaseous diluents to achieve compliance with an opacity standard or with a standard which is based on the concentration of a pollutant in the gases discharged to the atmosphere.

[40 CFR 60.12]

C.90. Activated Carbon Injection The owner or operator of an affected facility where activated carbon injection is used to comply with the mercury emission limit, or the dioxin/furan emission limits, or the dioxin/furan emission level specified in 40 CFR 60.58b(g)(5)(iii) shall follow the procedures specified in paragraphs (1) through (3).

(1) During the performance tests for dioxins/furans and mercury, as applicable, the owner or operator shall estimate an average carbon mass feed rate based on carbon injection system operating parameters such as the screw feeder speed, hopper volume, hopper refill frequency, or other parameters appropriate to the feed system being employed, as specified in paragraphs (i) and (ii).

(i) An average carbon mass feed rate in kilograms per hour or pounds per hour shall be estimated during the initial performance test for mercury emissions and each subsequent performance test for mercury emissions.

(ii) An average carbon mass feed rate in kilograms per hour or pounds per hour shall be estimated during the initial performance test for dioxin/furan emissions and each subsequent performance test for dioxin/furan emissions.

(2) During operation of the affected facility, the carbon injection system operating parameter(s) that are the primary indicator(s) of the carbon mass feed rate (e.g., screw feeder setting) must equal or exceed the level(s) documented during the performance tests specified under paragraphs (1)(i) and (1)(ii).

(3) The owner or operator of an affected facility shall estimate the total carbon usage of the plant (kilograms or pounds) for each calendar quarter by two independent methods, according to the procedures in paragraphs (i) and (ii).

(i) The weight of carbon delivered to the plant.

(ii) Estimate the average carbon mass feed rate in kilograms per hour or pounds per hour for each hour of operation for each affected facility based on the parameters specified under paragraph (1), and sum the results for all affected facilities at the plant for the total number of hours of operation during the calendar quarter.

[40 CFR 60.38b and 40 CFR 60.58b(m)]

C.91. General Applicability and Definitions. The Standards of Performance for New Stationary Sources adopted by reference in Rule 62-204.800(7), F.A.C., the Emission Guidelines for Existing Sources adopted by reference in Rule 62-204.800(8), F.A.C., and the National Emissions Standards for Hazardous Air Pollutants adopted by reference in Rule 62-204.800(9), F.A.C., shall be controlling over other standards in the air pollution rules of the Department except that any emissions limiting standard contained in or determined pursuant to the air pollution rules of the Department which is more stringent than one contained in a Standard of Performance, an Emission Guideline, or a National Emission Standard, or which regulates emissions of pollutants or emissions units not regulated by an applicable Standard of Performance, Emission Guideline, or National Emission Standard, shall apply.

[Rules 62-204.800(7)(c), (8)(a)1., and (9)(c), F.A.C.]

C.92. The combustor boilers shall have a metal name plate affixed in a conspicuous place on the shell showing manufacturer, model number, type waste, and rated capacity.

[PSD-FL-121(B)]

C.93. Continuous Load Monitoring: The owner or operator shall install, calibrate, maintain, and operate a steam flow meter or a feed water flow meter, measure steam (or feed water) flow in kilograms (or pounds) per hour on a continuous basis, and record the output of the monitor (in accordance with the ASME method described in 40 CFR 60.58b(i)(6)). Steam (or feed water) flow shall be calculated in 4-hour block arithmetic averages. Higher loads are allowed for testing purposes pursuant to 40 CFR 60.53b(b).

[Rule 62-204.800(8), F.A.C.; 40 CFR 60.31b, 60.38b, 60.51b, 60.53b(b), and 60.58b(i)(6); and, PSD-FL-121(B)]

C.94. Acid Rain Part Application. For any unit which was a solid waste incinerator, burning less than 20 percent fossil fuel as described in 40 CFR 72.6(b)(7), adopted and incorporated by reference at Rule 62-204.800, F.A.C. the designated representative of the source containing the unit shall submit a complete Acid Rain Part application governing such unit to the Department before the later of January 1, 1998, or March 1 of the year following the three calendar year period in which the incinerator consumed 20 percent or more fossil fuel on a British thermal unit (BTU) basis.
[Rule 62-214.320(1)(h), F.A.C.]

C.95. Continuous Emission Monitoring System (CEMS). CEMS with recorders shall be installed, calibrated, maintained and operated for each unit, subject to review by FDEP, for the following pollutants and operational parameters:
Carbon Monoxide
Nitrogen Oxides
Opacity
Sulfur Dioxide (monitors shall be located both upstream and downstream of the baghouse for percent removal efficiency calculations)
Oxygen
Total Steam Production (lbs/hr, pressure, and temperature) or Feed water Flow Rate (lbs/hr)
Flue Gas Temperature (at the fabric filter inlet)
Carbon Injection System Operating Parameters
Power Generation (in MW)
Unless required in 40 CFR 60, Subpart Cb, operational data monitoring systems (steam production, baghouse inlet temperature, carbon injection system parameters and power generation) shall be calibrated annually and operated in accordance with good engineering practice.
[PSD-FL-121(C)]

C.96. The monitoring devices shall meet the requirements of Rule 62-297.520, F.A.C., 40 CFR 60.45 and 40 CFR 60.13, including certification of each device in accordance with 40 CFR 60, Appendix B, Performance Specifications and 40 CFR 60.7(a)(5). Quality assurance procedures must conform to all applicable sections of 40 CFR 60, Appendix F. Data on CEM/COM equipment specifications, manufacturer, type, calibration and maintenance needs, and its location after the economizer or in the air pollution control equipment outlet duct shall be provided to the Department's Southwest District office and the Hillsborough County Environmental Protection Commission for review at least 90 days prior to installation. Initial performance evaluations must be completed within 180 days after initial startup of each retrofitted unit.
[PSD-FL-121(C)]

Section III. Emissions Unit(s) and Conditions.

Subsection D. This section addresses the following emissions unit(s).

E.U.

<u>ID No.</u>	<u>Brief Description</u>
-100	Ash Building and Handling System

Flyash and bottom ash is collected and conveyed to the ash handling building. The ash handling system is completely enclosed or covered to decrease the potential for fugitive emissions. The ash is quenched and wetted before being temporarily stored in the ash handling facility and loaded onto a truck. A baghouse is located on the ash handling building as an added precaution for fugitive emissions.

{Permitting note(s): This emissions unit is regulated under NSPS - 40 CFR 60, Subpart Cb, Emissions Guidelines and Compliance Times for Large Municipal Waste Combustors That Are Constructed on or Before September 20, 1994, adopted and incorporated by reference, subject to provisions, in Rule 62-204.800(8)(b), F.A.C.; Rule 62-212.400(5), F.A.C., Prevention of Significant Deterioration (PSD); and, Rule 62-212.400(6), F.A.C., Best Available Control Technology (BACT). Note: This project is subject to the requirements of 40 CFR 60, Subpart Cb. This permit may refer to the requirements of 40 CFR 60, Subpart Eb, where these requirements are referenced by Subpart Cb.}

The following specific conditions apply to the emissions unit(s) listed above:

Essential Potential to Emit (PTE) Parameters

D.1. Hours of Operation. This emissions unit is allowed to operate continuously, i.e., 8,760 hours/year. [Rule 62-210.200(PTE), F.A.C.; and, PSD-FL-121(B)]

Emission Limitations and Standards

{Permitting note: Table 1-1, Summary of Air Pollutant Standards and Terms, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

{Permitting Note: Unless otherwise specified, the averaging times for Specific Conditions **D.2.**, **D.4.** and **D.5.** are based on the specified averaging time of the applicable test method.}

Fugitive Ash Emissions

D.2. Fugitive Ash Emissions

(a) On and after the date on which the initial performance test is completed or is required to be completed under 40 CFR 60.8 of Subpart A, no owner or operator of an affected facility shall cause to be discharged to the atmosphere visible emissions of combustion ash from an ash conveying system (including conveyor transfer points) in excess of 5 percent of the observation period (i.e., 9 minutes per 3-hour period), as determined by EPA Reference Method 22 observations as specified in 40 CFR 60.58b(k), except as provided in paragraphs (b) and (c). See specific condition **D.7**.

(b) The emission limit specified in paragraph (a) does not cover visible emissions discharged inside buildings or enclosures of ash conveying systems; however, the emission limit specified in paragraph (a) does cover visible emissions discharged to the atmosphere from buildings or enclosures of ash conveying systems.

(c) The provisions of paragraph (a) do not apply during maintenance and repair of ash conveying systems.

[40 CFR 60.36b and 40 CFR 60.55b]

D.3. The potential for dust generation by ash handling activities will be mitigated by quenching the ash prior to loading in ash transport trucks. The ash handling facilities shall be enclosed. Unprocessed refuse storage areas which must be open for operational purposes (e.g., tipping floor of the refuse bunker while trucks are entering and leaving) will be under negative air pressure. Residue from the grates, grate siftings, and ash from the combustor/boiler and fabric filter hoppers during normal operations shall be discharged into the ash quenching system, or otherwise handled in a manner to minimize visible dust. The ash/residue in the ash handling building shall remain sufficiently moist to prevent dust during storage and handling operations.

[PSD-FL-121(B)]

D.4. PM emissions from the ash handling facility baghouse shall not exceed 1.63 pounds per hour.

[PSD-FL-121(B)]

D.5. Visible emissions from the ash handling facility baghouse shall not exceed 5 percent opacity.

[PSD-FL-121(B)]

Excess Emissions

{Permitting note: The Excess Emissions Rule at Rule 62-210.700, F.A.C., cannot vary any requirement of a NSPS, NESHAP, or Acid Rain program provision.}

D.6. At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.

[40 CFR 60.11(d)]

D.7. Excess emissions from these emissions units resulting from startup, shutdown or malfunction shall be permitted provided that best operational practices to minimize emissions are adhered to and the duration of excess emissions shall be minimized but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration.

[Rule 62-210.700(1), F.A.C.]

D.8. Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during startup, shutdown or malfunction shall be prohibited.

[Rule 62-210.700(4), F.A.C.]

Test Methods and Procedures

{Permitting note: Table 2-1, Summary of Compliance Requirements, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

Fugitive Ash

D.9. The procedures specified in paragraphs (1) through (4) shall be used for determining compliance with the fugitive ash emission limit under 40 CFR 60.55b.

(1) The EPA Reference Method 22 shall be used for determining compliance with the fugitive ash emission limit under 40 CFR 60.55b. The minimum observation time shall be a series of three 1-hour observations. The observation period shall include times when the facility is transferring ash from the municipal waste combustor unit to the area where ash is stored or loaded into containers or trucks.

(2) The average duration of visible emissions per hour shall be calculated from the three 1-hour observations. The average shall be used to determine compliance with 40 CFR 60.55b.

(3) The owner or operator of an affected facility shall conduct an initial performance test for fugitive ash emissions as required under 40 CFR 60.8.

(4) Following the date that the initial performance test for fugitive ash emissions is completed or is required to be completed under Sec. 60.8 for an affected facility, the owner or operator shall conduct a performance test for fugitive ash emissions on an annual basis (no more than 12 calendar months following the previous performance test).

[40 CFR 60.38b and 40 CFR 60.58b(k)]

D.10. Performance tests shall be conducted under such conditions as the Administrator shall specify to the plant operator based on representative performance of the affected facility. The owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of the performance tests. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test nor shall emissions in excess of the level of the applicable emission limit during periods of startup, shutdown, and malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard.

[40 CFR 60.8(c)]

D.11. Particulate Matter. The test methods for particulate emissions shall be EPA Method 5 incorporated by reference in Chapter 62-297, F.A.C. **The permittee has elected to accept an alternate standard of five (5) percent opacity to waive the particulate matter compliance test requirement.**

See specific condition **D.5.**

[Rules 62-213.440 and 62-297.620(4), F.A.C.]

D.12. Visible Emissions. EPA Method 9 shall be used to determine opacity compliance pursuant to Chapter 62-297, F.A.C.

[Rule 62-297.401, F.A.C.]

D.13. In the case of an emissions unit which has the potential to emit less than 100 tons per year of particulate matter and is equipped with a baghouse, the Secretary or the appropriate Director of District Management may waive any particulate matter compliance test requirements for such emissions unit specified in any otherwise applicable rule, and specify an alternative standard of 5% opacity. The waiver of compliance test requirements for a particulate emissions unit equipped with a baghouse, and the substitution of the visible emissions standard, shall be specified in the permit issued to the emissions unit.

If the Department has reason to believe that the particulate weight emission standard applicable to such an emissions unit is not being met, it shall require that compliance be demonstrated by the test method specified in the applicable rule.

[Rule 62-297.620(4), F.A.C.]

D.14. Operating Rate During Testing. Testing of emissions shall be conducted with the emissions unit operation at permitted capacity, which is defined as 90 to 100 percent of the maximum operation rate allowed by the permit. If it is impracticable to test at permitted capacity, an emissions unit may be tested at less than the minimum permitted capacity; in this case, subsequent emissions unit operation is limited to 110 percent of the test load until a new test is conducted. Once the emissions unit is so limited,

operation at higher capacities is allowed for no more than 15 consecutive days for the purpose of additional compliance testing to regain the authority to operate at the permitted capacity.

[Rules 62-297.310(2) & (2)(b), F.A.C.]

D.15. Applicable Test Procedures.

(a) Required Sampling Time.

1. Unless otherwise specified in the applicable rule, the required sampling time for each test run shall be no less than one hour and no greater than four hours, and the sampling time at each sampling point shall be of equal intervals of at least two minutes.

2. Opacity Compliance Tests. When either EPA Method 9 or DEP Method 9 is specified as the applicable opacity test method, the required minimum period of observation for a compliance test shall be sixty (60) minutes for emissions units which emit or have the potential to emit 100 tons per year or more of particulate matter, and thirty (30) minutes for emissions units which have potential emissions less than 100 tons per year of particulate matter and are not subject to a multiple-valued opacity standard. The opacity test observation period shall include the period during which the highest opacity emissions can reasonably be expected to occur. Exceptions to these requirements are as follows:

a. For batch, cyclical processes, or other operations which are normally completed within less than the minimum observation period and do not recur within that time, the period of observation shall be equal to the duration of the batch cycle or operation completion time.

b. The observation period for special opacity tests that are conducted to provide data to establish a surrogate standard pursuant to Rule 62-297.310(5)(k), F.A.C., Waiver of Compliance Test Requirements, shall be established as necessary to properly establish the relationship between a proposed surrogate standard and an existing mass emission limiting standard.

c. The minimum observation period for opacity tests conducted by employees or agents of the Department to verify the day-to-day continuing compliance of a unit or activity with an applicable opacity standard shall be twelve minutes.

[Rule 62-297.310(4), F.A.C.]

D.16. Frequency of Compliance Tests. The following provisions apply only to those emissions units that are subject to an emissions limiting standard for which compliance testing is required.

(a) General Compliance Testing.

3. The owner or operator of an emissions unit that is subject to any emission limiting standard shall conduct a compliance test that demonstrates compliance with the applicable emission limiting standard prior to obtaining a renewed operation permit. Emissions units that are required to conduct an annual compliance test may submit the most recent annual compliance test to satisfy the requirements of this provision. In renewing an air operation permit pursuant to Rule 62-210.300(2)(a)3.b., c., or d., F.A.C., the Department shall not require submission of emission compliance test results for any emissions unit that, during the year prior to renewal:

a. Did not operate; or

4. During each federal fiscal year (October 1 - September 30), unless otherwise specified by rule, order, or permit, the owner or operator of each emissions unit shall have a formal compliance test conducted for:

a. Visible emissions, if there is an applicable standard;

b. Each of the following pollutants, if there is an applicable standard, and if the emissions unit emits or has the potential to emit: 5 tons per year or more of lead or lead compounds measured as elemental lead; 30 tons per year or more of acrylonitrile; or 100 tons per year or more of any other regulated air pollutant; and

c. Each NESHAP pollutant, if there is an applicable emission standard.

9. The owner or operator shall notify the Department, at least 15 days prior to the date on which each formal compliance test is to begin, of the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted for the owner or operator.

(b) Special Compliance Tests. When the Department, after investigation, has good reason (such as complaints, increased visible emissions or questionable maintenance of control equipment) to believe that any applicable emission standard contained in a Department rule or in a permit issued pursuant to those rules is being violated, it may require the owner or operator of the emissions unit to conduct compliance tests which identify the nature and quantity of pollutant emissions from the emissions unit and to provide a report on the results of said tests to the Department.

(c) Waiver of Compliance Test Requirements. If the owner or operator of an emissions unit that is subject to a compliance test requirement demonstrates to the Department, pursuant to the procedure established in Rule 62-297.620, F.A.C., that the compliance of the emissions unit with an applicable weight emission limiting standard can be adequately determined by means other than the designated test procedure, such as specifying a surrogate standard of no visible emissions for particulate matter sources equipped with a bag house or specifying a fuel analysis for sulfur dioxide emissions, the Department shall waive the compliance test requirements for such emissions units and order that the alternate means of determining compliance be used, provided, however, the provisions of Rule 62-297.310(7)(b), F.A.C., shall apply.

[Rule 62-297.310(7), F.A.C.; and, SIP approved]

D.17. Compliance with standards in 40 CFR 60, other than opacity standards, shall be determined by performance tests established by 40 CFR 60.8, unless otherwise specified in the applicable standard.
[40 CFR 60.11(a)]

Monitoring of Operations

D.18. Determination of Process Variables.

(a) Required Equipment. The owner or operator of an emissions unit for which compliance tests are required shall install, operate, and maintain equipment or instruments necessary to determine process variables, such as process weight input or heat input, when such data are needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards.

(b) Accuracy of Equipment. Equipment or instruments used to directly or indirectly determine process variables, including devices such as belt scales, weight hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value.
[Rule 62-297.310(5), F.A.C.]

Recordkeeping and Reporting Requirements

D.19. The owner or operator subject to the provisions of 40 CFR 60 shall furnish the Administrator written notification as follows:

(4) A notification of any physical or operational change to an existing facility which may increase the emission rate of any air pollutant to which a standard applies, unless that change is specifically exempted under an applicable subpart or in 40 CFR 60.14(e). This notice shall be postmarked 60 days or as soon as practicable before the change is commenced and shall include information describing the precise nature of the change, present and proposed emission control systems, productive capacity of the facility before and after the change, and the expected completion date of the change. The Administrator may request additional relevant information subsequent to this notice.
[40 CFR 60.7(a)(4)]

D.20. The owner or operator subject to the provisions of 40 CFR 60 shall maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of an affected facility; any malfunction of the air pollution control equipment; or, any periods during which a continuous monitoring system or monitoring device is inoperative.
[40 CFR 60.7(b)]

D.21. (1) Notwithstanding the frequency of reporting requirements specified in 40 CFR 60.7(c), an owner or operator who is required by an applicable subpart to submit excess emissions and monitoring systems performance reports (and summary reports) on a quarterly (or more frequent) basis may reduce the frequency of reporting for that standard to semiannual if the following conditions are met:

- (i) For 1 full year (e.g., 4 quarterly or 12 monthly reporting periods) the affected facility's excess emissions and monitoring systems reports submitted to comply with a standard under this part continually demonstrate that the facility is in compliance with the applicable standard;
 - (ii) The owner or operator continues to comply with all recordkeeping and monitoring requirements specified in 40 CFR 60, Subpart A, and the applicable standard; and
 - (iii) The Administrator does not object to a reduced frequency of reporting for the affected facility, as provided in 40 CFR 60.7(e)(2).
- (2) The frequency of reporting of excess emissions and monitoring systems performance (and summary) reports may be reduced only after the owner or operator notifies the Administrator in writing of his or her intention to make such a change and the Administrator does not object to the intended change. In deciding whether to approve a reduced frequency of reporting, the Administrator may review information concerning the source's entire previous performance history during the required recordkeeping period prior to the intended change, including performance test results, monitoring data, and evaluations of an owner or operator's conformance with operation and maintenance requirements. Such information may be used by the Administrator to make a judgment about the source's potential for noncompliance in the future. If the Administrator disapproves the owner or operator's request to reduce the frequency of reporting, the Administrator will notify the owner or operator in writing within 45 days after receiving notice of the owner or operator's intention. The notification from the Administrator to the owner or operator will specify the grounds on which the disapproval is based. In the absence of a notice of disapproval within 45 days, approval is automatically granted.
- (3) As soon as monitoring data indicate that the affected facility is not in compliance with any emission limitation or operating parameter specified in the applicable standard, the frequency of reporting shall revert to the frequency specified in the applicable standard, and the owner or operator shall submit an excess emissions and monitoring systems performance report (and summary report, if required) at the next appropriate reporting period following the noncomplying event. After demonstrating compliance with the applicable standard for another full year, the owner or operator may again request approval from the Administrator to reduce the frequency of reporting for that standard as provided for in 40 CFR 60.7(e)(1) and (e)(2).
- [40 CFR 60.7(e)(1)]

{See attached Figure 1: Summary Report-Gaseous and Opacity Excess Emission and Monitoring System Performance}

D.22. Any owner or operator subject to the provisions of 40 CFR 60 shall maintain a file of all measurements, including continuous monitoring system, monitoring device, and performance testing measurements; all continuous monitoring system performance evaluations; all continuous monitoring system or monitoring device calibration checks; adjustments and maintenance performed on these systems or devices; and, all other information required by 40 CFR 60 recorded in a permanent form suitable for inspection. The file shall be retained for at least 5 (five) years following the date of such measurements, maintenance, reports, and records.

[40 CFR 60.7(f); and, Rule 62-213.440(1)(b)2.b., F.A.C.]

D.23. Test Reports.

- (a) The owner or operator of an emissions unit for which a compliance test is required shall file a report with the Department on the results of each such test.
- (b) The required test report shall be filed with the Department as soon as practical but no later than 45 days after the last sampling run of each test is completed.
- (c) The test report shall provide sufficient detail on the emissions unit tested and the test procedures used to allow the Department to determine if the test was properly conducted and the test results properly computed. As a minimum, the test report, other than for an EPA or DEP Method 9 test, shall provide the following information:
 - 1. The type, location, and designation of the emissions unit tested.
 - 2. The facility at which the emissions unit is located.
 - 3. The owner or operator of the emissions unit.
 - 4. The normal type and amount of fuels used and materials processed, and the types and amounts of fuels used and material processed during each test run.
 - 5. The means, raw data and computations used to determine the amount of fuels used and materials processed, if necessary to determine compliance with an applicable emission limiting standard.
 - 6. The type of air pollution control devices installed on the emissions unit, their general condition, their normal operating parameters (pressure drops, total operating current and GPM scrubber water), and their operating parameters during each test run.
 - 7. A sketch of the duct within 8 stack diameters upstream and 2 stack diameters downstream of the sampling ports, including the distance to any upstream and downstream bends or other flow disturbances.
 - 8. The date, starting time and duration of each sampling run.
 - 9. The test procedures used, including any alternative procedures authorized pursuant to Rule 62-297.620, F.A.C. Where optional procedures are authorized in this chapter, indicate which option was used.
 - 10. The number of points sampled and configuration and location of the sampling plane.
 - 11. For each sampling point for each run, the dry gas meter reading, velocity head, pressure drop across the stack, temperatures, average meter temperatures and sample time per point.
 - 12. The type, manufacturer and configuration of the sampling equipment used.
 - 13. Data related to the required calibration of the test equipment.
 - 14. Data on the identification, processing and weights of all filters used.
 - 15. Data on the types and amounts of any chemical solutions used.
 - 16. Data on the amount of pollutant collected from each sampling probe, the filters, and the impingers, are reported separately for the compliance test.
 - 17. The names of individuals who furnished the process variable data, conducted the test, analyzed the samples and prepared the report.
 - 18. All measured and calculated data required to be determined by each applicable test procedure for each run.
 - 19. The detailed calculations for one run that relate the collected data to the calculated emission rate.

20. The applicable emission standard, and the resulting maximum allowable emission rate for the emissions unit, plus the test result in the same form and unit of measure.

21. A certification that, to the knowledge of the owner or his authorized agent, all data submitted are true and correct. When a compliance test is conducted for the Department or its agent, the person who conducts the test shall provide the certification with respect to the test procedures used. The owner or his authorized agent shall certify that all data required and provided to the person conducting the test are true and correct to his knowledge.

[Rules 62-213.440 and 62-297.310(8), F.A.C.]

D.24. Malfunction Reporting. In the case of excess emissions resulting from malfunctions, each owner or operator shall notify the Department in accordance with Rule 62-4.130, F.A.C. A full written report on the malfunctions shall be submitted in a quarterly report, if requested by the Department.

[Rule 62-210.700(6), F.A.C.]

Miscellaneous Requirements

D.25. Definitions. For the purposes of Rules 62-204.800(7), (8), and (9), F.A.C., the definitions contained in the various provisions of 40 CFR Parts 60 and 61, adopted herein shall apply except that the term "Administrator" when used in 40 CFR Parts 60 and 61, shall mean the Secretary or the Secretary's designee except as noted in 40 CFR 61.157.

[40 CFR 60.2; and, Rules 62-204.800(7)(a), (8)(a)2., and, (9)(a), F.A.C.]

D.26. Circumvention. No owner or operator subject to the provisions of 40 CFR 60 shall build, erect, install, or use any article, machine, equipment or process, the use of which conceals an emission which would otherwise constitute a violation of an applicable standard. Such concealment includes, but is not limited to, the use of gaseous diluents to achieve compliance with an opacity standard or with a standard which is based on the concentration of a pollutant in the gases discharged to the atmosphere.

[40 CFR 60.12]

D.27. General Applicability and Definitions. The Standards of Performance for New Stationary Sources adopted by reference in Rule 62-204.800(7), F.A.C., the Emission Guidelines for Existing Sources adopted by reference in Rule 62-204.800(8), F.A.C., and the National Emissions Standards for Hazardous Air Pollutants adopted by reference in Rule 62-204.800(9), F.A.C., shall be controlling over other standards in the air pollution rules of the Department except that any emissions limiting standard contained in or determined pursuant to the air pollution rules of the Department which is more stringent than one contained in a Standard of Performance, an Emission Guideline, or a National Emission Standard, or which regulates emissions of pollutants or emissions units not regulated by an applicable Standard of Performance, Emission Guideline, or National Emission Standard, shall apply.

[Rules 62-204.800(7)(c), (8)(a)1., and (9)(c), F.A.C.]

Section III. Emissions Unit(s) and Conditions.

Subsection E. This section addresses the following emissions unit(s).

E.U.

<u>ID No.</u>	<u>Brief Description</u>
-101	Lime Storage Silo
-106	Dolomitic Lime Storage Silo

Lime used in the spray dryer absorbers for each municipal waste combustor is stored in silos. Emissions from each silo are controlled by bag house filters.

{Permitting note(s): Emissions unit -101 is regulated under Rule 62-212.400(5), F.A.C., Prevention of Significant Deterioration (PSD); and, Rule 62-212.400(6), F.A.C., Best Available Control Technology (BACT). Emissions unit -104 is regulated under Rule 62-296.320(4)(b), F.A.C., General Visible Emissions Standard.}

The following specific conditions apply to the emissions unit(s) listed above:

Essential Potential to Emit (PTE) Parameters

E.1. Hours of Operation. This emissions unit is allowed to operate continuously, i.e., 8,760 hours/year. [Rule 62-210.200(PTE), F.A.C.]

Emission Limitations and Standards

{Permitting note: Table 1-1, Summary of Air Pollutant Standards and Terms, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

{Permitting Note: Unless otherwise specified, the averaging times for Specific Conditions **E.2.** and **E.3.** are based on the specified averaging time of the applicable test method.}

E.2. Particulate Matter. Particulate matter emissions shall not exceed:
Emissions unit -101: 0.015 grains per dry standard cubic foot, front-half catch.
Emissions unit -106: 6.32 pounds per hour and 0.39 tons per year.
[PSD-FL-121(B) and 0570261-004-AC]

E.3. Visible Emissions.

Emissions unit -101: Visible emissions shall not exceed five (5) percent opacity.

Emissions unit -106: Visible emissions shall not be equal to or greater than 20 percent opacity.

[PSD-FL-121(B); 0570261-004-AC; and, Rule 62-296.320(4)(b)1., F.A.C.]

Excess Emissions

E.4. Excess emissions from these emissions units resulting from startup, shutdown or malfunction shall be permitted provided that best operational practices to minimize emissions are adhered to and the duration of excess emissions shall be minimized but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration.

[Rule 62-210.700(1), F.A.C.]

E.5. Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during startup, shutdown or malfunction shall be prohibited.

[Rule 62-210.700(4), F.A.C.]

Test Methods and Procedures

{Permitting note: Table 2-1, Summary of Compliance Requirements, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

E.6. Particulate Matter. The test methods for particulate emissions shall be EPA Method 5 incorporated by reference in Chapter 62-297, F.A.C. **The permittee has elected to accept an alternate standard of five (5) percent opacity to waive the particulate matter compliance test requirement. See specific condition E.3.**

[Rules 62-213.440 and 62-297.620(4), F.A.C.]

E.7. Visible Emissions. EPA Method 9 shall be used to determine opacity compliance pursuant to Chapter 62-297, F.A.C.

[Rule 62-297.401, F.A.C.]

E.8. In the case of an emissions unit which has the potential to emit less than 100 tons per year of particulate matter and is equipped with a baghouse, the Secretary or the appropriate Director of District Management may waive any particulate matter compliance test requirements for such emissions unit specified in any otherwise applicable rule, and specify an alternative standard of 5% opacity. The waiver of compliance test requirements for a particulate emissions unit equipped with a baghouse, and the substitution of the visible emissions standard, shall be specified in the permit issued to the emissions unit.

If the Department has reason to believe that the particulate weight emission standard applicable to such an emissions unit is not being met, it shall require that compliance be demonstrated by the test method specified in the applicable rule.

[Rule 62-297.620(4), F.A.C.]

E.9. Operating Rate During Testing. Testing of emissions shall be conducted with the emissions unit operation at permitted capacity, which is defined as 90 to 100 percent of the maximum operation rate allowed by the permit. If it is impracticable to test at permitted capacity, an emissions unit may be tested at less than the minimum permitted capacity; in this case, subsequent emissions unit operation is limited to 110 percent of the test load until a new test is conducted. Once the emissions unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purpose of additional compliance testing to regain the authority to operate at the permitted capacity.

[Rules 62-297.310(2) & (2)(b), F.A.C.]

E.10. Applicable Test Procedures.

(a) Required Sampling Time.

1. Unless otherwise specified in the applicable rule, the required sampling time for each test run shall be no less than one hour and no greater than four hours, and the sampling time at each sampling point shall be of equal intervals of at least two minutes.

2. Opacity Compliance Tests. When either EPA Method 9 or DEP Method 9 is specified as the applicable opacity test method, the required minimum period of observation for a compliance test shall be sixty (60) minutes for emissions units which emit or have the potential to emit 100 tons per year or more of particulate matter, and thirty (30) minutes for emissions units which have potential emissions less than 100 tons per year of particulate matter and are not subject to a multiple-valued opacity standard. The opacity test observation period shall include the period during which the highest opacity emissions can reasonably be expected to occur. Exceptions to these requirements are as follows:

a. For batch, cyclical processes, or other operations which are normally completed within less than the minimum observation period and do not recur within that time, the period of observation shall be equal to the duration of the batch cycle or operation completion time.

b. The observation period for special opacity tests that are conducted to provide data to establish a surrogate standard pursuant to Rule 62-297.310(5)(k), F.A.C., Waiver of Compliance Test Requirements, shall be established as necessary to properly establish the relationship between a proposed surrogate standard and an existing mass emission limiting standard.

- c. The minimum observation period for opacity tests conducted by employees or agents of the Department to verify the day-to-day continuing compliance of a unit or activity with an applicable opacity standard shall be twelve minutes.

[Rule 62-297.310(4), F.A.C.]

E.11. Frequency of Compliance Tests. The following provisions apply only to those emissions units that are subject to an emissions limiting standard for which compliance testing is required.

(a) General Compliance Testing.

3. The owner or operator of an emissions unit that is subject to any emission limiting standard shall conduct a compliance test that demonstrates compliance with the applicable emission limiting standard prior to obtaining a renewed operation permit. Emissions units that are required to conduct an annual compliance test may submit the most recent annual compliance test to satisfy the requirements of this provision. In renewing an air operation permit pursuant to Rule 62-210.300(2)(a)3.b., c., or d., F.A.C., the Department shall not require submission of emission compliance test results for any emissions unit that, during the year prior to renewal:

- a Did not operate;

4. During each federal fiscal year (October 1 - September 30), unless otherwise specified by rule, order, or permit, the owner or operator of each emissions unit shall have a formal compliance test conducted for:

- a. Visible emissions, if there is an applicable standard;
- b. Each of the following pollutants, if there is an applicable standard, and if the emissions unit emits or has the potential to emit: 5 tons per year or more of lead or lead compounds measured as elemental lead; 30 tons per year or more of acrylonitrile; or 100 tons per year or more of any other regulated air pollutant; and
- c. Each NESHAP pollutant, if there is an applicable emission standard.

9. The owner or operator shall notify the Department, at least 15 days prior to the date on which each formal compliance test is to begin, of the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted for the owner or operator.

(b) Special Compliance Tests. When the Department, after investigation, has good reason (such as complaints, increased visible emissions or questionable maintenance of control equipment) to believe that any applicable emission standard contained in a Department rule or in a permit issued pursuant to those rules is being violated, it may require the owner or operator of the emissions unit to conduct compliance tests which identify the nature and quantity of pollutant emissions from the emissions unit and to provide a report on the results of said tests to the Department.

(c) Waiver of Compliance Test Requirements. If the owner or operator of an emissions unit that is subject to a compliance test requirement demonstrates to the Department, pursuant to the procedure established in Rule 62-297.620, F.A.C., that the compliance of the emissions unit with an applicable weight emission limiting standard can be adequately determined by means other than the designated test procedure, such as specifying a surrogate standard of no visible emissions for particulate matter sources equipped with a bag house or specifying a fuel analysis for sulfur dioxide emissions, the Department shall waive the compliance test requirements for such emissions units and order that the alternate means of determining compliance be used, provided, however, the provisions of Rule 62-297.310(7)(b), F.A.C., shall apply.

[Rule 62-297.310(7), F.A.C.; and, SIP approved]

Monitoring of Operations

E.12. Determination of Process Variables.

(a) Required Equipment. The owner or operator of an emissions unit for which compliance tests are required shall install, operate, and maintain equipment or instruments necessary to determine process variables, such as process weight input or heat input, when such data are needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards.

(b) Accuracy of Equipment. Equipment or instruments used to directly or indirectly determine process variables, including devices such as belt scales, weight hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value.

[Rule 62-297.310(5), F.A.C.]

Recordkeeping and Reporting Requirements

E.13. Any measurements, maintenance, reports, and records shall be retained for at least 5 (five) years following the date of such measurements, maintenance, reports, and records.

[Rule 62-213.440(1)(b)2.b., F.A.C.]

E.14. Test Reports.

(a) The owner or operator of an emissions unit for which a compliance test is required shall file a report with the Department on the results of each such test.

(b) The required test report shall be filed with the Department as soon as practical but no later than 45 days after the last sampling run of each test is completed.

(c) The test report shall provide sufficient detail on the emissions unit tested and the test procedures used to allow the Department to determine if the test was properly conducted and the test results properly computed. As a minimum, the test report, other than for an EPA or DEP Method 9 test, shall provide the following information:

1. The type, location, and designation of the emissions unit tested.

2. The facility at which the emissions unit is located.
3. The owner or operator of the emissions unit.
4. The normal type and amount of fuels used and materials processed, and the types and amounts of fuels used and material processed during each test run.
5. The means, raw data and computations used to determine the amount of fuels used and materials processed, if necessary to determine compliance with an applicable emission limiting standard.
6. The type of air pollution control devices installed on the emissions unit, their general condition, their normal operating parameters (pressure drops, total operating current and GPM scrubber water), and their operating parameters during each test run.
7. A sketch of the duct within 8 stack diameters upstream and 2 stack diameters downstream of the sampling ports, including the distance to any upstream and downstream bends or other flow disturbances.
8. The date, starting time and duration of each sampling run.
9. The test procedures used, including any alternative procedures authorized pursuant to Rule 62-297.620, F.A.C. Where optional procedures are authorized in this chapter, indicate which option was used.
10. The number of points sampled and configuration and location of the sampling plane.
11. For each sampling point for each run, the dry gas meter reading, velocity head, pressure drop across the stack, temperatures, average meter temperatures and sample time per point.
12. The type, manufacturer and configuration of the sampling equipment used.
13. Data related to the required calibration of the test equipment.
14. Data on the identification, processing and weights of all filters used.
15. Data on the types and amounts of any chemical solutions used.
16. Data on the amount of pollutant collected from each sampling probe, the filters, and the impingers, are reported separately for the compliance test.
17. The names of individuals who furnished the process variable data, conducted the test, analyzed the samples and prepared the report.
18. All measured and calculated data required to be determined by each applicable test procedure for each run.
19. The detailed calculations for one run that relate the collected data to the calculated emission rate.
20. The applicable emission standard, and the resulting maximum allowable emission rate for the emissions unit, plus the test result in the same form and unit of measure.
21. A certification that, to the knowledge of the owner or his authorized agent, all data submitted are true and correct. When a compliance test is conducted for the Department or its agent, the person who conducts the test shall provide the certification with respect to the test procedures used. The owner or his authorized agent shall certify that all data required and provided to the person conducting the test are true and correct to his knowledge.

[Rules 62-213.440 and 62-297.310(8), F.A.C.]

Section III. Emissions Unit(s) and Conditions.**Subsection F. This section addresses the following emissions unit(s).****E.U.****ID No. Brief Description**

-102 Activated Carbon Storage Silo

Activated carbon used in the carbon injection system for each municipal waste combustor is stored in a silo. The activated carbon will be utilized for the control of mercury and dioxin/furans. Emissions from the silo are controlled by a baghouse.

{Permitting note(s): This emissions unit is regulated under Rule 62-212.400(5), F.A.C., Prevention of Significant Deterioration (PSD); and, Rule 62-212.400(6), F.A.C., Best Available Control Technology (BACT)}

The following specific conditions apply to the emissions unit(s) listed above:

Essential Potential to Emit (PTE) Parameters

F.1. Hours of Operation. This emissions unit is allowed to operate continuously, i.e., 8,760 hours/year. [Rule 62-210.200(PTE), F.A.C.]

Emission Limitations and Standards

{Permitting note: Table 1-1, Summary of Air Pollutant Standards and Terms, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

{Permitting Note: Unless otherwise specified, the averaging times for Specific Conditions **F.2.** and **F.3.** are based on the specified averaging time of the applicable test method.}

F.2. Particulate Matter. Particulate matter emissions shall not exceed 0.015 grains per dry standard cubic foot, front-half catch. [PSD-FL-121(B)]

F.3. Visible Emissions. Visible emissions shall not exceed five (5) percent opacity. [PSD-FL-121(B)]

Excess Emissions

F.4. Excess emissions from these emissions units resulting from startup, shutdown or malfunction shall be permitted provided that best operational practices to minimize emissions are adhered to and the duration of excess emissions shall be minimized but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration.

[Rule 62-210.700(1), F.A.C.]

F.5. Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during startup, shutdown or malfunction shall be prohibited.

[Rule 62-210.700(4), F.A.C.]

Test Methods and Procedures

{Permitting note: Table 2-1, Summary of Compliance Requirements, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

F.6. Particulate Matter. The test methods for particulate emissions shall be EPA Method 5 incorporated by reference in Chapter 62-297, F.A.C. **The permittee has elected to accept an alternate standard of five (5) percent opacity to waive the particulate matter compliance test requirement.** See specific condition **F.3.**

[Rules 62-213.440 and 62-297.620(4), F.A.C.]

F.7. Visible Emissions. EPA Method 9 shall be used to determine opacity compliance pursuant to Chapter 62-297, F.A.C.

[Rule 62-297.401, F.A.C.]

F.8. In the case of an emissions unit which has the potential to emit less than 100 tons per year of particulate matter and is equipped with a baghouse, the Secretary or the appropriate Director of District Management may waive any particulate matter compliance test requirements for such emissions unit specified in any otherwise applicable rule, and specify an alternative standard of 5% opacity. The waiver of compliance test requirements for a particulate emissions unit equipped with a baghouse, and the substitution of the visible emissions standard, shall be specified in the permit issued to the emissions unit.

If the Department has reason to believe that the particulate weight emission standard applicable to such an emissions unit is not being met, it shall require that compliance be demonstrated by the test method specified in the applicable rule.

[Rule 62-297.620(4), F.A.C.]

F.9. Operating Rate During Testing. Testing of emissions shall be conducted with the emissions unit operation at permitted capacity, which is defined as 90 to 100 percent of the maximum operation rate allowed by the permit. If it is impracticable to test at permitted capacity, an emissions unit may be tested at less than the minimum permitted capacity; in this case, subsequent emissions unit operation is limited to 110 percent of the test load until a new test is conducted. Once the emissions unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purpose of additional compliance testing to regain the authority to operate at the permitted capacity.

[Rules 62-297.310(2) & (2)(b), F.A.C.]

F.10. Applicable Test Procedures.

(a) Required Sampling Time.

1. Unless otherwise specified in the applicable rule, the required sampling time for each test run shall be no less than one hour and no greater than four hours, and the sampling time at each sampling point shall be of equal intervals of at least two minutes.

2. Opacity Compliance Tests. When either EPA Method 9 or DEP Method 9 is specified as the applicable opacity test method, the required minimum period of observation for a compliance test shall be sixty (60) minutes for emissions units which emit or have the potential to emit 100 tons per year or more of particulate matter, and thirty (30) minutes for emissions units which have potential emissions less than 100 tons per year of particulate matter and are not subject to a multiple-valued opacity standard. The opacity test observation period shall include the period during which the highest opacity emissions can reasonably be expected to occur. Exceptions to these requirements are as follows:

- a. For batch, cyclical processes, or other operations which are normally completed within less than the minimum observation period and do not recur within that time, the period of observation shall be equal to the duration of the batch cycle or operation completion time.
- b. The observation period for special opacity tests that are conducted to provide data to establish a surrogate standard pursuant to Rule 62-297.310(5)(k), F.A.C., Waiver of Compliance Test Requirements, shall be established as necessary to properly establish the relationship between a proposed surrogate standard and an existing mass emission limiting standard.
- c. The minimum observation period for opacity tests conducted by employees or agents of the Department to verify the day-to-day continuing compliance of a unit or activity with an applicable opacity standard shall be twelve minutes.

[Rule 62-297.310(4), F.A.C.]

F.11. Frequency of Compliance Tests. The following provisions apply only to those emissions units that are subject to an emissions limiting standard for which compliance testing is required.

(a) General Compliance Testing.

3. The owner or operator of an emissions unit that is subject to any emission limiting standard shall conduct a compliance test that demonstrates compliance with the applicable emission limiting standard prior to obtaining a renewed operation permit. Emissions units that are required to conduct an annual compliance test may submit the most recent annual compliance test to satisfy the requirements of this provision. In renewing an air operation permit pursuant to Rule 62-210.300(2)(a)3.b., c., or d., F.A.C., the Department shall not require submission of emission compliance test results for any emissions unit that, during the year prior to renewal:

a. Did not operate;

4. During each federal fiscal year (October 1 - September 30), unless otherwise specified by rule, order, or permit, the owner or operator of each emissions unit shall have a formal compliance test conducted for:

a. Visible emissions, if there is an applicable standard;

b. Each of the following pollutants, if there is an applicable standard, and if the emissions unit emits or has the potential to emit: 5 tons per year or more of lead or lead compounds measured as elemental lead; 30 tons per year or more of acrylonitrile; or 100 tons per year or more of any other regulated air pollutant; and

c. Each NESHAP pollutant, if there is an applicable emission standard.

9. The owner or operator shall notify the Department, at least 15 days prior to the date on which each formal compliance test is to begin, of the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted for the owner or operator.

(b) Special Compliance Tests. When the Department, after investigation, has good reason (such as complaints, increased visible emissions or questionable maintenance of control equipment) to believe that any applicable emission standard contained in a Department rule or in a permit issued pursuant to those rules is being violated, it may require the owner or operator of the emissions unit to conduct compliance tests which identify the nature and quantity of pollutant emissions from the emissions unit and to provide a report on the results of said tests to the Department.

(c) Waiver of Compliance Test Requirements. If the owner or operator of an emissions unit that is subject to a compliance test requirement demonstrates to the Department, pursuant to the procedure established in Rule 62-297.620, F.A.C., that the compliance of the emissions unit with an applicable weight emission limiting standard can be adequately determined by means other than the designated test procedure, such as specifying a surrogate standard of no visible emissions for particulate matter sources equipped with a bag house or specifying a fuel analysis for sulfur dioxide emissions, the Department shall waive the compliance test requirements for such emissions units and order that the alternate means of determining compliance be used, provided, however, the provisions of Rule 62-297.310(7)(b), F.A.C., shall apply.

[Rule 62-297.310(7), F.A.C.; and, SIP approved]

Monitoring of Operations

F.12. Determination of Process Variables.

(a) Required Equipment. The owner or operator of an emissions unit for which compliance tests are required shall install, operate, and maintain equipment or instruments necessary to determine process variables, such as process weight input or heat input, when such data are needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards.

(b) Accuracy of Equipment. Equipment or instruments used to directly or indirectly determine process variables, including devices such as belt scales, weight hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value.

[Rule 62-297.310(5), F.A.C.]

Recordkeeping and Reporting Requirements

F.13. Any measurements, maintenance, reports, and records shall be retained for at least **5 (five)** years following the date of such measurements, maintenance, reports, and records.

[Rule 62-213.440(1)(b)2.b., F.A.C.]

F.14. Test Reports.

(a) The owner or operator of an emissions unit for which a compliance test is required shall file a report with the Department on the results of each such test.

(b) The required test report shall be filed with the Department as soon as practical but no later than 45 days after the last sampling run of each test is completed.

(c) The test report shall provide sufficient detail on the emissions unit tested and the test procedures used to allow the Department to determine if the test was properly conducted and the test results properly computed. As a minimum, the test report, other than for an EPA or DEP Method 9 test, shall provide the following information:

1. The type, location, and designation of the emissions unit tested.
2. The facility at which the emissions unit is located.
3. The owner or operator of the emissions unit.
4. The normal type and amount of fuels used and materials processed, and the types and amounts of fuels used and material processed during each test run.
5. The means, raw data and computations used to determine the amount of fuels used and materials processed, if necessary to determine compliance with an applicable emission limiting standard.
6. The type of air pollution control devices installed on the emissions unit, their general condition, their normal operating parameters (pressure drops, total operating current and GPM scrubber water), and their operating parameters during each test run.

7. A sketch of the duct within 8 stack diameters upstream and 2 stack diameters downstream of the sampling ports, including the distance to any upstream and downstream bends or other flow disturbances.
8. The date, starting time and duration of each sampling run.
9. The test procedures used, including any alternative procedures authorized pursuant to Rule 62-297.620, F.A.C. Where optional procedures are authorized in this chapter, indicate which option was used.
10. The number of points sampled and configuration and location of the sampling plane.
11. For each sampling point for each run, the dry gas meter reading, velocity head, pressure drop across the stack, temperatures, average meter temperatures and sample time per point.
12. The type, manufacturer and configuration of the sampling equipment used.
13. Data related to the required calibration of the test equipment.
14. Data on the identification, processing and weights of all filters used.
15. Data on the types and amounts of any chemical solutions used.
16. Data on the amount of pollutant collected from each sampling probe, the filters, and the impingers, are reported separately for the compliance test.
17. The names of individuals who furnished the process variable data, conducted the test, analyzed the samples and prepared the report.
18. All measured and calculated data required to be determined by each applicable test procedure for each run.
19. The detailed calculations for one run that relate the collected data to the calculated emission rate.
20. The applicable emission standard, and the resulting maximum allowable emission rate for the emissions unit, plus the test result in the same form and unit of measure.
21. A certification that, to the knowledge of the owner or his authorized agent, all data submitted are true and correct. When a compliance test is conducted for the Department or its agent, the person who conducts the test shall provide the certification with respect to the test procedures used. The owner or his authorized agent shall certify that all data required and provided to the person conducting the test are true and correct to his knowledge.

[Rules 62-213.440 and 62-297.310(8), F.A.C.]

Appendix U-1, List of Unregulated Emissions Units and/or Activities.

Hillsborough County
Hillsborough County Resource
Recovery Facility

FINAL Permit No.: 0570261-005-AV
Facility ID No.: 0570261

Unregulated Emissions Units and/or Activities. An emissions unit which emits no "emissions-limited pollutant" and which is subject to no unit-specific work practice standard, though it may be subject to regulations applied on a facility-wide basis (e.g., unconfined emissions, odor, general opacity) or to regulations that require only that it be able to prove exemption from unit-specific emissions or work practice standards.

The below listed emissions units and/or activities are neither 'regulated emissions units' nor 'insignificant emissions units'.

<u>E.U. ID</u>	
<u>No.</u>	<u>Brief Description of Emissions Units and/or Activity</u>
-103	Cooling Tower
-104	Waste Water Treatment Plant
-105	NaOH Storage Tank

Appendix I-1, List of Insignificant Emissions Units and/or Activities.

Hillsborough County
Hillsborough County Resource
Recovery Facility

FINAL Permit No.: 0570261-005-AV
Facility ID No.: 0570261

The facilities, emissions units, or pollutant-emitting activities listed in Rule 62-210.300(3)(a), F.A.C., Categorical Exemptions, are exempt from the permitting requirements of Chapters 62-210 and 62-4, F.A.C.; provided, however, that exempt emissions units shall be subject to any applicable emission limiting standards and the emissions from exempt emissions units or activities shall be considered in determining the potential emissions of the facility containing such emissions units. Emissions units and pollutant-emitting activities exempt from permitting under Rule 62-210.300(3)(a), F.A.C., shall not be exempt from the permitting requirements of Chapter 62-213, F.A.C., if they are contained within a Title V source; however, such emissions units and activities shall be considered insignificant for Title V purposes provided they also meet the criteria of Rule 62-213.430(6)(b), F.A.C. No emissions unit shall be entitled to an exemption from permitting under Rule 62-210.300(3)(a), F.A.C., if its emissions, in combination with the emissions of other units and activities at the facility, would cause the facility to emit or have the potential to emit any pollutant in such amount as to make the facility a Title V source.

The below listed emissions units and/or activities are considered insignificant pursuant to Rule 62-213.430(6), F.A.C.

Brief Description of Emissions Units and/or Activities

1. Fire and safety equipment
2. Paint usage of less than 6 gallons per day
3. Emergency generator
4. Mineral spirits drums
5. Bulk drum of cooling water treatment
6. Flanges and valves
7. 55 gallon oil storage drums
8. 300 and 449 gallon fuel storage tanks
9. Laboratory vent
10. Yard waste mulching operation
11. Emergency generator at Falkenburg Wastewater Treatment Plant
12. Sulfuric acid tank
13. Chlorine cylinders
14. Aqueous Ammonia (19%) Storage Tank

Appendix H-1: Permit History

Hillsborough County
Hillsborough County Resource Recovery Facility

FINAL Permit No.: 0570261-005-AV
Facility ID No.: 0570261

E.U. ID No.	Description	Permit No.	Effective Date	Expiration Date	Project Type ¹
All	Facility	0570261-001-AV	10/24/2000	10/24/2005	Initial
-001	Unit #1	0570261-002-AC	07/20/2000	12/19/2000	Construction (mod.)
-002	Unit #2				
-003	Unit #3				
-100	Ash Handling				
All	Facility	0570261-003-AV	04/23/2001	10/24/2005	Admin. Correction
-106	Dolomitic Lime Storage Silo	0570261-004-AC	03/27/2002	12/31/2002	Construction (new)
All	Facility	0570261-005-AV	04/30/2003	10/24/2005	Revision

¹ Project Type (select one): Title V: Initial, Revision, Renewal, or Admin. Correction; Construction (new or mod.); or, Extension (AC only).

² Change to an actual date, which is day 55 from the date of posting the PROPOSED Permit for EPA review (see confirmation e-mail from Tallahassee) or the date that EPA confirms resolvment of any objections.

Appendix 6
Correspondence Related to
Governmental Jurisdictions



Civil Engineering
Surveying, Planning
Environmental Services
Construction Administration
Transportation Engineers

September 30, 2004

Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, Florida 32399-1600

RE: Hillsborough County Solid Waste Energy Recovery Facility
350 North Falkenburg Road, Tampa, Florida

Dear Sir/Madam:

Burcaw & Associates has been contracted to prepare a new certification for Hillsborough County Solid Waste Energy Recovery Facility located at 350 North Falkenburg Road in Tampa. The original project study and certification was prepared in 1984.

We need your assistance in identifying properties under the jurisdiction of Florida Fish and Wildlife Conservation Commission which are within a five mile radius of the facility listed above.

Enclosed are two maps: 1) Governmental Jurisdictions used in the 1984 study which identifies affected properties within a five mile radius of the project. 2) a current map which includes updated information and local roads for 2004.

Please review both maps and make any changes and/or additions necessary to identify properties under your jurisdiction that are located within the five mile radius shown. Please mark up the enclosed maps with all updates/changes and add additional information as necessary and return to our office. ***Specific information required from Florida Fish and Wildlife Conservation Commission includes: Game Management Areas.***

If the information provided on the enclosed maps is accurate, please sign the bottom of this letter and return to our office in the enclosed, self addressed envelope by Wednesday, October 6, 2004. Please do not hesitate to contact me at the number below with any questions.

Sincerely,

A handwritten signature in cursive script that reads "Jerry Keith".

Jerry W. Keith
Engineering Intern

The information on the enclosed maps is accurate and correct. The Florida Fish and Wildlife Conservation Commission has no additional properties within a five mile radius of this site.

Name, Title, Agency

Date

6402 W. Linebaugh Ave.
Suite A.
Tampa, FL 33625

Phone: 1.813.882.4815
Fax: 1.813.882.3808
Web site: www.Burcawinc.com



Civil Engineering
Surveying, Planning
Environmental Services
Construction Administration
Transportation Engineers

September 30, 2004

Mr. Mike Bullock, Director
Florida Department of Environmental Protection
Division of Recreation and Parks
3900 Commonwealth Boulevard, MS 500
Tallahassee, Florida 32399

RE: Hillsborough County Solid Waste Energy Recovery Facility
350 North Falkenburg Road, Tampa, Florida

Dear Mr. Bullock:

Burcaw & Associates has been contracted to prepare a new certification for Hillsborough County Solid Waste Energy Recovery Facility located at 350 North Falkenburg Road in Tampa. The original project study and certification was prepared in 1984.

We need your assistance in identifying properties under the jurisdiction of Florida Department of Environmental Protection, Division of Recreation and Parks which are within a five mile radius of the facility listed above.

Enclosed are two maps: 1) Governmental Jurisdictions used in the 1984 study which identifies affected properties within a five mile radius of the project. 2) a current map which includes updated information and local roads for 2004.

Please review both maps and make any changes and/or additions necessary to identify properties under your jurisdiction that are located within the five mile radius shown. Please mark up the enclosed maps with all updates/changes and add additional information as necessary and return to our office. ***Specific information required from the Division of Recreation and Parks include: Monuments, Memorials and State Parks.***

If the information provided on the enclosed maps is accurate, please sign the bottom of this letter and return to our office in the enclosed, self addressed envelope by Wednesday, October 6, 2004. Please do not hesitate to contact me at the number below with any questions.

Sincerely,

A handwritten signature in cursive script, reading "Jerry Keith".

Jerry W. Keith
Engineering Intern

The information on the enclosed maps is accurate and correct. The Florida Department of Environmental Protection, Division of Recreation and Parks has no additional properties within a five mile radius of this site.

Name, Title, Agency

Date

6402 W. Linebaugh Ave.
Suite A.
Tampa, FL 33625

Phone: 1.813.882.4815
Fax: 1.813.882.3808
Web site: www.Burcawinc.com



Civil Engineering
Surveying, Planning
Environmental Services
Construction Administration
Transportation Engineers

September 30, 2004

Mr. Michael Barnett, Director
Florida Department of Environmental Protection
Division of Beaches & Coastal Systems
3900 Commonwealth Boulevard, MS 300
Tallahassee, Florida 32399

RE: Hillsborough County Solid Waste Energy Recovery Facility
350 North Falkenburg Road, Tampa, Florida

Dear Mr. Barnett:

Burcaw & Associates has been contracted to prepare a new certification for Hillsborough County Solid Waste Energy Recovery Facility located at 350 North Falkenburg Road in Tampa. The original project study and certification was prepared in 1984.

We need your assistance in identifying properties under the jurisdiction of Florida Department of Environmental Protection, Beaches & Coastal Systems which are within a five mile radius of the facility listed above.

Enclosed are two maps: 1) Governmental Jurisdictions used in the 1984 study which identifies affected properties within a five mile radius of the project. 2) a current map which includes updated information and local roads for 2004.

Please review both maps and make any changes and/or additions necessary to identify properties under your jurisdiction that are located within the five mile radius shown. Please mark up the enclosed maps with all updates/changes and add additional information as necessary and return to our office. ***Specific information required from the Division of Beaches & Coastal Systems include: State Parks, State Forests, Game Management Areas, Areas of Critical State Concern, Conservation & Recreation Areas, Aquatic Preserves, Outstanding Florida Waters, Scenic and Wild Rivers, Military Lands.***

If the information provided on the enclosed maps is accurate, please sign the bottom of this letter and return to our office in the enclosed, self addressed envelope by Wednesday, October 6, 2004. Please do not hesitate to contact me at the number below with any questions.

Sincerely,

A handwritten signature in cursive script that reads "Jerry W. Keith".

Jerry W. Keith
Engineering Intern

The information on the enclosed maps is accurate and correct. The Florida Department of Environmental Protection, Division of Beaches & Coastal Systems has no additional properties within a five mile radius of this site.

Name, Title, Agency

6402 W. Linebaugh Ave.
Suite A.
Tampa, FL 33625

Date

Phone: 1.813.882.4815
Fax: 1.813.882.3808
Web site: www.Burcawinc.com



Civil Engineering
Surveying, Planning
Environmental Services
Construction Administration
Transportation Engineers

September 30, 2004

Ms. Eva Armstrong, Director
Florida Department of Environmental Protection
Division of State Lands
3900 Commonwealth Boulevard, MS 100
Tallahassee, Florida 32399

RE: Hillsborough County Solid Waste Energy Recovery Facility
350 North Falkenburg Road, Tampa, Florida

Dear Ms. Armstrong:

BurcaW & Associates has been contracted to prepare a new certification for Hillsborough County Solid Waste Energy Recovery Facility located at 350 North Falkenburg Road in Tampa. The original project study and certification was prepared in 1984.

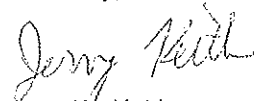
We need your assistance in identifying properties under the jurisdiction of Florida Department of Environmental Protection, Division of State Lands which are within a five mile radius of the facility listed above.

Enclosed are two maps: 1) Governmental Jurisdictions used in the 1984 study which identifies affected properties within a five mile radius of the project. 2) a current map which includes updated information and local roads for 2004.

Please review both maps and make any changes and/or additions necessary to identify properties under your jurisdiction that are located within the five mile radius shown. Please mark up the enclosed maps with all updates/changes and add additional information as necessary and return to our office. ***Specific information required from the Division of State Lands includes: State Forests.***

If the information provided on the enclosed maps is accurate, please sign the bottom of this letter and return to our office in the enclosed, self addressed envelope by Wednesday, October 6, 2004. Please do not hesitate to contact me at the number below with any questions.

Sincerely,


Jerry W. Keith
Engineering Intern

The information on the enclosed maps is accurate and correct. The Florida Department of Environmental Protection, Division of State Lands has no additional properties within a five mile radius of this site.

Name, Title, Agency

Date

6402 W. Linebaugh Ave.
Suite A.
Tampa, FL 33625

Phone: 1.813.882.4815
Fax: 1.813.882.3808
Web site: www.Burcawinc.com



Civil Engineering
Surveying, Planning
Environmental Services
Construction Administration
Transportation Engineers

September 30, 2004

Mr. Michael C. Long, Director
Florida Department of Agriculture
Division of Forestry
3125 Connor Boulevard
Tallahassee, Florida 32399

RE: Hillsborough County Solid Waste Energy Recovery Facility
350 North Falkenburg Road, Tampa, Florida

Dear Mr. Long:

Burcaw & Associates has been contracted to prepare a new certification for Hillsborough County Solid Waste Energy Recovery Facility located at 350 North Falkenburg Road in Tampa. The original project study and certification was prepared in 1984.

We need your assistance in identifying properties under the jurisdiction of Florida Department Agriculture, Division of Forestry which are within a five mile radius of the facility listed above.

Enclosed are two maps: 1) Governmental Jurisdictions used in the 1984 study which identifies affected properties within a five mile radius of the project. 2) a current map which includes updated information and local roads for 2004.

Please review both maps and make any changes and/or additions necessary to identify properties under your jurisdiction that are located within the five mile radius shown. Please mark up the enclosed maps with all updates/changes and add additional information as necessary and return to our office. ***Specific information required from the Florida Department of Agriculture, Division of Forestry includes: State Forests.***

If the information provided on the enclosed maps is accurate, please sign the bottom of this letter and return to our office in the enclosed, self addressed envelope by Wednesday, October 6, 2004. Please do not hesitate to contact me at the number below with any questions.

Sincerely,

A handwritten signature in cursive script that reads "Jerry Keith".

Jerry W. Keith
Engineering Intern

The information on the enclosed maps is accurate and correct. The Florida Department of Agriculture, Division of Forestry has no additional properties within a five mile radius of this site.

Name, Title, Agency

Date

6402 W. Linebaugh Ave.
Suite A.
Tampa, FL 33625

Phone: 1.813.882.4815
Fax: 1.813.882.3808
Web site: www.Burcawinc.com



Civil Engineering
Surveying, Planning
Environmental Services
Construction Administration
Transportation Engineers

September 30, 2004

Ms. Katherine Andrews, Director
Florida Department of Environmental Protection
Office of Coastal and Aquatic Managed Areas
3900 Commonwealth Boulevard, MS 235
Tallahassee, Florida 32399

RE: Hillsborough County Solid Waste Energy Recovery Facility
350 North Falkenburg Road, Tampa, Florida

Dear Ms. Andrews:

Burcaw & Associates has been contracted to prepare a new certification for Hillsborough County Solid Waste Energy Recovery Facility located at 350 North Falkenburg Road in Tampa. The original project study and certification was prepared in 1984.

We need your assistance in identifying properties under the jurisdiction of Florida Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas which are within a five mile radius of the facility listed above.

Enclosed are two maps: 1) Governmental Jurisdictions used in the 1984 study which identifies affected properties within a five mile radius of the project. 2) a current map which includes updated information and local roads for 2004.

Please review both maps and make any changes and/or additions necessary to identify properties under your jurisdiction that are located within the five mile radius shown. Please mark up the enclosed maps with all updates/changes and add additional information as necessary and return to our office. ***Specific information required from the Office of Coastal and Aquatic Managed Areas includes: Conservation and Recreation Lands, Scenic and Wild Rivers, Save Our Rivers Lands, Aquatic Preserves.***

If the information provided on the enclosed maps is accurate, please sign the bottom of this letter and return to our office in the enclosed, self addressed envelope by Wednesday, October 6, 2004. Please do not hesitate to contact me at the number below with any questions.

Sincerely,

A handwritten signature in cursive script that reads "Jerry Keith".

Jerry W. Keith
Engineering Intern

The information on the enclosed maps is accurate and correct. The Florida Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas has no additional properties within a five mile radius of this site.

Name, Title, Agency

Date

6402 W. Linebaugh Ave.
Suite A.
Tampa, FL 33625

Phone: 1.813.882.4815
Fax: 1.813.882.3808
Web site: www.Burcawinc.com



Civil Engineering
Surveying, Planning
Environmental Services
Construction Administration
Transportation Engineers

September 30, 2004

Mr. Ryan Wheeler, Chief
Office of the Bureau Chief
Florida Department of State
Office of Cultural and Historical Resources
500 South Bronough Street
Tallahassee, Florida 32399

RE: Hillsborough County Solid Waste Energy Recovery Facility
350 North Falkenburg Road, Tampa, Florida

Dear Chief Wheeler:

Burcaw & Associates has been contracted to prepare a new certification for Hillsborough County Solid Waste Energy Recovery Facility located at 350 North Falkenburg Road in Tampa. The original project study and certification was prepared in 1984.

We need your assistance in identifying properties under the jurisdiction of Florida Department of State, Office of Cultural and Historical Resources which are within a five mile radius of the facility listed above.

Enclosed are two maps: 1) Governmental Jurisdictions used in the 1984 study which identifies affected properties within a five mile radius of the project. 2) a current map which includes updated information and local roads for 2004.

Please review both maps and make any changes and/or additions necessary to identify properties under your jurisdiction that are located within the five mile radius shown. Please mark up the enclosed maps with all updates/changes and add additional information as necessary and return to our office. ***Specific information required from the Office of Cultural and Historical Resources include: State Archaeological Lands or Landmark Zones.***

If the information provided on the enclosed maps is accurate, please sign the bottom of this letter and return to our office in the enclosed, self addressed envelope by Wednesday, October 6, 2004. Please do not hesitate to contact me at the number below with any questions.

Sincerely,

A handwritten signature in cursive script that reads "Jerry Keith".

Jerry W. Keith
Engineering Intern

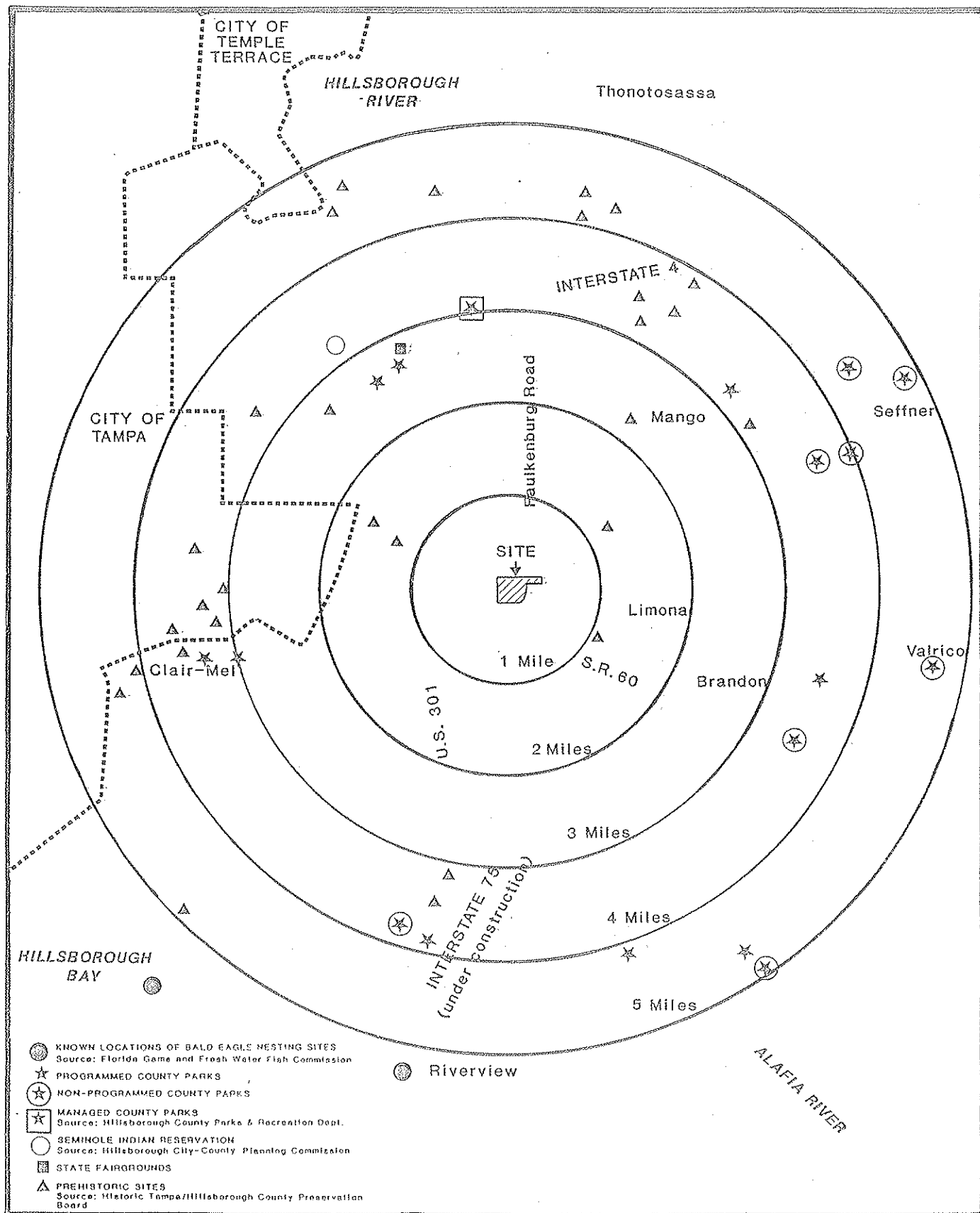
The information on the enclosed maps is accurate and correct. The Florida Department of State Office of Cultural and Historical Resources has no additional properties within a five mile radius of this site.

Name, Title, Agency

Date

6402 W. Linebaugh Ave.
Suite A.
Tampa, FL 33625

Phone: 1.813.882.4815
Fax: 1.813.882.3808
Web site: www.Burcawinc.com

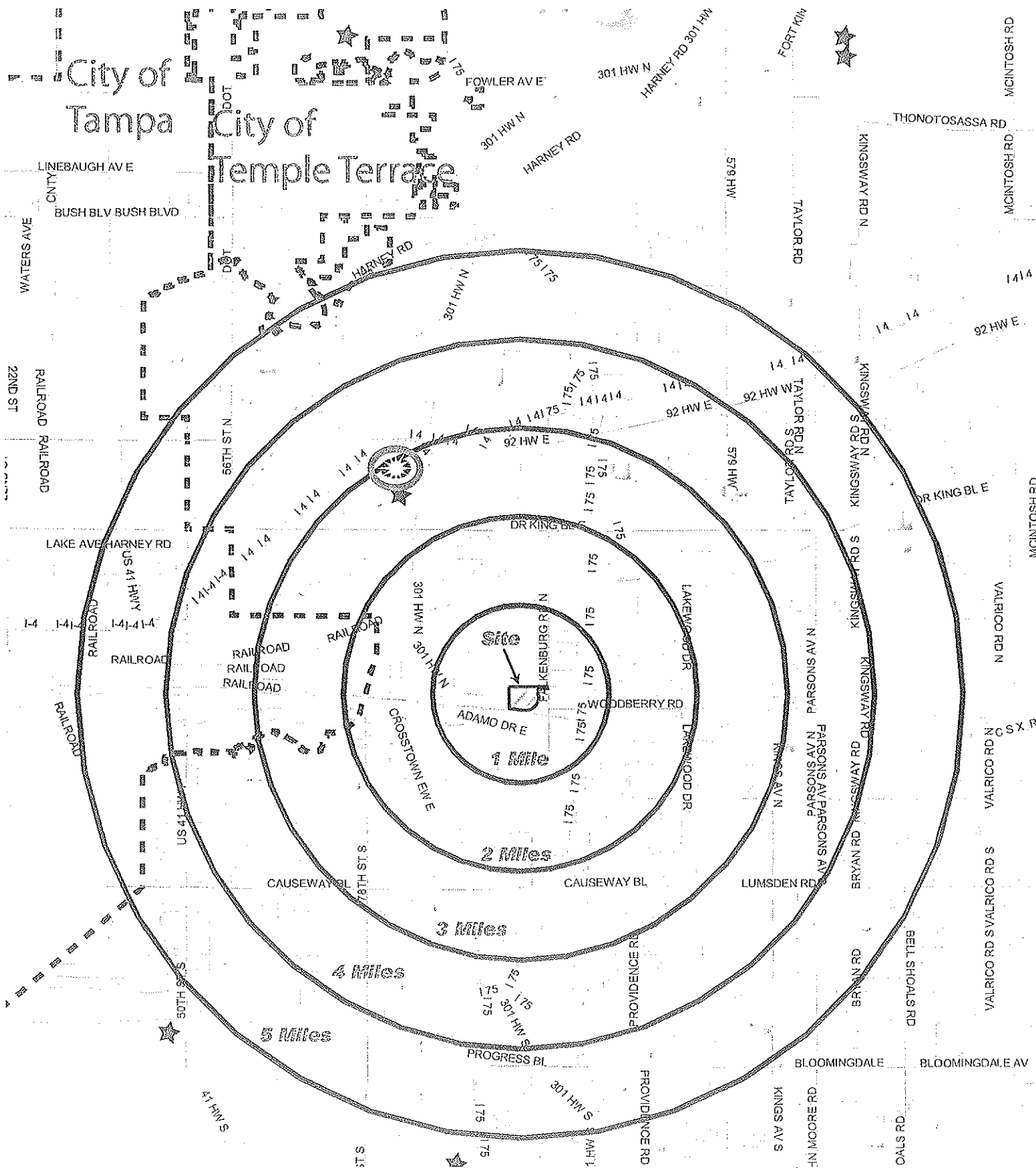


HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

1984

FIGURE 2.7
GOVERNMENTAL JURISDICTIONS MAP

1 0 1 2 MILES



Hillsborough County Parks

State Fairgrounds

Known Locations of Bald
Eagle Nesting Sites (approximate)

2004



Scale
0 1.5 miles

Appendix 7

Groundwater Well Inventory



Figure 7-1. Aerial Photograph

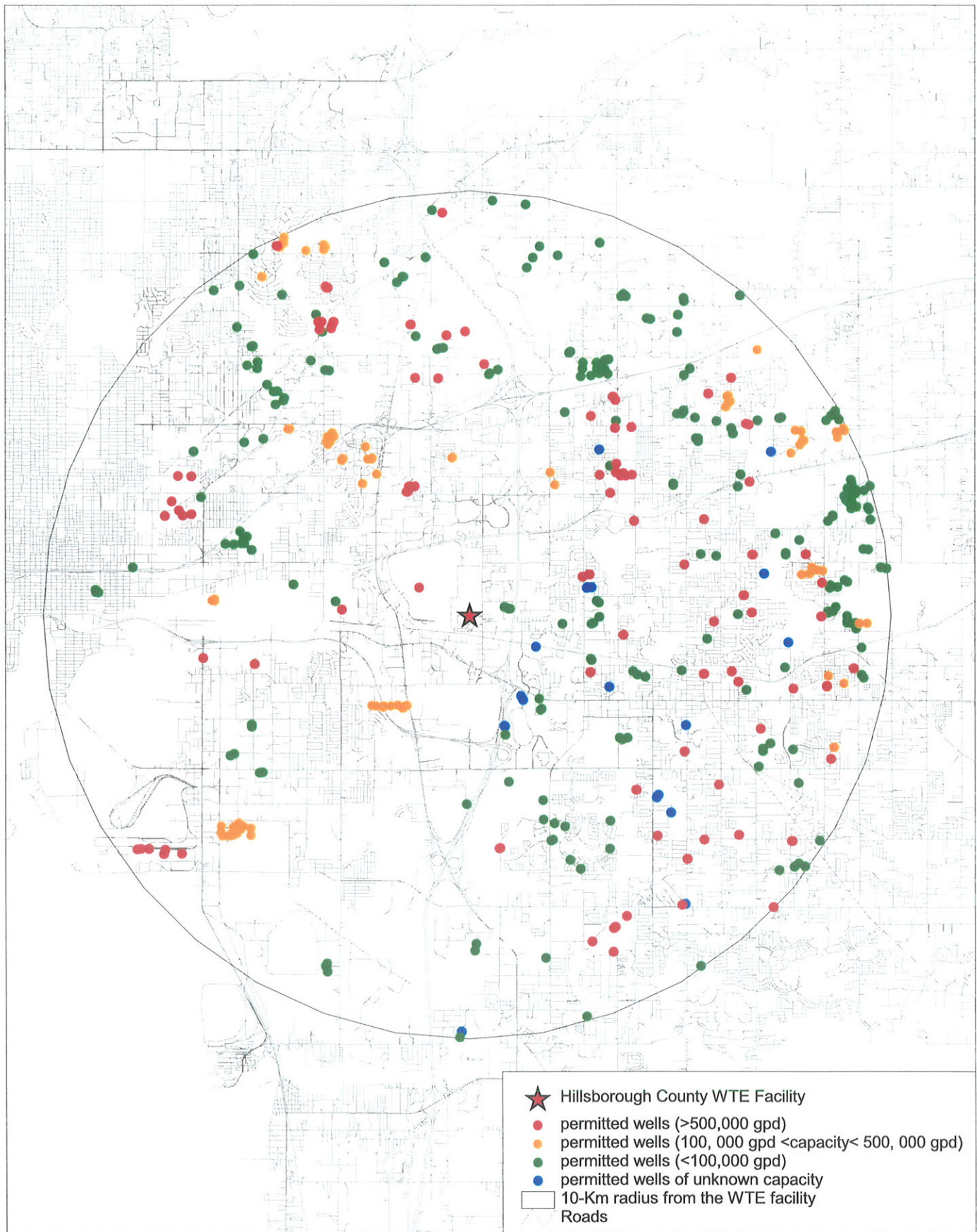


Figure 7-2. SWFWMD Permitted Wells

PWS ID	Mailing Name	Mailing Street	City	Zip	PWS Type	Status	Pop	Capacity(GPD)
6290017	A&A MHP	11010 CLAY PIT ROAD	TAMPA	33610	C	A	69	10,000
6290047	PARKVIEW MHP	10801 MAIN STREET	THONOTOSASSA	33592	C	A	48	19,000
6290072	ANNA MARY MHP	11014 HWY 301 N	THONOTOSASSA	33592	C	A	38	19,000
6290075	HCPRD/ANTIOCH CTY PK	FRANKLIN RD E/O CRUM ROAD	THONOTOSASSA	33592	N	A	50	19,000
6290157	HARMONY OAKS MHP	10321 MAIN ST.	THONOTOSASSA	33592	C	A	528	81,000
6290160	CLUB 92/MOULIN ROUGE	10101 U.S. 92 E.	TAMPA	33610	N	A	50	38,000
6290186	BRANDON TP	113 SOUTH MT. CARMEL ROAD	BRANDON	33511	C	A	422	110,000
6290227	CAMELOT MHP	11611 SIR LAWRENCE COURT	THONOTOSASSA	33592	C	A	240	230,000
6290256	CAROUSEL VILLAGE MHP	5410 FAULKENBERG RD	TAMPA	33610	C	A	82	15,000
6290266	CAST CRETE CORP	6324 C.R. 579	DOVER	33584	P	A	180	230,000
6290277	CHAPPARAL MHP	4409 FOXWORTH RD.	RIVERVIEW	33569	C	A	80	12,500
6290279	CHARLIES MHP	10813 E MAIN ST	THONOTOSASSA	33592	C	A	218	50,000
6290309	CITRUS KNOLL MHP	12960 MORRIS BRIDGE RD	THONOTOSASSA	33592	C	A	52	15,000
6290327	CITY OF TAMPA-WATER DEPARTMENT	7125 N. 30TH STREET	TAMPA	33610	C	A	540000	140,000,000
6290333	HCWD/SEABOARD	8612 1/2 FISHLAKE RD	TAMPA	33619	C	A	10023	400,000
6290392	COUNTRYSIDE MHP	10107 MAIN ST	THONOTOSASSA	33592	C	A	48	38,000
6290430	DAVPAM MHP	102 MAGNOLIA LANE	TAMPA	33610	C	A	768	100,000
6290474	TRIPLE T MHP	10602 TAYLOR ROAD	THONOTOSASSA	33592	C	A	75	19,000
6290497	EASTLAKE UTILITIES	6608 WALTON WAY	TAMPA	33610	C	A	2282	510,000
6290505	FAMILY RENTALS OF SEFFNER(PREVATT'S MHP)	11416 US 92 E	SEFFNER	33584	C	A	62	57,000
6290534	HCPRD/EUREKA SPRINGS	6400 EUREKA SPRINGS RD	TAMPA	33610	N	A	50	96,000
6290722	HAPPY ACRES MHP	10509 SYMMES RD	RIVERVIEW	33569	C	A	40	19,000
6290728	HAPPY TRAVELER'S RVP	9401 E FOWLER AVE	THONOTOSASSA	33592	P	A	190	159,000
6290740	HAVEN MHP	10606 MAGNOLIA DR.	THONOTOSASSA	33592	C	A	30	19,000
6290786	DEPARTMENT OF	6612 STARK RD.	SEFFNER	33584	N	A	25	518,000
6290793	HILLSBOROUGH RIVER	15402 U.S.301 NORTH	THONOTOSASSA	33592	N	A	1001	120,000
6290800	HILLTOP MHP	9915 U.S. 92	TAMPA	33610	C	A	44	19,000
6290937	KING RICHARDS' CT	10306 BIG BEND ROAD	RIVERVIEW	33569	C	A	210	43,000
6291135	MANGO TP	CURRY ROAD	MANGO	33584	N	A	65	6,500
6291153	MARY HELP OF CHRISTIAN	6400 CHELSEA ST.	TAMPA	33610	P	A	150	232,000
6291213	EASY LIVING MHP	4943 E HILLSBOROUGH AVE	TAMPA	33610	C	A	150	50,000
6291219	MOSS HAVEN MHP	3610 N HWY 301	TAMPA	33619	C	A	89	7,000
6291250	HCS/NATURES'	MORRIS BRIDGE ROAD	THONOTOSASSA	33592	P	A	32	15,000

PWS ID	Mailing Name	Mailing Street	City	Zip	PWS Type	Status	Pop	Capacity(GPD)
6291276	MGM MOBILE HOME	10632 S.R 579	THONOTOSASSA	33592	C	A	74	34,000
6291280	OAK HILL VILLAGE MHP	2620 E HWY 60 LOT 110	VALRICO	33594	C	A	555	35,000
6291341	PARADISE VILLAGE	9304 PARADISE DRIVE	TAMPA	33610	C	A	1228	200,000
6291445	BLACKDAIRY ROAD TP	6421/6427 BLACK DAIRY RD.	SEFFNER	33584	C	A	50	81,225
6291481	RANCH OAKS MHP	11940 U.S 301 NORTH	THONOTOSASSA	33592	C	A	164	50,000
6291529	GUTHRIES SUNSHINE PK	11930 HAZEN AVENUE LOT #15	THONOTOSASSA	33592	C	A	40	28,000
6291541	FEATHEROCK MHP	2200 HWY 60 E E/O VALRICO	VALRICO	33594	C	A	1044	500,000
6291605	SELF MOBILE HOME SITES	4260 CASTLEWOOD DR	SEFFNER	33584	C	A	42	28,000
6291610	SHADY GROVE	12966 MORRIS BRIDGE ROAD	THONOTOSASSA	33592	C	A	42	7,500
6291684	SPANISH MAIN RESORT	12110 SPANISH MAIN RESORT	THONOTOSASSA	33592	C	A	662	384,000
6291776	MCCARTHY'S MHP	8207 BOWLES ROAD	TAMPA	33610	C	A	53	7,500
6291778	SINGH 301 INC.	6503 US 301	TAMPA	33610	N	A	300	19,000
6291781	TAMPA MHP &	5319 GARDEN LANE ROAD	TAMPA	33610	P	A	32	10,000
6291840	TOWN & COUNTRY MHP	1221 N VALRICO RD	VALRICO	33594	C	A	136	20,000
6291870	TWIN PALMS COURT	11520 US 92 EAST	SEFFNER	33584	C	A	70	8,000
6291891	VALRICO HILLS UTILITY	712 FALKIRK AVE	VALRICO	33594	C	A	1239	576,000
6291988	WINDWARD KNOLL MHP	12415 THONOTOSASSA ROAD	THONOTOSASSA	33592	C	A	248	50,000
6292074	CHELSEA DUPLEXES	5624 CHELSEA RD.	TAMPA	33610	C	A	80	12,000
6292128	NEW HOPE CHILDREN'S	110 HUNTER RD	VALRICO	33594	P	A	95	62,100
6292152	FIRST BAPTIST CHURCH	11619 SR 574	MANGO	33584	N	A	100	1,000
6292159	LITTLE KIDS ACADEMY	11103 E US 92	SEFFNER	33584	P	A	49	1,600
6292161	PRECIOUS JEWELS DAY	5016 GARDEN LANE	TAMPA	33610	P	A	30	2,000
6292453	OAKWOOD ACRES APTS	10600 DAVIS ROAD	TAMPA	33637	C	A	80	10,000
6292477	CHINA PALACE	1807 HWY 60 E	VALRICO	33594	N	A	180	2,500
6292478	WILLIES RESTAURANT	1912 FRONT STREET	VALRICO	33594	N	A	455	15,000
6292549	HACIENDA	4109 E HILLSBOROUGH AVE	TAMPA	33610	N	A	170	5,000
6292554	KASH & KARRY	6422 HARNEY RD	TAMPA	33610	P	A	150	50,000
6292561	MOTEL 301	3411 N HWY 301	TAMPA	33619	N	A	28	2,500
6292566	DENTAL HEALTH GROUP	1620 HWY 60	VALRICO	33594	N	A	30	3,000
6292568	SUNBELT SALES &	6429 HARNEY RD	TAMPA	33610	N	A	55	5,000
6292571	SMOKING DOG	6501 US HWY 301 S	RIVERVIEW	33569	N	A	40	1,500
6292577	VALRICO MEDICAL CTR	1810 E BRANDON BLVD	VALRICO	33594	N	A	75	3,000
6292578	VILLAGE RESTAURANT	512 S.R.574	SEFFNER	33584	N	A	100	2,500
6292645	RIVERBREEZE MHP	4804 CLEWIS AVE	TAMPA	33610	C	A	38	5,000
6292647	YAK'S MHP	5507 BAPTIST CHURCH ROAD	TAMPA	33610	C	A	32	8,000

PWS ID	Mailing Name	Mailing Street	City	Zip	PWS Type	Status	Pop	Capacity(GPD)
6292660	HCPRD/STERLING	11706 WILLIAMS ROAD	THONOTOSASSA	33592	P	A	50	5,000
6292788	TERRACE ACRES APTS	10402 WILLIAMS RD.	THONOTOSASSA	33592	N	A	32	5,000
6292831	CIRCLE K #7074	SR 579 & MAIN ST	THONOTOSASSA	33592	N	A	100	2,500
6292833	JAY'S MINIMART	11606 WILLIAMS ROAD	THONOTOSASSA	33592	N	A	100	1,500
6292834	CIRCLE K #7108	10401 MCINTOSH ROAD	THONOTOSASSA	33592	N	A	100	2,500
6292835	CIRCLE K #7112	MORRIS BRIDGE AT ELOIAN	THONOTOSASSA	33592	N	A	100	2,500
6292836	PRESCO FOOD STORE #66	11931 HWY. 301 NORTH	THONOTOSASSA	33592	N	A	100	2,500
6292842	CITGO	11305 US 92 E.	SEFFNER	33584	N	A	100	5,000
6292846	CAMP DOROTHY THOMAS	16119 BOYETTE RD	RIVERVIEW	33569	N	A	190	45,000
6292847	ROTARY'S CAMP FLORIDA	1915 CAMP FLA RD	BRANDON	33510	N	A	120	10,000
6292851	AUNT FRANNIES	1708 SR 574	SEFFNER	33584	P	A	40	5,000
6292855	GIT N GO #4	5320 N. FAULKENBURG ROAD	TAMPA	33610	N	A	100	1,750
6292859	CAUSEWAY GRILL & FOOD	6110 CAUSEWAY BLVD	TAMPA	33619	N	A	100	1,500
6292861	MARY'S MIRACLE	10203 E. HWY 92	TAMPA	33610	N	A	75	5,000
6293003	SPUR	13025 U.S 301 N/O BIG BEND	RIVERVIEW	33569	N	A	100	1,500
6293036	FANTASY MENS CLUB	4948 N 56 TH ST	TAMPA	33610	N	A	50	2,500
6293037	DALLAS BULL	8222 HWY 301 NORTH	TAMPA	33637	N	A	250	5,000
6293041	POT BELLIES COUNTRY	11711 M.L.KING BLVD	MANGO	33584	N	A	100	5,000
6293068	301 HOUSE	8601 BOWLES RD	TAMPA	33637	N	A	25	5,000
6294000	GIT N GO MARKETS	6912 CAUSEWAY BLVD.	TAMPA	33619	N	A	100	1,750
6294172	GREEN OAKS MHP	12001 US 301 N	THONOTOSASSA	33592	C	A	70	6,000
6294333	GOLDEN OAKS APTS	9317 GOLDENROD ROAD	THONOTOSASSA	33592	C	A	40	15,000
6294339	GRACELAND MHP	6010 WILLIAMS RD	SEFFNER	33584	N	A	56	5,000
6294342	RUSTY ANCHOR PUB	7201 N 40TH ST	TAMPA	33604	N	A	75	1,500
6294409	HIGHLAND APARTMENTS	E/O HERSHEY S/O EASTFIELD	THONOTOSASSA	33592	C	A	60	10,000
6294591	MAIN STREET PLAZA	10804 MAIN STREET	THONOTOSASSA	33592	N	A	75	2,500
6294596	MIRROR LAKE PLAZA	11803 DR.M.L.KING BLVD	TAMPA	33584	N	A	25	10,410
6294597	MCCORMICK SKI SCHOOL	6120 MUCK POND RD	SEFFNER	33584	N	A	50	10,620
6294612	CAMP LEMORA	14910 DEAD RIVER RD	THONOTOSASSA	33592	N	A	447	30,000
6294792	SOUTHERN AIRE RVP	10511 FLORENCE RD	THONOTOSASSA	33592	P	A	258	50,000
6294846	GRACE COMMUNITY	1300 VALRICO ROAD	BRANDON	33594	P	A	450	32,400
6294856	EASTFIELD SLOPES	9529 FIELDVIEW CR.	THONOTOSASSA	33592	C	A	300	50,000
6294867	ATLANTIC FOOD MART	8407 N US HWY 301	TAMPA	33637	N	A	100	5,000
6294879	301 GRILL/WAGON WHEEL	12464 US 301 N	THONOTOSASSA	33592	N	A	75	5,500
6294891	EASTBAY RACEWAY PARK	6311 BURTS RD	TAMPA	33619	N	A	1000	1,000

PWS ID	Mailing Name	Mailing Street	City	Zip	PWS Type	Status	Pop	Capacity(GPD)
6294893	FOE/BRANDON AERIE	1810 FRONT ST	TAMPA	33594	N	A	25	2,500
6294913	THONOTOSASSA CHURCH OF GOD DC	11702 TAYLOR RD	THONOTOSASSA	33592	P	A	85	20,000
6294921	GULF COAST THERMO	7802 HWY 301 N	TAMPA	33637	P	A	30	2,500
6294940	ALL AREA ROOFING	1820 N 57TH STREET	TAMPA	33619	N	A	37	1
6294946	ANTIOCH FEED & FARM	12650 N. MCINTOSH RD.	THONOTOSASSA	33592	N	A	25	1,500
6294949	COUNTRY AIRE MHP	10914 CLAYPIT RD	SEFFNER	33584	C	A	122	30,000
6294954	ELEVEN MILE TAVERN	1118 SR 574 WEST	SEFFNER	33584	N	A	80	2,500
6294995	GENTLE SLOPE MHP	5019 WILLIAMS RD.	TAMPA	33610	N	A	24	12,000
6295002	CIRCLE K #7443	10039 E. BROADWAY	TAMPA	33619	N	A	100	5,000
6295018	YELLOW FREIGHT	8950 MAISLIN DRIVE	TAMPA	33637	N	A	30	3,200
6295028	BEVERAGE CASTLE 301	9202 US HWY 301 NORTH	TAMPA	33637	N	A	100	1,500
6295031	CALVARY TABERNACLE	10930 NORTH US HWY 301	THONOTOSASSA	33592	N	A	150	7,500
6295047	ERNIE'S METAL	8919 MAISLIN DRIVE	TAMPA	33637	P	A	70	2,500
6295073	HCPRD/DEAD RIVER	DEAD RIVER RD	THONOTOSASSA	33592	N	A	100	5,000
6295074	HCPRD/JOHN B SARGEANT SR PARK	US HWY 301	THONOTOSASSA	33592	N	A	100	2,500
6295075	HCPRD/MORRIS BRIDGE	13330 MORRIS BRIDGE ROAD	THONOTOSASSA	33592	N	A	100	5,000
6295087	COUNTRY COVE	807 DR. M.L.KING BLVD	SEFFNER	33584	N	A	50	2,500
6295089	PEOPLE FOR CHRIST MINISTRIES INC.	10511 MAIN ST	THONOTOSASSA	33592	N	A	150	1,500
6295112	OAKWOOD CT APTS	5313 OAKWOOD CT	TAMPA	33610	C	A	52	17,000
6295129	TRANSPORTATION SAFTEY CONTRACT	7750 PROFESSIONAL PLACE	TAMPA	33637	N	A	25	1,500
6295179	BARLOWORLD HANDLING	3915 HWY 301 N	TAMPA	33619	P	A	35	5,000
6295183	BAY HILLS VILLAGE	10504 BAY HILLS CIRCLE	THONOTOSASSA	33592	C	A	218	75,000
6295196	ASHLEY COVE MLC	420 N. ST. CLOUD	VALRICO	33594	N	A	100	2,600
6295214	RIVERVIEW SEVENTH DAY ADVENTISTS	10405 HOLLAND RD.	RIVERVIEW	33569	N	A	100	1,500
6295215	GOODSON FARMS	14215 BALM RIVERVIEW ROAD	BALM	33569	N	A	100	7,000
6295240	COUNTRY HOME PK	8401 BOWLES ROAD	TAMPA	33637	C	A	60	8,000
6295245	BRANDON KIDDIE CARE	202 PAULS DRIVE	BRANDON	33511	P	A	50	4,000
6295251	KELLY'S HIDEAWAY	1425 US 92 EAST	SEFFNER	33584	N	A	100	13,577
6295264	CROFTON & SONS	10250 WOODBERRY RD	TAMPA	33619	P	A	25	12,000

PWS ID	Mailing Name	Mailing Street	City	Zip	PWS Type	Status	Pop	Capacity(GPD)
6295291	HOLY INNOCENTS EPISCOPAL CHURC	604 N. VALRICO RD.	VALRICO	33594	N	A	150	12,344
6295321	TAMPA AMALGAMATED STEEL CORP.	5215 ST. PAUL STREET	TAMPA	33619	P	A	45	5,000
6295325	CAUSEWAY MEDICAL	7108 CAUSEWAY BOULEVARD	TAMPA	33619	N	A	35	1,500
6295340	CIRCLE K #7109	11721 BALM RIVERVIEW ROAD	RIVERVIEW	33569	N	A	100	1,500
6295360	VALRICO PLACE	3120 E. HWY. 60	VALRICO	33594	N	A	75	7,500
6295369	ACTS(ALCOHOL COMM	11309 TOM FOLSOM RD	THONOTOSASSA	33592	P	A	40	10,000
6295385	SCOREBOARD LOUNGE	11018 U.S. 92 E	SEFFNER	33584	N	A	75	14,400
6295388	HCPRD/FLATWOOD SITE	14302 MORRIS BRIDGE ROAD	THONOTOSASSA	33592	N	A	100	2,500
6295398	SUNLAND MHP	802 ROLLINWOOD OAK LANE	SEFFNER	33584	C	A	50	15,000
6295399	FALKENBURG CTR	501 FALKENBURG ROAD	TAMPA	33619	P	A	75	2,800
6295404	YOUNGER YEARS	1905 S. LENNA AVE	SEFFNER	33584	P	A	54	1,500
6295408	LIVING FAITH CHURCH	5500 EAST SLIGH AVENUE	TAMPA	33610	N	A	80	1,000
6295409	BAY AREA CHURCH OF	3905 ORANGE ST	MANGO	33584	N	A	100	2,500
6295420	CIRCLE K #8532	7220 E. HILLSBOROUGH AVE.	TAMPA	33619	N	A	25	2,750
6295427	ST CECELIAS' EPISCOPAL	1920 MAY DELL DRIVE	TAMPA	33619	N	A	75	2,500
6295466	HCPRD/TROUT CREEK	MORRIS BRIDGE ROAD	THONOTOSASSA	33592	N	A	100	10,000
6295471	ASHLEY OAKS MOBILE	6401 CLEWIS AVENUE	TAMPA	33610	C	A	60	12,700
6295474	FIRST THONO BAPT	10650 MCINTOSH ROAD	THONOTOSASSA	33592	N	A	75	1,500
6295477	THONOTOSASSA BRANCH	10715 MAIN STREET [P.O. 1529]	THONOTOSASA	33592	N	A	30	2,500
6295492	HCRD/ROAD	13173 N. US HWY 301	THONOTOSASSA	33592	P	A	75	57,000
6295507	HUTTO'S MHP	11920 HAZEN AVENUE LOT #1	THONOTOSASSA	33592	C	A	60	10,000
6295510	AMERICAN LEGION #111	6918 NORTH FLORIDA AVENUE	TAMPA	33604	N	A	60	7,500
6295513	SOUTHEASTERN FREIGHT	12315 COUNTY ROAD 579	THONOTOSASSA	33592	P	A	150	1,000
6295541	THONOTOSASSA METHODIST CHURCH	11905 FORT KING RD	THONOTOSASSA	33592	N	A	150	1,000
6295551	JOE'S SUBURBAN CLUB	11601 DOWNS LOOP SOUTH	RIVERVIEW	33569	N	A	25	375
6295569	HILLSBOROUGH MHP	1610 S.R. 60	VALRICO	33594	C	A	60	7,500
6295577	NATURE'S TRAIL MHP	12880 MORRIS BRIDGE ROAD	THONOTOSASSA	33592	C	A	40	50,000
6295591	EMMANUEL BAPTIST	9812 HARNEY ROAD	THONOTOSASSA	33592	N	A	90	1,500
6295613	CYPRESS MOBILE HOME	25 SPRUCE LANE	VALRICO	33594	C	A	50	15,000
6295614	RAINBOW FOREST M.H.P.	9102 N. WILLIAMS ROAD	SEFFNER	33584	C	A	35	18,000
6295621	SHEARWOOD M.H.P.	9917 E. ELLICOTT STREET	TAMPA	33610	C	A	55	7,500
6295674	RANGE DAY CARE CENTER	10235 HARNEY ROAD	THONOTOSASSA	33592	P	A	43	2,500

PWS ID	Mailing Name	Mailing Street	City	Zip	PWS Type	Status	Pop	Capacity(GPD)
6295679	MERITA BAKERY	12221 HWY 301 NORTH	THONOTOSASSA	33592	N	A	25	1,000
6295685	DURANT CHEVRON	1005 LITHIA-PINCREST ROAD	BRANDON	33594	N	A	75	1,500
6295690	EAST TAMPA CHRISTIAN	7824 24TH AVE SO	TAMPA	33619	N	A	30	1,500
6295969	ALRO-METALS SERVICE	10223 WOODBERRY ROAD	TAMPA	33619	P	A	50	1,750
6295970	IRIS COURT APARTMENTS-	GREYROCK & HERSHEY	THONOTOSASSA	33592	N	A	25	24,999
6295972	FERNHILL TRAILER PARK	10704 FERNHILL	RIVERVIEW	33569	C	A	61	8,000
6295984	IRIS COURT APARTMENTS-	GREYROCK & HERSHEY	THONOTOSASSA	33592	N	A	25	24,999
6295991	THONOTOSASSA SDA	9525 JOE EBERT ROAD	THONOTOSASSA	33592	N	A	200	36,000
6295996	FRATERNAL ORDER OF	9001 NORTH TAYLOR ROAD	SEFFNER	33584	N	A	25	15,000
6295999	J.D. MILLER AND SONS	10441 NORTH HARNEY ROAD	THONOTOSASSA	33592	N	A	40	5,000
6296004	M&B OF TAMPA INC	8601 HARNEY RD	TAMPA	33637	P	A	70	200,000
6296005	ST. FRANCIS FOUNDATION	13133 ST FRANCIS LANE	THONOTOSASSA	33592	C	A	50	15,000
6296009	MACEDONIA M.B.C.	9750 ROCKHILL RD	THONOTOSASSA	33592	N	A	75	1,500
6296039	EAST POINT ASSEMBLY OF	5337 GARDEN LANE	TAMPA	33610	C	A	100	5,000
6296043	E.THONOTOSASSA BAPTIST CHURCH	12725 KNIGHTS GRIFFIN RD	THONOTOSASSA	33592	N	A	150	2,500
6296048	INDOOR SHOOTING CO	9402 EAST FOWLER AVE	THONOTOSASSA	33592	N	A	25	1,000
6296050	SEFFNER FOOD STORE	340 E. MARTIN LUTHER KING	SEFFNER	33584	N	A	100	1,000
6296057	UNITED SIKH FOUNDATION	15302 MORRIS BRIDGE ROAD	THONOTOSASSA	33592	N	A	50	5,000
6296064	SOUTHERN PALMS MHP	10615 OHIO AVE	THONOTOSASSA	33592	C	A	38	24,999
6296066	CONIGLIO LAND FILL	11981 NORTH WILLIAMS ROAD	THONOTOSASSA	33592	N	A	25	15,000
6296067	REESES FISH CAMP	11502 THONOTOSASSA RD.	THONOTOSASSA	33592	N	A	25	1,000
6296076	WEST CENTRAL SIGNS	7720 U. S. 301 NORTH	TAMPA	33637	P	A	30	2,000
6296084	SOUTHERN WINDING	5302 ST PAUL ST	TAMPA	33619	P	A	34	1,000
6296093	HUGHES SUPPLIES- TAMPA/ FIFE FL. ELECTRIC	10301 FISHER AVE	TAMPA	33619	P	A	30	1,200
6296096	RMC EWELL INC.	311 FAULKENBURG	BRANDON	33619	N	A	26	27,465
6296097	LITTLE SICILY	1724 8TH AVE EAST	TAMPA	33605	N	A	100	1,500
6296104	HOBBS STREET	501 HOBBS STREET	TAMPA	33619	P	A	175	7,000
6296106	SEAFOOD PALACE	6207 CAUSEWAY BLD	TAMPA	33619	N	A	75	1,500
6296120	SUNRISE LANDSCAPE	10000 HINES RD	TAMPA	33610	N	A	25	2,000
6296122	AUGUST GROUP	9501 E. HILLSBOROUGH AVE.	TAMPA	33610	N	A	25	2,000
6296123	FL. DIST. PENTECOSTAL CHURCH OF GOD	10320 MAIN STREET	THONOTOSASSA	33592	N	A	150	2,000
6296124	STATE HIGHWAY BAPTIST	5502 BAPTIST CHURCH ROAD	TAMPA	33610	N	A	100	2,000

PWS ID	Mailing Name	Mailing Street	City	Zip	PWS Type	Status	Pop	Capacity(GPD)
6296125	NEW TESTAMENT MISSIONARY B. CHURCH	11530 WALKER ROAD	THONOTOSASSA	33592	N	A	100	2,000
6296126	BRADCO SUPPLY CO.	7820 PROFESSIONAL PLACE	TAMPA	33637	N	A	50	2,000
6296129	ST. MATTHEWS CHURCH	10701 BLOOMINGDALE AVE	RIVERVIEW	33569	N	A	100	86
6296130	COLLINS PRODUCE	101 N ST. CLOUD ST	VALRICO	33594	N	A	100	3,000
6296132	LITHIA PINECREST	725 LITHIA PINECREST RD	LITHIA	33511	P	A	50	1,080
6296133	SIMMONS LOOP BAPTIST	6610 SIMMONS LOOP	RIVERVIEW	33569	N	A	100	1,500
6296138	VANDENBERG AIRPORT	9334 VANDENBERG AIRPORT	TAMPA	33610	P	A	85	4,800
6296145	FAIRVIEW MHP	7100 MLK JR BLVD	TAMPA	33610	C	A	98	25,000
6296147	POLICE/FIRE	2920 E. HENRY AVENUE	TAMPA	33610	N	A	40	13,300
6296149	FELLOWSHIP BAPTIST CHURCH OF VALRICO	106 ROLLING HILLS	VALRICO	33594	N	A	50	1,500
6296151	DISCOUNT AUTO PARTS	12114 US HIGHWAY 301	THONOTOSASSA	33592	N	A	200	5,000
6296155	JOHN W. YORE	10350 FISHER AVE	TAMPA	33510	N	A	25	1,000
6296157	HORTICULTURE VOCATIONAL TRAINING	520 FALKENBERG RD.	TAMPA	33601	P	A	25	1,688
6296158	SAFETY-KLEEN CORP	5309 24TH AVE S	TAMPA	33619	N	A	48	5,000
6296164	MILLENNIUM CENTER	1206 MILLENNIUM PARKWAY	BRANDON	33511	P	A	80	1,000
6296165	ALL AMERICAN DINER	4406 FAULKENBURG ROAD	TAMPA	33610	N	A	75	2,500
6296181	VANDENBERG SOUTH HANGAR-US AIR FORCE	VANDENBERG HANGAR ROAD	TAMPA	33610	N	A	25	2,500
6296182	VANDENBERG RELIABLE AVIATION HANGAR	6044 VANDENBERG HANGAR LANE	TAMPA	33610	N	A	25	5,000
6296183	FELLOWSHIP BAPTIST	13515 N. US HWY 301	THONOTOSASSA	33592	N	A	300	3,480
6296188	IGLESIA DE ROCA ESPERANZA CHURCH	5903 NORTH 47TH STREET	TAMPA	33610	N	A	250	1,500
6296221	NEW LIFE FELLOWSHIP	125 CHURCH ST	VALRICO	33594	P	A	40	5,000
6296225	STACI'S LEARNING	10611 CONE GROVE ROAD	RIVERVIEW	33569	P	A	90	5,760
6296230	KRESTVIEW ACADEMY	11425 BALM-RIVERVIEW ROAD	RIVERVIEW	33569	P	A	40	8,000
6296234	SKINNER NURSERIES	9740 HARNEY ROAD	THONOTOSASSA	33592	N	A	25	7,872
6296247	MAIN STREET GRILL	10609 MAIN STREET	THONOTOSASSA	33592	N	A	100	1,000

Appendix 8
Historic and Archeological
Report

Appendix 8-1
Correspondence with Florida
Department of State Division of
Archives, History, and Records
Management

Memorandum FLORIDA DEPARTMENT of STATE

TO: Ms. Jane W. Wheeler
Camp, Dresser & McKee, Inc.
FROM: Frederick Gaske, Historic Sites Specialist
Division of Archives, History & Records Management
DATE: May 11, 1984

SUBJECT: Your Letter of April 26, 1984
Cultural Resource Assessment Request
Faulkenburg Road Resource Recovery Facility, Hillsborough
County, Florida

Dear Ms. Wheeler:

As discussed in our telephone communication of this date, the subject tract was surveyed for archaeological and historic sites in 1983. The results of this investigation were reviewed by this office in our letter of June 21, 1983, a copy of which is enclosed for your reference. Please note that it was the opinion of this agency that no significant cultural resources would be affected by the proposed project.

If I can be of any further assistance, please do not hesitate to contact me.

Sincerely,

Frederick Gaske



FLORIDA DEPARTMENT OF STATE

George Firestone

Secretary of State

DIVISION OF ARCHIVES,
HISTORY AND RECORDS MANAGEMENT

The Capitol, Tallahassee, Florida 32301

(904) 488-1480

June 21, 1983

In Reply Refer to:

Frederick P. Gaske
Historic Sites Specialist
(904) 487-2333

Ms. Patricia A. Vogel
Environment Engineer
Resource Recovery Project
Hillsborough County Department
of Solid Waste
P.O. Box 1110
Tampa, Florida 33601

Re: Your Letter and Attachment of May 26, 1983
Cultural Resource Assessment Review Request
"An Archaeological and Historic Survey of the
Faulkenburg Road Resource Recovery Facility Tract,
Hillsborough County, Florida" by Dr. J. Raymond Williams,
Christine Newman, Richard Estabrook and William Johnson.

Dear Ms. Vogel:

As per the provisions of Chapter 17-17, Florida Administrative Code ("Rules of the State of Florida Department of Environmental Regulation, Electrical Power Plant Siting"), we have reviewed the above cited report prepared under the direction of Dr. J. Raymond Williams of the University of South Florida.

On the basis of the information contained in their report, we concur with the authors in concluding that the identified isolated prehistoric artifact finds located during the archaeological and historic site location survey do not constitute a significant archaeological site.

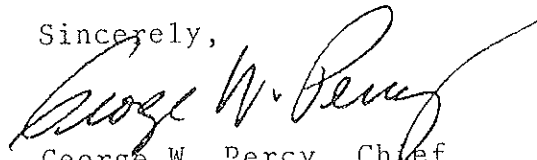
It is, therefore, the opinion of this office that the proposed project is unlikely to affect any significant archaeological or historic resources, and may proceed without further involvement with this agency.

If you have any questions concerning our comments, please feel free to contact us.

Ms. Patricia A. Vogel
June 21, 1983
Page Two

Your interest and cooperation in helping to protect Florida's archaeological and historical resources are appreciated.

Sincerely,

A handwritten signature in dark ink, appearing to read "George W. Percy". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

George W. Percy, Chief
Bureau of Historic Preservation

GWP:Gcm

cc: Patrick Lewis
William Ockunzzi
Hamilton S. Owen, Jr.
Paul J. Stoller
Dr. J. Raymond Williams

Appendix 8-2
National Register Entries from
Hillsborough County

REC'D JUNE 11, 1984

NATIONAL REGISTER ENTRIES FROM
HILLSBOROUGH COUNTY

The official name of the entry is listed first followed by the date of construction, type of entry, and address.

Union Railroad Station, 1912, building, 601 North Nebraska Avenue, Tampa
Tampa City Hall, 1915, building, 315 East J. F. Kennedy Boulevard, Tampa
Old School House, 1858, building, University of Tampa Campus, Tampa
U. S. Post Office, 1905, building, 601 North Florida Avenue, Tampa
Tampa Bay Hotel, 1891, building, 401 West J. F. Kennedy Boulevard, Tampa
Ward-Taliaferro House, 1890, building, 305 South Hyde Park Avenue, Tampa
Leiman House, 1915, building, 716 South Newport Avenue, Tampa
Slovall House, 1909, building, 4621 Bayshore Boulevard, Tampa
Chapin-Logan House, c. 1890, building, 4607 Bayshore Boulevard, Tampa
Johnson-Wolfe House, 1885, building, 6823 South De Soto Street, Port Tampa
Centro Asturiano, 1914, building, 1913 North Nebraska Avenue, Tampa
Centro Espanol de West Tampa, 1912, building, 2306 North Howard Avenue,
Tampa
First National Bank Facade, 1894, object, 1415 North Franklin Street, Tampa
Ybor Cigar Factory, 1886, building, 1910 Avenida Republica de Cuba, Ybor City
El Pasaje, 1886, building, 1318 East 9th Avenue, Ybor City
Cuban Club, 1907, building, 2010 Avenida Republica de Cuba, Ybor City
Ruskin Women's Club, 1914, building, 508 Tamiami Trail, Ruskin
Plant City Railroad Station, 1908, building, Plant City (downtown)
Fort Foster, 1836, archaeological site, NE Hillsborough County
Cockroach Key, 700-1500 A. D., archaeological site, SW Hillsborough County
Ybor City Historic District, late 19th century, Ybor City, Tampa

OLD PLANT CITY HIGH SCHOOL, 1914, N. Collins St., Plant City

ANDERSON-FRANK HOUSE, Building, 1901, 341 Plant Avenue, Tampa

KRESS BUILDING, building, 811 N. Franklin Street, Tampa

WEST TAMPA HISTORIC DISTRICT

Appendix 8-3
Archaeological and Historical
Survey of the Site by J. Raymond
Williams, Et Al

AN ARCHAEOLOGICAL AND HISTORICAL SURVEY OF THE FAULKENBURG ROAD
RESOURCE RECOVERY FACILITY TRACT, HILLSBOROUGH COUNTY, FLORIDA

conducted for

The Department of Solid Waste
Hillsborough County, Florida

by

J. Raymond Williams
Christine Newman
Richard Estabrook
William Johnson

May 1983

ABSTRACT

This report details an archaeological and historical survey of a 50 acre tract in central Hillsborough County, Florida, conducted for the Solid Waste Department of Hillsborough County. The Florida Master Site File listed no historic or prehistoric sites known to be present within the tract boundaries. However, 34 sub-surface test pits were excavated to determine if any sites could be located. Testing was done since surveys in nearby, similar areas indicate that there may be sites present even though there is no surface indication of them.

Two chert flakes were recovered in a random testing design. More intensive testing near the location of these cultural materials was then undertaken, but no other material was found and no archaeological site is present. An historic assessment indicated that no significant historic sites have existed on the property. Furthermore, no significant historic events have occurred on the property.

Thus, the project will have no impact on any cultural resources, pre-historic or historic.

TABLE OF CONTENTS

	Page
ABSTRACT.....	i
TABLE OF CONTENTS.....	ii
LIST OF FIGURES.....	iii
INTRODUCTION.....	1
SUMMARY OF PREVIOUS ARCHAEOLOGICAL WORK IN THE GULF COAST REGION.....	3
OTHER SURVEYS NEAR THE PROJECT AREA AND THE USE OF SITE LOCATION MODELS.....	5
PREHISTORY.....	8
HISTORICAL ASSESSMENT.....	13
ENVIRONMENTAL BACKGROUND.....	16
RESEARCH DESIGN: RESEARCH STRATEGIES AND GOALS.....	18
FIELD METHODOLOGY.....	22
ARTIFACT ANALYSIS AND LABORATORY PROCEDURES.....	24
RESULTS, CONCLUSIONS AND RECOMMENDATIONS.....	25
REFERENCES CITED.....	35
BRIEF RESUME OF SENIOR AUTHOR.....	36
SCOPE OF WORK.....	37

LIST OF FIGURES

	Page
FIGURE 1. GENERAL AREA OF THE SURVEY TRACT.....	2
FIGURE 2. LOCATION OF THE TEST PITS WITHIN THE SURVEY TRACT.....	21

iii

INTRODUCTION

This report details the archaeological and historical survey of the 50 acre Faulkenburg Road Resource Recovery Facility Site tract in Sections 18 and 19, Township 29 South, Range 20 East, in Hillsborough County, Florida (see Figures 1 and 2).

The Florida Master Site File indicated no known sites on the property. However, since sites are known to exist in similar geographical and environmental areas nearby, a survey was recommended by the State Historic Preservation Officer (SHPO), State Division of Archives, History and Records Management. Because ground cover is usually heavy in Florida, there are few surface exposures. Also, buried sites do not always have surface expression. As a result of these factors, it was decided, in addition to a walk-over reconnaissance survey, that sub-surface testing was needed to locate any cultural resources.

Testing began by the authors on April 2, 1983, but ended at noon because of rain. A second half-day of field work took place on April 15, 1983, which concluded the field work portion of the project. A total of 32 person hours was spent in the field portion of the project digging 34 test pits and checking any exposed surface areas within the boundaries of the tract.

The only cultural materials found were two chert flakes. These were recovered in two different test pits. Intensive testing near these pits resulted in no other cultural materials and no site.

Most of the land has been cleared and consists of improved pastureland. Thus, some surface disturbance has occurred in the past.

The tract has one standing structure of recent construction. This structure is associated with the agricultural activities on-going at the property and is not considered significant. Some farm machinery is still stored near this structure.

The planned use of the project area by the Solid Waste Department of Hillsborough County will, then, have no impact on any prehistoric or historic cultural resources.

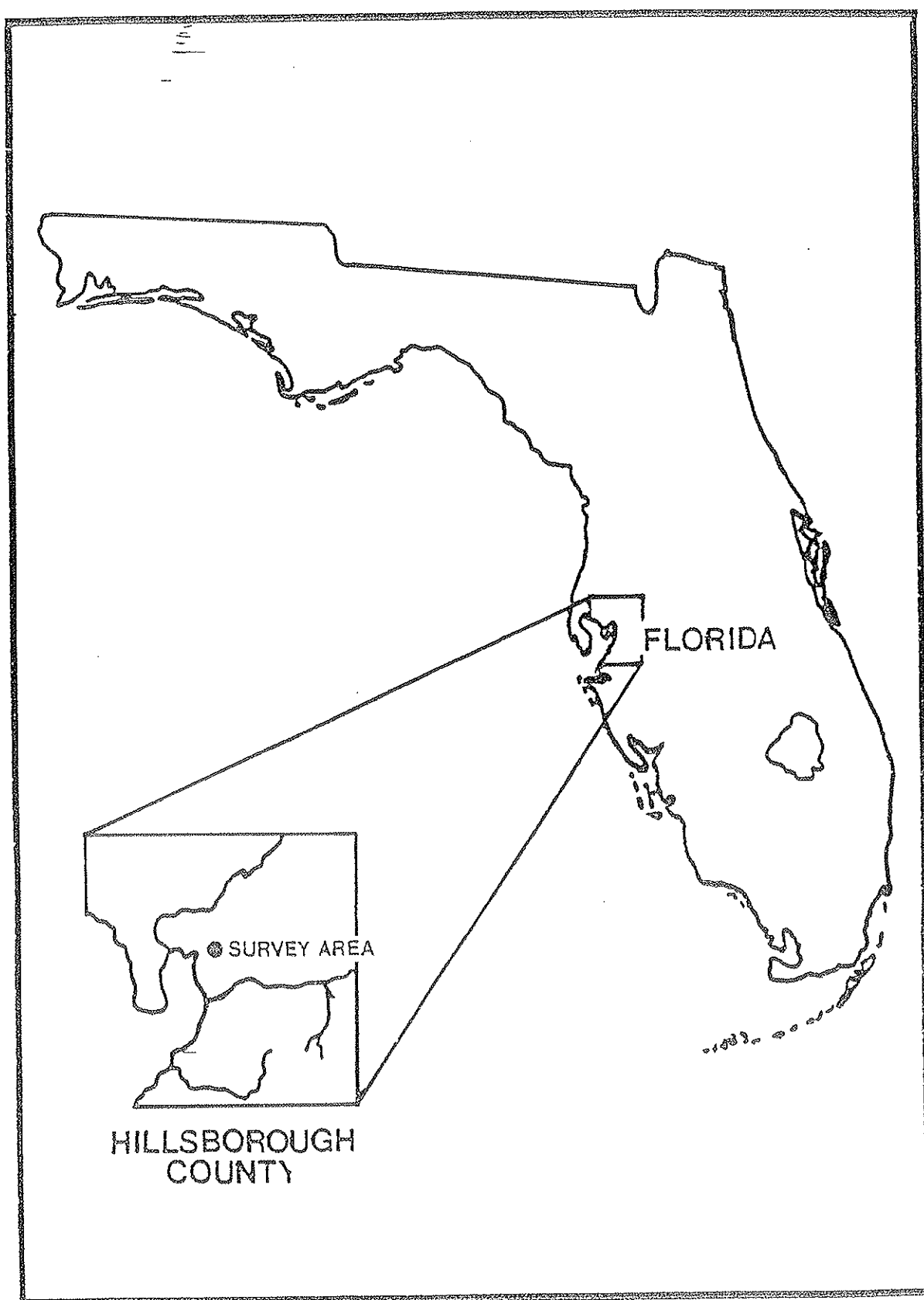


Figure 1. General Area of the Survey Tract.

SUMMARY OF PREVIOUS ARCHAEOLOGICAL WORK IN THE GULF COAST REGION

The major piece of literature that describes the history of archaeological research in the Central Peninsula Gulf Coast Region is Willey (1949). The sources in this short summary of work in these areas of Florida are to a great extent taken from Willey's volume.

Among the earliest published sources that relate to the area are those of Allen (1846) and Conrad (1846). Both Allen and Conrad discussed shell mounds and concluded that they were of natural origin. In fact, little of value was published about the archaeology of the area until the last quarter of the 1800s with two of the writings of S.T. Walker (1880a, 1880b). Walker not only excavated, but noted changes in stratigraphy and ceramic types by level. The last major figure of the Nineteenth Century was F.H. Cushing who excavated several sites including Key Marco far to the south of the Tampa Bay region. Cushing's report (1897) is shy of detail and he had a rather active imagination.

Although there are numerous references to specific sites in the Central Peninsula Gulf Coast Region in the late 1880s, most are accounts of dilettantes and are not worth referencing here. It was the work of Clarence Moore which laid "the groundwork for any synthesis of Florida Prehistory" (Willey 1949:21). Moore's first sojourn to the Gulf Coast was in 1900. Heading south from Clearwater Harbor in the north, he excavated numerous sites (mainly sand mounds) in the Central Peninsula Gulf Coast Region (Moore 1900). He returned to this area of Florida in 1903 and explored the lower reaches of several southern Central Peninsula Gulf Coast Rivers (Moore 1903).

Although Walker and Moore were as scientifically oriented as any other archaeologists of the day, their work leaves much to be desired by modern standards. Moore's greatest contribution is the volume of his work. He did, however, note intersite and regional differences, but his work can be characterized as conservative, if not almost devoid of ideas. Perhaps this was best after the rampant speculations of earlier investigators.

Although W.W. Holmes is associated with ceramic typology for the Eastern United States (Holmes 1903), Florida archaeologists were indebted to him for the order he gave to Moore's great collections (Holmes 1894a). His classifications do not relate specifically to the Central Peninsula Gulf Coast Region, however, he recognized the unique Weeden Island types and discussed their possible West Indies and Yucatan origins (Holmes 1894b).

Two famous archaeological sites were investigated in the Tampa Bay Region in the 1920s, both associated with M.W. Stirling. A burial mound at the famous Weeden Island site in Tampa Bay was excavated in 1923-1924 by J.W. Fewkes and Stirling (Fewkes 1924). Later, Stirling, who by this time was Chief of the Bureau of American Ethnology, returned to dig at the Safety Harbor site, also in the southern

Central Peninsula Gulf Coast archaeological region. Stirling headed the Smithsonian Federal Relief project excavations. Sites such as Perico Island and Englewood, other type sites for cultural periods, were excavated between 1933 and 1936 (Stirling 1935: Willey 1949).

The federally financed excavations were continued by the old Florida State Board of Conservation under the direction of J.C. Simpson (Willey 1949:31). Simpson excavated several sand mounds in Hillsborough County (Bullen 1952) between 1935 and 1938.

Although several other important sites were excavated or re-excavated in the 1930s, such as Griffin's work at Safety Harbor (Griffin and Bullen 1950), it was Gordon Willey whose major synthesis, Archaeology of the Florida Gulf Coast (Willey 1949), laid the foundation for all recent work. Although Willey obtained a considerable amount of data himself, others such as John Goggin, Charles Fairbanks, Ripley Bullen, Hale Smith, John Griffin, M.W. Stirling, R.B. Woodbury, Preston Holder, J. Clarence Simpson and Marshall T. Newman contributed significantly in terms of excavation data and knowledge of Florida archaeology. Willey's book and sites reported through the 1950s and 1960s may be referred to as "old archaeology," but they are the bases for our understanding of the temporal and spatial aspects of the Central Peninsula Gulf Coast Region of Florida. The most recent synthesis of Florida archaeology is that of Milanich and Fairbanks (1980). This book updates what is known throughout the state, but is aimed at overview rather than detail.

The major impetus to increasing archaeological work in the vicinity of the survey tract during the 1970s has been the state and federal requirements for cultural resource investigations in relation to Development of Regional Impact or Environmental Impact studies. The results of these investigations are discussed in detail in another section of this report.

Early research problems in the Florida Gulf Coast area were concentrated on the development of a regional chronological framework (Willey 1949) and its extension into the interior areas more removed from the coast. As discussed above, these cultural historical problems have not been completely solved and many questions remain.

Now, archaeologists have begun to turn their attention to more contemporary problems. Hypotheses testing, site prediction models and explanatory issues are examples of goals of research in more recent survey projects, particularly those covering large numbers of acres. This level of research is discussed more thoroughly in another section of this report.

OTHER SURVEYS NEAR THE PROJECT AREA AND THE USE OF SITE LOCATION MODELS

The 50 acre Faulkenberg Road Resource Recovery Facility tract is, when viewed within a large geographical context, in an area which has been subjected to several archaeological surveys within the past 10 years as a result of both state and federal historic preservation legislation.

To the east is the 868 acre Hopewell Land Corporation property (Piper, Piper and Fryman 1980). To the south is the Brandon Town Center tract of approximately 300 acres (Piper, Hardin and Piper 1982), the Big Bend tract which consisted of 1900 acres (Deming and Almy 1981), the 300 acre Hillsborough County South 201 Facilities tract (Deming 1981) and the Alderman's Ford Park tract of approximately 640 acres (Grange and Williams 1977). To the northwest, two large parcels have been surveyed, specifically, the seven recreation resource sites in the Lower Hillsborough River Flood Detention Area (Daniel, Wisenbaker and Fryman 1979) and the Deltona Corporation's Tampa Palms property (Grange, Fryman and Williams 1979; Rom 1979). These latter two projects total nearly 6000 acres. The I-75 corridor running through western Hillsborough County was also surveyed (Jones 1979). Though narrow, one of the interesting facts about this survey was that it crossed through several varied environmental zones and allows analysis of these zones in terms of site presence or absence. Somewhat more distant in eastern and southeastern Hillsborough County, Western Polk County and in Manatee and Hardee Counties, there have been numerous surveys, both large and small, associated with phosphate mining. These will not be mentioned here, although many are used in other parts of this section and in this report.

These surveys provide a substantial data base for planning survey work on new tracts of land within the region. They indicate that site density is low and many sites are referred to as "fragile patterns" and yield only sparse surface materials. Some sites have been substantial enough to warrant salvage excavations, however. Data from these and other surveys in the Central Gulf Coast Region are all useful in developing a preliminary prediction model of potential site locations prior to the actual field survey phase of a project.

The use of predictive models in archaeological survey has been growing since 1969, but most published examples post date 1975 (King 1978:122-124). Predictive surveys have been successful in west Florida in Hillsborough, Manatee and Polk counties (Grange and Williams 1977, 1978a, 1978b, 1978c, 1979a, 1979b; Grange, Williams and Almy 1977; Almy and Williams 1978; Williams and Grange 1980). The predictive models have been developed in conjunction with both specific surveys and on the basis of more general, county-wide studies (Almy 1976, 1978; Deming 1976, 1980; Grange 1978).

One factor which has been used effectively in site location prediction is soil type. The non-random association of archaeological sites with specific soil types was demonstrated by Almy in Sarasota County (Almy 1976, 1978). Soil itself is probably not the significant factor involved, but soils reflect drainage patterns and may be useful indicators of better drained areas suitable for habitation. Grange (1978) and Deming (1980)

showed, in a county-wide evaluation of site data for Hillsborough County, that a similar non-random association of prehistoric sites with soils was present. The soil type data have been employed in predictive surveys by Almy and Reed (1978), Almy and Williams (1978), and Grange and Williams (1977). Soils also reflect elevation, vegetation and the species of fauna which would be associated with specific vegetation communities. All of these played an important role in prehistoric site location.

A fairly direct association of prehistoric sites with permanent or semi-permanent water sources is also a well known settlement factor (Deming 1975, 1976). In her survey of the Beker mine tract, Deming developed some specific site location prediction models for hunting camps and village sites. Specifically, she indicated that hunting camps would be between 1 meter and 926 meters from a semi-permanent water source, and less than 1200 meters from a hardwood hammock. They would be in the flood-plain or bottom slope, not on upland terrain, and on relatively flat, moderately to poorly drained soil. Village sites would be expected, in her model, to be between 100 and 1200 meters from semi-permanent water, on moderately well-drained soils in an upland location (Deming 1976:37, 94-95).

These are not new predictive factors. A number of archaeologists have noted the consistent association of sites with valley slopes close to water (Hemmings 1975:48; Batcho and Milanich 1978:6; Padgett 1976:45; Wood 1976:75). Miller (1976) found a similar pattern of site location in Hookers Prairie where sites were at the margin of the prairie water source. Deming's contribution was an effort to express the association in quantitative terms for predictive purposes. In a review of Hillsborough County data, Grange (1978) found that two-thirds of the sites were within 742 meters of a permanent water source, skewed closer to the source since 90 percent of the sites are within 579 meters of a water source (Grange 1978:38). This distance factor proved to be very useful during the re-examination of the Duette tract (Grange and Williams 1978c). Willis (1979:114) has shown that 14 aboriginal sites found in the AMAX Pine Level survey are all within 700 meters of water, and 12 of the 14 are within 300 meters which is virtually identical with Deming's mean distance of 299 ± 314 meter distance prediction, and 927 meter maximum limit for 95 percent of all sites (Deming 1975:91).

In the survey of the Hookers Prairie tract, Miller found six sites. Five of them were at the edge of the prairie water source and one was 150 meters distant from the water.

Deming estimated that sites would also be within 1200 meters of a hardwood hammock. It is presumed that such environments contain a significant resource base attractive to prehistoric hunters and gathers (Batcho and Milanich 1978:4). In a recent examination of a Hillsborough County location adjacent to the Hillsborough River (Daniel *et al.* 1979:79), it was found that the ecotonal break between uplands and river valley forest habitats, i.e., the margins of hardwood hammocks, was a primary site location. Another sample on the Hillsborough River showed the average

distance to a hardwood locus to be 1065 feet within a range of 300 to 3000 feet (Grange, Fryman and Williams 1979:28). In the Little Payne survey, the attraction of wooded area resources for prehistoric people was noted (Batcho and Milanich 1978:4).

Willis also showed a high correlation between sites and mesic hardwood locations in the AMAX survey (Willis 1979:114). Miller discussed the importance of live oak hammock strands as site locations and the potential for hydric hammock resources in the Hookers Prairie tract (Miller 1976: 20, 22).

Surveys of the two tracts of land that include the South Prong of the Alafia River--the Lonesome Mine (Hemmings 1975) and the Borden Big Four (Martin 1976)--clearly show that sites are located "in predictable locations along the valley slope-floodplain ecotone" (Hemmings 1975:48). Both Martin's and Hemmings' surveys were exclusively pedestrian, and involved no subsurface testing for buried sites that have no surface expression. Had they included this form of survey methodology, results could have been different and another perspective might have been added to site location prediction models.

PREHISTORY

The survey tract lies within what has been defined as the Central Peninsula Gulf Coast archaeological region (Milanich and Fairbanks 1980) which serves as both a geographical and cultural region. Geographically, the Central Peninsula Gulf Coast Region runs from Pasco County south to Charlotte Harbor and includes southern Pasco County, all of Pinellas, Hillsborough, Manatee and Sarasota Counties, the southwestern portion of Polk County, and the western portions of Hardee, DeSoto and Charlotte Counties. Two factors should be noted, however, first, these boundaries are "somewhat arbitrary" (Milanich and Fairbanks 1980:16), and second, although used as a cultural region, there is little cultural disparity between this and Florida's other cultural regions prior to 1000 B.C.

Prehistoric sites from all periods of the cultural sequence are found in this region. The cultural sequence begins with the Paleo-Indian Period, dating from the time that humans entered Florida (circa 14,000 years ago) to about 6500 B.C. There are few properly excavated sites dating from the Paleo-Indian Period in the Central Peninsula Gulf Coast Region, and site distribution is known primarily from scattered finds of cultural materials that date from this period.

One recently excavated site which has not yet been officially reported (Daniel and Wisenbaker n.d.) is the Harney Flats Site (8-Hi-507) in north central Hillsborough County, approximately two miles east of Temple Terrace. This site is located on a scarp overlooking Harney Flats, a low, swampy area. Although a later Middle Archaic Period component exists at the site, the Paleo-Indian component of the site is of primary interest because it contains more than a two meter deposit within a homogeneous sand matrix. Preliminary analysis, based on tool types and use wear, indicates that Harney Flats was a habitation site, or base camp. Furthermore, it is the only Paleo-Indian Period site with an extensive, controlled excavation by professional archaeologists in Florida. When analysis is complete and the report is published, it will contribute extensively to knowledge of this early period of human occupation in Florida.

Examples of possible Paleo-Indian artifacts are found at the Kellogg Fill (Warren 1970), Apollo Beach (Warren 1968b), Caladesi Causeway (Warren 1968a), Bear Creek (Warren 1967), an unnamed site near State Road 584, the Boot Ranch site near Oldsmar (Warren 1966), and the Fish Creek site in Tampa (Karklins 1970). It might be noted that most of these are isolated finds, or artifacts from dredged sites and dated relatively late within the Paleo-Indian Period.

It has long been suspected that prehistoric sites along bays, estuaries, rivers and coastal areas were inundated by the rising sea level at the end of the Wisconsin glaciation. Warren (1963, 1964, 1970) reported finding Archaic and Paleo-Indian cultural

material in fill that had been dredged along old, now underwater river channels in Tampa Bay, and in Boca Ciega Bay. The modern dredged channels in Tampa Bay follow the routes of the natural channels, and the natural channels were old river bottoms. There is reason to believe, then, that the rivers which now flow into Tampa Bay once flowed over a land surface when the sea level was lower, and that prehistoric people lived on the banks of these rivers. Unfortunately, little of this early cultural material was discovered in situ.

More recent finds, dating to 10,000 B.C. have been excavated underwater with excellent provenience control of artifacts, human skeletal material and associated faunal and floral remains. These discoveries at Warm Mineral Springs (Cockrell 1973:3; Clausen et al. 1975) and at Little Salt Springs (Clausen 1972:1-3, Clausen et al. 1979) are among the earliest documented finds in Eastern North America. The human skeletal material indicates that the individuals were buried, above water, when the water was 60 - 90 feet below present sea level.

The Paleo-Indian Period is followed by what is called the Archaic Period which dates from approximately 6500 to 1200 B.C. This period is usually divided into Early, Middle and Late stages. Early Archaic dates from 6500 to 5000 B.C., Middle Archaic from 5000 to 3000 B.C., and Late Archaic from 3000 to 1200 B.C. (Milanich and Fairbanks 1980). Environmental and cultural changes, which are of course related, mark the introduction of this period. The land became less arid and pine-palmetto forests replaced the hardwood forests (Milanich and Fairbanks 1980). Whereas Paleo-Indian peoples had hunted the large Pleistocene mammals (though they hunted the smaller ones too) which died out at the end of that period, Archaic peoples hunted deer and smaller animals and learned to efficiently exploit their environment for food. Population increased, as did the number of sites.

Again, there are few reported sites properly excavated with reliable provenience data. This situation has improved with data from several Archaic sites recently excavated in Hillsborough County by the State Division of Archives. These sites include the Deerstand Site (8-Hi-483), which Daniel (1982:161) considered to be a "short-term extraction station" occupied throughout the Archaic Period. Further, he stated (1982:161) that "it appears that the area was utilized as a biface workshop where quarried material from nearby sources was finished into tools." Other sites recently excavated within this program include 8-Hi-450D, an Early and Middle Archaic Period site (Daniel and Wisenbaker:1981), and Wetherington Island (8-Hi-473), a quarry site, which was utilized by aboriginal populations for lithic procurement during the Middle and Late Archaic Periods (Chance 1982:9).

Archaic sites are known from both coastal and hinterland areas although they differ considerably. Whereas Paleo-Indian Period sites probably represent remains of nomadic peoples, Archaic sites, at least those along the coast, represent a more sedentary or semi-sedentary way of life based on the acquisition of a relatively reliable year-around food resource--shellfish and other marine foods.

Examples of Early Archaic sites are the Apollo Beach site (Warren 1968b), the Bear Creek site (Warren 1967) (these are multi-component sites with both Paleo-Indian and Archaic occupations), the Palmer site (Bullen and Bullen 1976) and the Crystal Beach site (Wolf 1975). Late Archaic is primarily distinguished from the Early Archaic by distinct forms of projectile points (Bullen 1975). Late Archaic sites are represented by components at the Pinellas Point site (Goodyear 1968), Culbreath Bayou (Warren et al. 1967), and the Maximo Park Beach site (Williams 1979). These are coastal midden sites in or near Tampa Bay. Archaic sites can be divided into various functional categories, however. For example, in addition to coastal midden (habitation) sites, there are quarries, large central-base villages, special use camps, etc. The latter tend to be found inland from the present coast. Undoubtedly, the same people occupied many of the different functional categories of sites at different times of the year as a result of seasonal exploitation of food and other resources such as stone. One recently excavated Late Archaic site in interior Hillsborough County is the Mizelle Creek One Site (8-Hi-374) (Swindell 1977). Swindell's analysis of cultural materials from this site enabled us to understand the function of interior or hinterland sites to a much greater degree. Recently two sites on Amax Phosphate, Inc. in southeast Hillsborough County were excavated by Welch (1983). One site (8-Hi-425) was, to a great extent, previously destroyed as a result of road borrowing activities. The other (8-Hi-418), had surface areas damaged as a result of borrowing and clearing, but extensive testing at the site has given us further insight into interior sites. Basically, 8-Hi-418, the South Prong I site, appears to have been utilized over a long chronological time period, but by short-term occupants. The same is true for 8-Hi-425, the Cates Site. Both appear to be hunting camps used by seasonal people or migrating bands since the lithic materials resulted primarily from secondary reduction activities (Welch 1983).

The first ceramics appear at the end of the Archaic Period and mark the beginning of the third cultural period--the Orange. In west-central Florida, this period dates from approximately 2000 to 1000-500 B.C. (Milanich and Fairbanks 1980:23). As the overlapping dates indicate, it is difficult to define the end of the Archaic and the beginning of the Orange Period. The Orange Period is sometimes considered a continuation of the Archaic lifestyle with the addition of ceramics. However, the presence of pottery does signify an increasingly sedentary pattern of living as well as food storage. Orange Period ceramics are tempered with vegetable fibers and frequently decorated. The presence of these ceramics at sites enables us to cross-date the strata since they can be used as a horizon marker. Orange Period ceramics have been found at the Kellogg Fill (Warren 1970), Maximo Point (Bushnell 1962; Sears 1958), the Palmer site (Bullen and Bullen 1976), Perico Island (Bullen 1950), and at the Yellow Bluffs-Whittaker Mound (Milanich 1972). All of these sites are in the Tampa Bay area south to Sarasota.

Following the Orange Period, a greater extent of cultural heterogeneity develops in Florida, and people's technologies more efficiently adapt to their local or microenvironmental settings. In the Tampa Bay area, the next period is the Deptford, dating from approximately

500 B.C. to A.D. 100-200 (Milanich and Fairbanks 1980). A great deal of research has been concluded on this period, and our understanding of it in relation to earlier periods is much more complete. However, this knowledge applies mainly to north Florida and Georgia, while little is known of its manifestation in the Tampa Bay area. Although the Deptford culture extends to Charlotte Harbor, little evidence of it is found in the Central Peninsula Gulf Coast region. Sites which produced Deptford cultural materials in the Tampa Bay area were the Bay Pines site in Pinellas County (Braley 1978) and the Culbreath Bayou site (Warren *et al.* 1967). The Deptford Period is characterized by distinct types of check-stamped pottery. The period also marks the beginning of burial mound construction in Florida and increasingly complex social and ceremonial activities associated with the burial of people in prepared earthen structures.

Following Deptford is the Weeden Island Period, dating from approximately A.D. 200-1300 (Milanich and Fairbanks 1980). Weeden Island is divided into several regional variations and the Tampa Bay Area lies within the Central Coast Peninsula (Manasota) culture. Weeden Island is also distinguished by distinctive types of ceramics, usually sand tempered, although some limestone tempered wares similar to those further north do occur. The Weeden Island culture has a wide geographical range including Florida, Georgia and Alabama. The site type is the famous Weeden Island prehistoric complex in Tampa Bay (Fewkes 1924; Willey 1949; Sears 1971). Other sites in the Tampa Bay area include the Thomas Mound (Bullen 1952), Cockroach Key (Walker 1880a; Moore 1900; Bullen 1952), Terra Ceia (Bullen 1951), Bay Pines (Gagel 1976; Braley 1978), and the Manatee Springs site (Bullen 1953). Inland sites also exist and may include the Stanley Mound in eastern Manatee County (Deming 1975) and the Cypress Creek site (8-Hi-471) which Almy (1982:179) believed was "utilized for short intervals as a special extractive task camp rather than a village or base camp." This site extends, Almy thought (1982:174-178), from the Deptford through Weeden Island Periods.

A sedentary village life is indicated and village sites are found both along the coast and inland. Villages frequently have associated mounds, but mounds may not be in the village area. Food resources seem to remain a result of hunting, gathering, and the utilization of marine life. No horticultural remains have been found, at least in sites in the Tampa Bay area, but they have been further north, and it is assumed that domesticated plants were becoming increasingly more important as a food resource and are linked to the increase in population, complex ceremonialism, and the growth in the political, social and economic substructures of the culture.

The last prehistoric manifestation in the Tampa Bay area is the Safety Harbor Period. This represents a continuation of Weeden Island traits with the infusion of Mississippian ideas from the north. Safety Harbor sites are more numerous than those of the Weeden Island Period and range from large coastal ceremonial sites to small inland sites. The type site is the Safety Harbor site at Phillipe Park (Griffin and Bullen 1950; Willey 1949), but other large coastal sites exist. Examples are Maximo Point (Bushnell 1962; Sears 1958),

Narvez (Bushnell 1966), the Tierra Verde Mound (Sears 1967), the Palm River Midden (Karklins 1968) and the sites on Rocky Point (Neill 1968). Inland sites include Buck Island (Bullen 1952) just north of the University of South Florida. Again, the coastal sites are most easily identified, but the inland areas of the state were undoubtedly utilized as an area of food procurement. Early archaeological research was not aimed at locating or excavating these sites.

According to Bullen (1978), a chiefdom level of sociopolitical organization developed during the Safety Harbor Period as reflected in the complexity of the sites. Burials were frequently in cemetaries as well as mounds, the construction of large pyramidal (ceremonial and residence) mounds occurred, and the use and variety of cultigens must have increased. Population must have expanded as more food resources were efficiently exploited.

Again, as with several of the earlier periods, ceramics provide the means of identification of Safety Harbor Period sites. In addition, however, these sites are also distinctive in other ways. These distinctions include new varieties of projectile points, village physical layout and artificially constructed mounds of sand and shell.

The prehistoric era was brought to an end by the Narvez expedition of 1528. Evidence of Spanish contact or influence with Safety Harbor peoples is indicated by the presence of historic period artifacts in Safety Harbor site contexts. However, the introduction of new diseases and the disruption of their cultural systems led to an end of the Safety Harbor culture as defined archaeologically. The vacuum created by the decline of aboriginal Florida populations, in conjunction with European and American political pressure in Georgia, caused Muskogean speaking peoples (Creeks, later called Seminoles) to migrate into Florida in the early 1700s. This era, however, is better understood from historical rather than archaeological studies.

A review of the prehistory of the area, then, indicates that prehistoric sites from any cultural period from 12,000 B.C. to A.D. 1500 might be found on the survey tract.

HISTORICAL ASSESSMENT

The purpose of this historical assessment is to ascertain whether the survey tract in parts of Section 18 and Section 19 of Township 29 South, Range 20 East, Hillsborough County, Florida contains any significant historic sites or remains that may be eligible for inclusion in the National Register of Historic Places. A study was conducted of pertinent state documents, local records, maps and other primary and secondary sources that pertained to the study area. This research indicates that the area contains no significant historic sites or remains.

While contact between the western world and Florida's west coast occurred as early as the first half of the Sixteenth century, Narvaez in 1528 and DeSoto in 1539, little knowledge was gained from these early expeditions. It was not until the 1800s that the first white settlers came to the Hillsborough County area. Before this time a few sporadic settlements had sprung up in this area but, due to the continued conflicts between the Seminoles and the settlers, only a few settlements resulted.

In 1821, Florida became a territory of the United States. Three years later Catonment (later Fort) Brooke was established on the south side of the mouth of the Hillsborough River where Robert J. Hackley had started a plantation (Guthrie 1974:10). Catonment Brooke was to become the "most important fort in Florida, often the headquarters of the Army in Florida and focal point of Indian removal" (Chamberlain 1968:63).

Along with the establishment of the fort, settlements began to emerge catering to the fort and in defiance of the Camp Moultrie Agreement of 1823. This agreement gave the Indians the right to settle the lands below a line just south of Ocala known as the Gadsen Boundary (Guthrie 1974:10). Scrimmages between Indians and settlers resulted and proved to be major factor in retarding development in the Hillsborough County area (Historic Tampa/Hillsborough County Preservation Board n.d.:1).

In 1830 the U.S. War Department established a military reservation around Fort Brooke of "16 miles square" (Chamberlin 1968:42). The survey property is included within these reservation lands since this boundary extended to the east of the survey tract (Florida Department of Natural Resources 1852). Apparently no effort was made by the military to remove any of the civilians that had homesteaded in any of the lands included within the reservation (Chamberlin 1968:43).

In 1836 an act requiring the entire Seminole Tribe to be reestablished in Arkansas resulted in the Second Seminole War, a war that was to last for seven years. During the first part of this period Hillsborough County saw little growth. At the end of the Second Seminole War the Fort Brooke reservation was reduced to "four miles square." In 1848, a further reduction to the limits of the military quarters took effect (Chamberlin 1968:111).

As the Second Seminole War was coming to an end, central Florida lands became available for settlement. The Armed Occupation Act of 1843 brought additional settlers to Central Florida. Arms, ammunition and acreage were supplied to people willing to occupy, defend and build upon lands for at least five years (Guthrie 1974:13). While many loci in Hillsborough County were occupied during this time, U.S. Government surveys conducted by Randolph (1843) and later by Hopkins (1853) make no mention of settlements in either Section 18 or Section 19. The lands within these sections consisted of "third rate pine" and swamp land (Randolph 1843).

While not within the specific survey tract, two roads did cross close to the property. To the north, the "Road to Thonotassassa" was illustrated on the Plat Map. It was later to become the Fort Mellon Road leading to present day Sanford, Florida (Chamberlin 1968:25). To the south, the "trail to Fort Alafia" is shown on an 1852 Plat Map of Township 29 South, Range 20 East (Florida Department of Natural Resources 1852).

No settlements are recorded in the areas outlying Tampa from 1868 to 1870 (Robinson 1928:51-52). In 1872, and again in 1884, a large portion of Section 18, including the survey property, was deeded to the Plant Investment Corporation (Florida Department of Natural Resources 1845). The Plant Investment Corporation was formed by several wealthy individuals: H.B. Plant, Henry M. Flagler, Morris Ketchum Jesup and William Thompson Walter. They controlled railroad lines, steamship lines, telegraph lines, hotels and real estate in Florida (Johnson 1965:144).

Another railroad company, the Jacksonville, Tampa and Key West Railroad, was to construct a line between Jacksonville and Tampa. This line, now owned by Seaboard Coastline, runs just south of the survey tract. They had been unable to secure the capital for construction of one section of the railroad track. In 1883 the Plant Investment Corporation bought this section of the route and the line was completed seven months later. This line played a major role in the development of the region. The line was extended to Port Tampa where, within the coming years, phosphate and tobacco were to become important export products (Johnson 1965:150-152). In 1902 much of the Plant Investment Corporation was sold to the Atlantic Coastline Railroad (Johnson 1965:182).

The remaining land in the survey tract was deeded in 1880 to the Florida Central and Peninsular Railroad. While completing a line that was to run from Tampa to Plant City, just south of the survey tract, problems arose with settlers on the edge of the old military reservation boundary. The railroad crew was forced to work between Saturday and midnight Sunday in order to avoid a court injunction. When the courts opened on Monday, the lands had already been crossed. The line was completed in 1890 with no further problems (Johnson 1965:97).

The Florida Central and Peninsular Railroad, incorporated from all properties of the Florida Railway and Navigation Company in addition to several other small railways, later merged with Florida Northern Railroad Company and in 1893 became Florida Central and Peninsular

railroad (Johnson 1965:98-100). As the Florida Central and Peninsular railroad, it linked lines from Florida to South Carolina. In 1903 it was taken over by the Seaboard Air Line Railroad Company (Bowman n.d.: 45; Johnson 1965:101).

During the 1880s in Florida, large grants of land were deeded to railroads for their investment in money, labor and equipment (Covington 1957). The railroads developed increased access to areas, thus stimulating growth and providing lines to other parts of the United States. At this time, citrus, cattle, lumber and phosphate became the major economic growth industries in the area.

Today the survey tract is still relatively undisturbed, improved pastureland. The two railroad lines running to Plant City, the Atlantic Coastline to the north of the survey tract and the Seaboard Air Lines to the south, merged in 1960 into the Seaboard Coast Line Railroad (Saunders 1978:202). The Seaboard Coast Line presently owns the survey property.

A comparison of the 1956 and the 1981 photorevised U.S.G.S. Brandon Quadrangle Maps indicates that additional construction to the south of the survey tract has occurred since 1956. This includes small railroad lines extending from the main track which do not appear on the 1981 Quadrangle Map.

In conclusion, a study of historic documents pertaining to the survey tract indicates there have been no significant events which have occurred and there are no significant historic sites or remains within this area that may be considered eligible for inclusion in the National Register of Historic Places.

ENVIRONMENTAL BACKGROUND

Geology, topography, soil association, relative elevation and nearby water resources are important factors to be considered in archaeological site locations. These factors have been determined to be useful as indicators of prehistoric land use and settlement patterning.

The survey tract is positioned on the Hawthorne Formation, a middle Miocene impermeable layer of phosphoritic sands, clays, marls and sandy limestones formed by the erosion of limestone strata which had accumulated during the Tertiary Period of the Cenozoic Era. Subsequent fluctuations in average global temperatures caused alternate periods of glaciation and melting, resulting in an advancing and receding shoreline. This action formed five terraces above the Hawthorne Formation. These terraces are divided by escarpments where the ancient shorelines existed (see Almy 1982). Weathering of these terraces by the action of streams and rivers gave rise to the present day topography of the Tampa Bay region.

Between approximately 14,000 and 7000 years ago, a relatively rapid rise in sea level affected the Paleo-environment of the Tampa Bay region. During this time, a cooler and dryer environment prevailed. According to Daniel and Wisenbaker (1981), much of Florida must have resembled the great Serengetti Plains of East Africa, with large herds of browsing and grazing herbivores being pursued by the many carnivores that also existed at that time.

Later, a warming trend developed and the vegetation slowly evolved into long-leaf pine forests, hammocks, marshes and cypress swamps which are typical of peninsular Florida today. Accompanied with these changes in vegetation came changes in the faunal community, reflected in undisturbed portions of present day central Florida.

The present topography of the area surrounding the survey tract is that of gently rolling land. The lower areas border creeks and swamps and rise to higher, sloping regions containing oak and pine. Extending further away are the pine flatwoods.

The soils on the survey tract are Leon fine sand, Leon fine sand, light-colored surface phase and Rutlege fine sand. The Leon fine sand and the Leon fine sand, light-colored surface phase are somewhat poorly drained soils with a slow surface runoff. The latter occupies slightly higher, better drained positions than the former and both are strongly acidic. The Rutlege fine sand occurs on level or nearly level relief or in slight depressions in the wet areas throughout the flatwoods. It is a strongly acidic and poorly drained to very poorly drained soil. Part of the year, areas of Rutlege fine sand are covered by several inches of water (Leighty *et al.* 1958).

The survey tract ranges in elevation from 25 to 40 feet above sea level, with only a small portion (5 acres) at the 40 foot level. During the archaeological survey, this small portion was noted as being the only

relatively dry area after heavy rains.

Water resources include small ponds around the survey tract as well as seasonal ponds on the survey tract (occurring on the Rutlege fine sand). Also, Sixmile Creek is located approximately 1.75 miles west of the property and serves as the major drainage for the area.

The natural vegetation occurring on the survey tract includes wiregrass, saw-palmetto, pine, scrub live-oaks, short grasses and shrubs (Leighty et al 1958). According to Daniel (1982), some of the well known mammals that inhabit eastern Hillsborough County (a similar physiographic region to the survey tract) include: bobcat, black bear, cottontail rabbit, gray fox and white-tailed deer (as well as others). The white-tailed deer is considered to be the most important of the above to the pre-historic peoples of this area. Also listed are some of the birds, amphibians, reptiles and fishes that may have been utilized by prehistoric people.

Historically, the original 19th century survey of this Section lists the area as "third rate pine" and suggests that the land might be utilized for grazing (Randolph 1843, Hopkins 1853). According to the soil survey map (Leighty et al 1958), the land was still in its natural state in 1958, therefore, clearing activities were relatively recent. Presently the survey tract is in improved pasture with a few pine trees in the western edge. Approximately 10% of the survey tract was noted as being under several inches of water, presumably reflecting the areas of Rutlege sand.

In summary, the survey tract offers minimal resources for prehistoric exploitation. The historic land use appears to have had a minimal impact on any site that might be situated on the property.

RESEARCH DESIGN: RESEARCH STRATEGIES AND GOALS

A research design is a plan to coordinate archaeological investigative activities from the inception to the completion of a project. This plan should minimally account for three considerations. It should make explicit the goals and intentions of the research. It should logically define the sequence of events to be undertaken in pursuit of the research goals. The research design should also provide a basis for evaluating the findings and conclusions drawn from the investigation. The assessment survey discussed in the Request for Services does not require a multi-stage research design, yet a statement of research goals and a discussion of research strategies is in order.

The goal of this archaeological and historic site assessment survey is to locate and document the existence of any evidence of potentially important historic or prehistoric behavior within the survey tract. The survey is the traditional and most cost-effective means of locating evidence of historic and prehistoric human behaviors within spatially defined boundaries (Schiffer et al. 1978). These behaviors usually manifest as archaeological or historic sites, historic structures, or non-site loci. Reconnaissance surveys attempt to locate all evidence of human behaviors that are archaeologically discernable with current investigative techniques. Survey techniques need to be exhaustive. These techniques must be able to document any material manifestation characteristic of any cultural period, yet be cost effective, as not to expose the contracting party to excessive expense. Toward this end, the investigation of the survey property employed a non-exclusive survey with systematic and judgementally placed sub-surface testing (King 1978:36) within a four part research strategy.

The research strategy is composed of four interrelated and roughly sequential components: the background investigation, the historic documents search, the formulation of an aboriginal site location predictive model, and the field survey. The background investigation involved several inquiries. A perusal of the relevant archaeological literature produced a summary of previous archaeological work in the Gulf Coast region and a discussion of previous survey work undertaken near the project area. The Florida Master Site File was checked for any previously recorded sites within the tract and to provide an indication of the prehistoric settlement and land-use patterns for the area. All current soil surveys, vegetation maps, and relevant literature were consulted to provide a description of the physiographic and geological region of which the survey tract is part.

The historic documents search involved research of the original township plat map, tract book entries and surveyor's field notes, and all relevant secondary historical sources for any information pertaining to the existence of historic structures, site of historic events, and historically occupied or noted aboriginal settlements within the survey tract area. An aboriginal site location predictive model for the survey tract was formulated based on the variables of soil drainage characteristics,

distance to permanent sources of potable water, and distance to a hardwood hammock. The field survey involved an on-site investigation consisting of a pedestrian transect survey and sub-surface investigation. The first two components the background investigations and the historic documents search, are discussed in separate sections of this report. The last two components, the aboriginal site location predictive model and the field survey, will define the present discussion topics.

Cultural resources surveys in the Central Gulf Coast region of Florida have successfully employed site location prediction models to assist in the location of archaeological resources (Grange, Fryman and Williams 1979; Grange and Williams 1983; Kammerer 1980). These models have been based on a variety of physiographic and hydrolic variables, three of the most salient being the relative location of potable (fresh) water, the distance from a hardwood hammock, and soil drainage characteristics.

The survey tract is characterized by three soil types: Rutledge fine sand (Rc), Leon fine sand (Lh), and Leon fine sand, light-colored surface phase (Lk). All three soil types are described as poorly to very poorly drained (Leighty *et al.* 1958). Almy (1976, 1978), and others, have established that prehistoric sites tend to co-occur with well-drained soils. Conversely, recent studies of site location and soil drainage characteristics for the combined known sites in Hernando, Citrus, Sumter, and Marion Counties produced an association between aboriginal site location and the poorly drained soil associations (Withlacoochee Regional Planning Council 1982). Deming and Almy (1983:18) interpret this apparent conflict in the data by noting that a large portion of the sites in the WRPC site sample are coastal sites, and could be biasing the study results.

Hardwood hammocks do not presently exist in the survey tract or in the surrounding area, nor does the area contain soils which would support such vegetation (Leighty *et al.* 1958). The potable water variable is of little use in microstratifying the survey tract as the entire survey area is within 1200 meters (Deming 1980) of some permanent or intermittent source of freshwater.

Site location prediction models, such as the one described here, are usually able to microstratify the survey tract into three zones, based on the relative co-occurrence of soil drainage characteristics, vegetation, and the location of sources of potable water. High probability areas for site location suggest areas with well-drained soils, hardwood hammocks, and adjacent freshwater sources, with which archaeological sites, historical sites, and non-site loci frequently co-occur. Medium probability areas for site location, are areas with fair to poorly drained soils, and either an adjacent water supply or a nearby hammock, with which cultural resources sometimes co-occur. Low probability areas for site location are associated with poorly drained to flooded soils and have neither an adjacent water source nor a nearby hammock.

Based on the presence or absence of these physiographic variables, and the suggested co-occurrence rates between these variables and prehistoric and

historic site locations, the survey tract can not be microstratified, but categorized as a single unit, medium probability zone for cultural resource location. This determination, and the relative size of the survey tract, suggest the use of a single survey sampling methodology and a moderately intensive regimen of sub-surface testing.

A non-exclusive survey with sub-surface investigation was chosen as the basis for the field survey strategy. A non-exclusive survey, as defined by King (1978:35) implies that survey coverage is complete, and no part of the project area is excluded from inspection. This is not to suggest that all parts of the survey tract will be covered, as total coverage will not be undertaken. Whenever survey coverage is not total, some form of sampling the area must be employed.

Transects were chosen as sample units and were preplotted on aerial photographs prior to the field investigation. Transects were placed at 100 meter intervals, running east west across the survey tract. The initial transect line was 25 meters south of the northwest property boundary. Each subsequent transect was then set in relation to the first at intervals of 100 meters. Five transects, including the initial transect, were established across the tract. The southernmost transect had to be moved north to include the southernmost extension of the property. The transect interval was shortened to 65 meters for this transect (see Figure 2).

The systematic sub-surface tests were placed along the transects at 100 meter intervals. Sub-surface test locations were preplotted on aerial photographs prior to the field investigation. Twenty-six systematic sub-surface tests were anticipated. The initial sub-surface test location was preestablished along the northernmost transect 50 meters from the west side of Faulkenberg Road. The sub-surface sample grid was established from this point. All sub-surface test locations were established along the transects, and within the sample grid, at 100 meter intervals (see Figure 2).

The location of four sub-surface tests were not predetermined, but were left to the discretion of the field archaeologists. This allowed for some flexibility in the field methodology so that unforeseen events could be accommodated, and any areas that intuitively "looked promising" could be investigated.

In sum, the field survey strategy called for five pedestrian transects, one every 100 meters, and 26 systematic and 4 judgementally placed sub-surface tests.

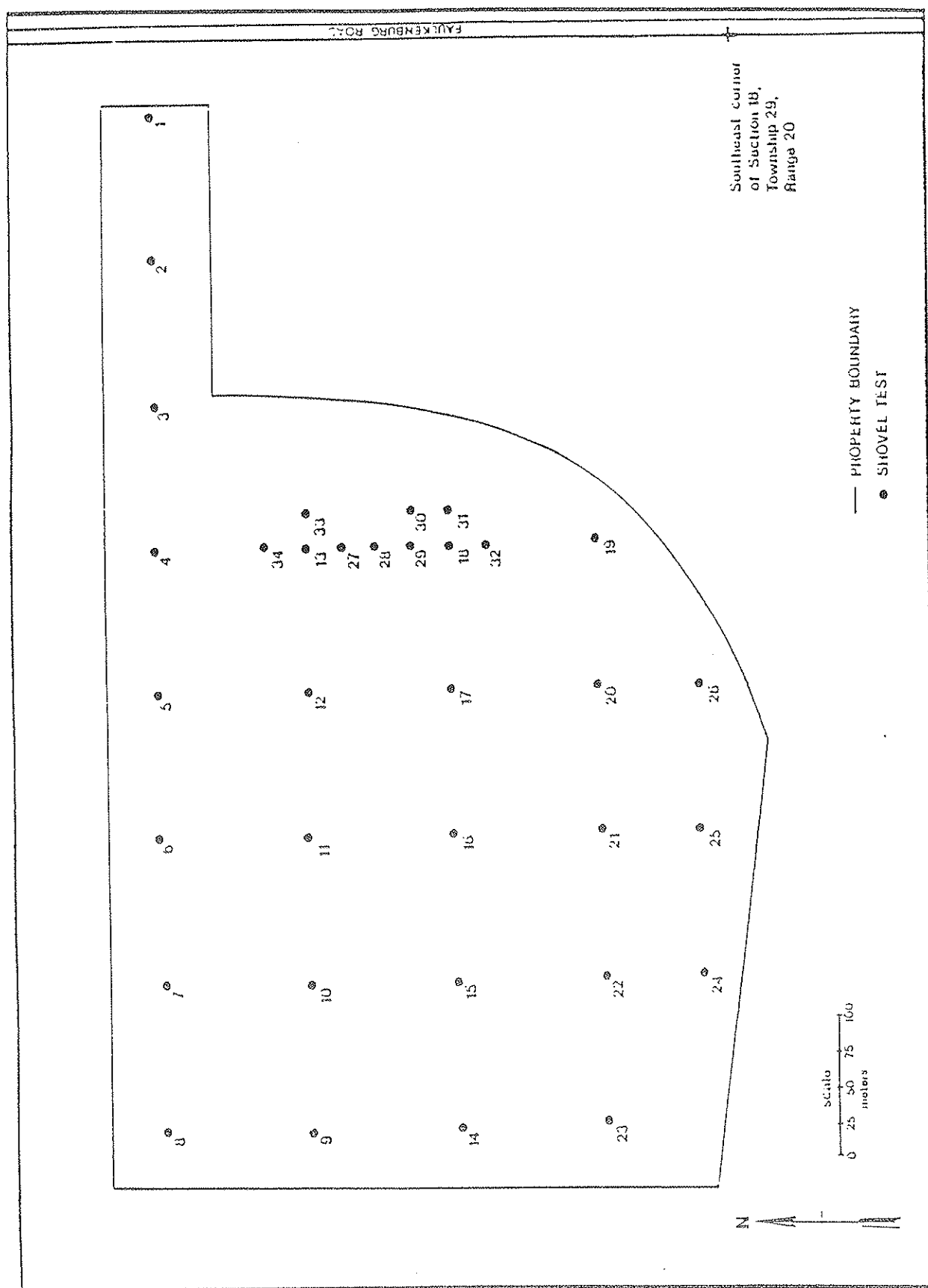


Figure 2. Location of the Test Pits within the Survey Tract.

FIELD METHODOLOGY

The field methodology formally operationalized the field survey strategy. A four person field crew was employed and divided in half to form two crews of two persons each. The field work was initiated on April 2, 1983, but rain forced postponement. The field work was continued on April 15, 1983 and the survey was completed. All transect locations were determined from the base points indicated on the aerial photographs and were oriented by compass sightings. One crew was responsible for the two northernmost transect and sub-surface tests. The second crew was assigned to the remaining three transects and sub-surface investigation. The field survey was completed by the four person crew in 32 person-hours.

The surface investigation involved each of the two person teams walking transects and inspecting the ground surface. One person was responsible for compass readings and pacing off the distance between tests. The second person was responsible for visually inspecting all ground surfaces, animal burrows, and exposed areas. As the survey tract is entirely improved pasture with planted grass ground cover, visibility was considered very good. No problems were encountered during the surface investigation, and all transects and test pit locations were identified. A check of all transect locations indicated that all transects and sub-surface test locations are accurate to within five meters. No aboriginal or historic material culture was located during the surface investigation.

All systematic sub-surface tests were 30 to 40 centimeter round soundings, performed every 100 meters along the transects as predetermined on the aerial photographs. All soil removed from the tests was screened through one-quarter inch hardwire mesh cloth. Observations regarding soil stratigraphy, soil condition, and the provenience of all cultural materials were recorded in the field. Test pits ranged from 60 to 110 centimeters in depth, with an average pit depth of 84 centimeters. Water was always encountered between 70 and 90 centimeters below ground surface. Testing continued until removing the soil from the test was no longer possible. All sub-surface tests were backfilled as completed. One flake was found in test pit 13, at approximately 25 centimeters below the ground surface. A second flake was discovered in test pit 18, at a depth of approximately 70 centimeters. Since these two test pits were within 100 meters of each other, the judgemental sub-surface testing focused in this area (see Figure 2).

Nine sub-surface tests were judgementally placed at 25 meter intervals in the vicinity of test pits 13 and 18. These tests were executed in the same manner as the systematic tests described above, except they were placed at the discretion of the Principal Investigator. Three tests, numbers 27, 28, and 29 were placed at 25 meter intervals on a north-south axis between the flake bearing test pits. Three tests, numbers 30, 31 and 32, were undertaken in the area around test pit 18. Two final tests, numbers 33 and 34, were undertaken 25 meters east and 25 meters north of test pit 13 respectively. No material remains were recovered from any of the judgemental sub-surface tests.

In sum, five pedestrian transects were traversed as part of the surface investigation, with negative results. Twenty-six systematically placed sub-surface tests were executed with positive results in two tests, numbers 13 and 18. Nine sub-surface investigations were undertaken in the areas between, and adjacent to, test pits 13 and 18. These tests failed to recover any historic or prehistoric remains.

ARTIFACT ANALYSIS AND LABORATORY PROCEDURES

All material remains recovered during the field investigation were returned to the University of South Florida Archaeology Laboratory for cleaning, labeling, and analysis. The material remains consisted of two chert flakes recovered from testpit numbers 13 and 18. No diagnostic artifacts were recovered. The recovered material was washed, dried, and labeled with the number of the testpit from which it was recovered. Each flake was then measured, weighed, and subjected to microscopic investigation. Each flake was examined under a Bausch and Lomb binocular microscope, (7x to 30x power), for evidence of usewear, modification, and determination of the stage of lithic reduction (the stage at which each flake was removed).

The chert flake from testpit 13 was recovered at a depth of 25 centimeters below surface. This non-thermally altered chert flake is 1.50 centimeters long, 1.46 centimeters wide, 0.23 centimeters thick, and weighs 0.5 grams. The striking platform is laterally faceted and crushed, and the ventral face exhibits a diffuse bulb of force. When the flake was originally removed, it terminated in a step fracture. This flake is classified as a non-decortication thinning flake, usually considered the result of late stage, or tertiary reduction.

The second flake was recovered from testpit 18 at a depth of 70 centimeters below surface. This non-thermally altered chert flake is 1.08 centimeters long, 1.13 centimeters wide, 0.16 centimeters thick, and weighs 0.15 grams. The striking platform is not prepared or modified, and the ventral face exhibits a diffuse bulb of force. The flake terminated in a step fracture when originally removed, and shows evidence of damage in the right lateral margin. This flake is classified as a non-decortication thinning flake, usually considered the result of late stage, or tertiary reduction.

Both flakes can be classified as non-decortication thinning flakes. It is possible that both are associated with the tertiary, or late stage of the lithic reduction continuum, or associated with the maintenance or resharpening of stone implements sometime during the 14,000 years of human occupation in this area. As the specimens were encountered 100 meters apart, it is assumed that they were the result of discrete maintenance or reduction episodes.

RESULTS, CONCLUSIONS AND RECOMMENDATIONS

A non-exclusive pedestrian survey and sub-surface testing scheme was conducted on the 50 acre tract. This survey was designed on the basis of previous archaeological and historical surveys in nearby areas. The results of these surveys have provided a basis for a prediction model used in prehistoric site location. No surficial cultural materials were found during the pedestrian survey. Two chert flakes were recovered from the sub-surface testing phase of the field investigation. These were found in test pits 13 and 18, located 100 meters apart. These two flakes resulted from prehistoric activity on the tract, this activity being associated with a late stage in the manufacture or rejuvenation of stone tools. The excavation of 8 other test pits near these activity loci did not produce any other cultural materials. Thus, no evidence of habitation or even a short-term camp site exists. Isolated finds such as these have been referred to as "non-site loci" (Batcho and Milanich 1978). They provide evidence of prehistoric activity on the survey tract, but are not considered to be what is normally termed a prehistoric "site"; neither are the activity loci considered significant in terms of National Register of Historic Places criteria. Further data recovery (excavation) would yield very little, if any, cultural materials. The significance of the information lies in the fact that archaeologists are now aware of this prehistoric activity at these particular loci. This information is now recorded. No further archaeological investigation is recommended.

The historical documents research provided insight into the historic period use of the tract and its immediate environs. This research concluded that the survey tract has no significant historic period cultural resources; a fact that was confirmed by the field investigations. Only one modern farm related building is located on the tract and it is not a significant architectural structure. No further historical research is recommended.

Based on the research and investigations undertaken during the study, it is concluded that the projected use of the property will not impact any historic or prehistoric cultural resources.

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BRIEF RESUME OF SENIOR AUTHOR

J. Raymond Williams

1958 B.S. Missouri State University (history)
 1962 M.A. University of Missouri (anthropology)
 1971 Ph.D. University of Missouri (anthropology)

Research interests: Southeastern U.S. Prehistory; Cultural Resource
 Management

Experience: University of Missouri: 1966-1969--Research
 Associate
 University of South Florida: 1969-present--
 Professor

Publications: 5 monographs
 8 refereed articles
 55 technical reports

Certification: Society of Professional Archaeologists

Professional
 Activities: Past President; Florida Anthropological Society
 President; Anthropological Sciences Section,
 Florida Academy of Sciences
 Editor; SOPANEWS, The Newsletter of the Society
 of Professional Archaeologists

REQUEST FOR ARCHAEOLOGICAL
AND
HISTORIC SITE ASSESSMENT SERVICES
FAULKENBURG ROAD RESOURCE RECOVERY FACILITY SITE
HILLSBOROUGH COUNTY, FLORIDA

I. PURPOSE:

Hillsborough County is proposing to build a Solid Waste Energy Recovery Facility. As part of the State of Florida's permitting process for the facility, an archaeological and historic site assessment survey must be undertaken. The Florida Department of State (Division of Archives, History and Records Management) has determined that there is a moderate to high likelihood of currently unknown significant archaeological or historic sites occurring within the parcel (described below) which has been previously unsurveyed for such sites.

Hillsborough County is therefore desirous of procuring the services of a professional archaeological consultant who has performed such site assessment surveys in Florida.

II. DELINEATION OF STUDY AREA:

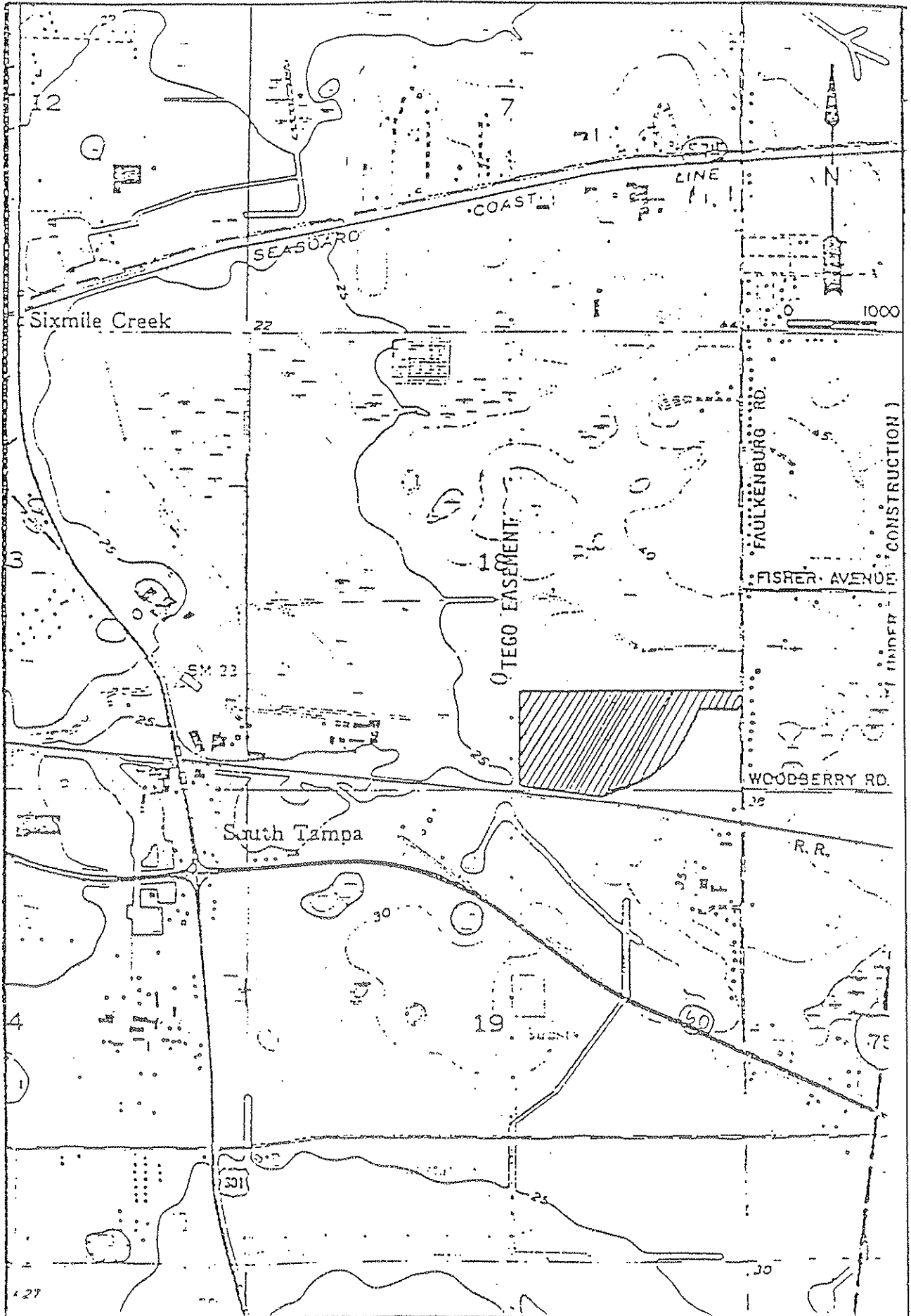
Figure 1 shows the location of the site. State Road 60 is located to the south of the site, County Road 574 to the north, and U. S. Route 301 is located to the west. The site area is bordered by Faulkenburg Road to the east, the Seaboard Coast Line Railroad (SCL) to the south, and the Tampa Electric Company powerline right-of-way to the west. The site is 50 acres M.O.L. and lies in Sections 18 and 19, Township 29 South, Range 20 East, Hillsborough County, Florida.

This property is now owned by SCL. Negotiations are underway with SCL to acquire the property for the Hillsborough County Resource Recovery Project. SCL has granted the County and its contractors permission to enter this property to complete engineering studies.

III. SCOPE OF SERVICES:

The contractor shall provide a high standard of professional archaeological service and will exert its best efforts with the time and funds available for this work program. The results of this study will be presented to the County in a written report following the guidelines which have been prepared by the Florida Archaeological Council and the Florida Department of State for the completion of such assessment studies (Attachment A). The contractor shall be responsible for coordination of all work to complete this site assessment survey and the provision of all labor, equipment and materials to perform the work. Hillsborough County shall assist consultant by placing at his disposal all available pertinent information including previous reports and any other data relative to the consultant's scope of services.

FIGURE 1 - RESOURCE RECOVERY SITE LOCATION



IV. SCHEDULE:

Due to the timing of other work activities in the Resource Recovery Program, the site assessment survey report must be completed expeditiously. The consultant shall provide the County with a draft report within 30 days after the start date. After review and comment by the County, the final report shall be submitted no later than 60 days after the original start date.

ATTACHMENT ASITE ASSESSMENT SURVEY REPORTS

Site assessment survey reports may vary in format from a long letter style report to a detailed lengthy formal report, depending upon the particular project. In all instances such reports should identify for whom, by whom and why the work was performed, as well as the location of the area surveyed (including a project location map), field methodology and reasons for same, survey findings and conclusions. When in doubt, individuals or agencies preparing to conduct or have conducted such work are urged to contact the Division's project review staff to discuss the particular minimum needs of a specific project. This suggested consultation may be particularly helpful in determining the amount of background research necessary for a project.

I. TITLE PAGE (Formal Reports)

- A. Report Title
- B. Sponsoring Agency or Organization
- C. Research Organization
- D. Author(s)
Note: The research organization may be the author in some instances
- E. Date of Report

II. ABSTRACT (Optional)

- A. Presents report title, type of project, regulatory authorities (federal, state, local), sponsoring agency and research organization
- B. Concise summary of report content including project location, field methodology, conclusions and any new information.
- C. Summary of management recommendations

III. TABLE OF CONTENTS (Formal Reports)

IV. INTRODUCTION (Formal Presentation in Formal Reports and Informal Presentation in Letter Reports)

- A. A statement of when, why and for whom the work was performed
- B. Mention of the project location, including a general project location map
- C. A general description of the nature and extent of the project
- D. Other information deemed appropriate by the author

V. LITERATURE REVIEW (Formal Presentation in Formal Reports;
Optional Brief Presentation in Letter Reports)

Note: This review should list previous studies in and around the project area. Its purpose is not to review the historical development of archaeological and historic studies in Florida; although, the author is not prohibited from making such a presentation. Its purpose is to demonstrate an awareness of the location, field methodology, and findings of previous researchers, including the information contained in the Florida Master Site File, in order to facilitate development of an adequate field methodology/research design. In areas containing historic structures or locales of historic activities, its purpose is also to identify associated research data and conclusions.

VI. BACKGROUND RESEARCH: DISCUSSION OF PREHISTORY/HISTORY (Formal Presentation in Formal Reports; Optional Brief Presentation in Letter Reports)

Note: This section summarizes the information derived from the Literature Review, and can be divided into two parts: Archaeological Review and Historical Review. The amount of detail devoted to each depends on the project's location as well as the type of project. For example, a pipeline or powerline right-of-way project through a historically undeveloped, poorly drained rural area with no extant or previously extant structures or roads over 40-50 years old will not require detailed historic background research; although, a general historic background presentation should be included in the report to document the rationale for the omission of a more detailed presentation. When in doubt, please call the Division's project review staff.

A. Archaeological Review

1. Presents a summary of the area's history and prehistory based on the archaeological record.
2. Its purpose is to provide a regional framework for the development of a site location predictive model, permit the analysis of recovered artifacts and evaluation of site significance, and to develop testable hypotheses.

B. Historical Review

1. Presents a summary of the area's history based on documentary records, biographies, etc.
2. Its purpose is to outline the major course of historical development in the area as it particularly relates to the project tract. Particular attention should be given to land use history for the subject tract and information relating to potentially significant historic structures or their remains and associated features.

VII: ENVIRONMENTAL BACKGROUND: DESCRIPTION OF PROJECT AREA AND VICINITY

- A. Description of Project Location and Area (Included in both formal and letter reports)

This should describe the project's location in terms of township, range, section and parts of sections and/or U.T.M. coordinates. And include a project location map. The dimensions of the project tract in terms of acres or hectares should be noted.

B. Description of Geologic and Physiographic Province in which Project Tract Occurs.

(Optional in letter reports, except for a very brief overview to indicate survey conditions; also optional in formal reports, except for brief overview, IF a source in which this subject is adequately presented is cited. For instance, project EIS's frequently have this as a special chapter or appendix, and, thus, the survey report would appear as a companion chapter or supporting documentation. Furthermore, the geologic development of an area prior to 50,000 B.P. should be omitted unless its particular relevance to a project can be demonstrated.)

1. For upland and wetland tracts, information of relevance would include topographic features, drainage, ground slope, soils, water sources, clay or hard mineral outcrops or near surface (aboriginally) exploitable features, the effects of sea level changes within the last 50,000 years, evidence of erosion, etc.;
2. For inundated locales, information of relevance would include depth below surface, topographic features, types of sediments and rock outcrops, current or wave surge conditions, stream flow, salinity, oxygen content, temperature regime, the effects of sea level changes within the last 50,000 years, erosion, etc.

C. Environment and Paleo-Environment

(Optional in letter reports except for a brief presentation of the present environment to indicate survey conditions. Also, beyond a brief overview, optional in formal reports IF a source in which the subject is adequately presented is cited. A noted exception is when a task of the survey is to investigate Paleo-Indian to Archaic site distribution in which case a discussion of the paleo-environment is required. However, a special report by a specialist may be attached as an appendix to the main survey report.)

1. The purpose of this section is to note the environmental conditions in which sites occur. Caution is urged for altered environments.

D. Historic Land Use Patterns

(Optional in letter reports, except for brief presentation to indicate survey conditions and potential site alteration. Formal presentation in formal reports; although, the amount of detail need not extend beyond a general overview except where it relates to site integrity and significance issues.)

1. The purpose of this section is to note known environmental changes and factors influencing site integrity. It is recognized that this information will not always be available to the researcher, in which case its unavailability should be noted.

VIII. FIELD METHODOLOGY/RESEARCH DESIGN

(Required for Both Formal and Letter Reports; Although, A Brief Presentation will be Appropriate in the Latter)

Note: Many factors influence survey methodology, including the size of the study area, its location (rural/urban; uplands/wetlands/coastal/submerged/etc.), vegetative cover, and present (and recent past) land use.

- A. Survey Techniques, Including Subsurface Survey Strategy: This should contain an explicit discussion of the rationale for the survey methodology employed to locate and assess archaeological sites and historic structures. Particular attention should be paid to the selection of subsurface testing methodology.
- B. Hypotheses to be Tested: (Generally Optional)
This would include a discussion of the analytical techniques required to test the hypotheses.
- C. Map of Survey Area: This should show the location of the survey transects or area of survey coverage; and areas not surveyed. Ideally this map should also include the approximate location of subsurface tests with some code to distinguish between the various kinds of subsurface testing techniques employed. The location of identified archaeological sites and historic structures and associated features should also be shown. However, it is recognized that the verbal description of survey methodology is often of sufficient detail to preclude the need of mapping the test hole locations, and the location of identified sites may be omitted if included in the survey results section.
- D. Constraints on Investigations: This would include limitations on access, poor ground visibility or other environmental limitations such as flooding, snowstorms, hurricanes, water currents, wave surge, wild hunters and attack dogs, etc.
- E. Description of Data Collection Techniques: It is particularly important to describe the manner in which the horizontal and vertical limits, internal integrity, and other necessary site assessment data was obtained for identified archaeological sites. A description of method for locating and evaluating historic buildings, structures and other sites should also be included when applicable.
- F. Listing and Justification For Any In-Field Modification of the Proposed Research Strategy
- G. Personnel and Work Organization Technique (If not presented elsewhere)

IX. LABORATORY METHODS AND ANALYSIS

(Formal Presentation in Formal Reports or Brief Informal Presentation in Letter Reports if Sites Found. Optional in Letter and Formal Report if no Sites Found, or if Only a Few Non-Significant Sites are Found.)

- A. Method For Artifact Processing and Accessioning: brief statement
- B. Method For Chronological Determination: brief statement (e.g., based on artifact types, carbon dating, stratigraphy, etc.)

C. Other Special Analytical Methods and Techniques: (Optional)

1. Paleo-ecological studies including soils, pollen, faunal and ethnobotanical analyses. (Note: A specialist is generally required for this type of work.)
2. Photographs and/or line drawings of all or a representative example of diagnostic artifact types or classes, and excavation unit profiles.
3. Artifact distribution tables and occurrence lists, etc.

D. Discussion of Changes in Proposed Laboratory Methods and Analysis

E. Discussion of Results

X. SURVEY RESULTS

(Formal in Both Formal or Letter Reports; although, the Presentation May be Brief if No Sites are Found. Site Forms Must Accompany All Reports When Sites are Located, Except for Isolated Find Sites.)

Note: Essentially this section should be an assessment inventory of the archaeological and historic sites, located within a survey area. For some projects where visual and other indirect impacts must be considered, it would also include the identification of nearby significant sites, particularly historic structures. It is important to remember that this will probably represent the only information which will ever be recorded for sites determined not significant. Also, information on the kinds of locations in which sites are not located is equally as important as locations with sites.

- A. Site Forms: Florida Master Site File site forms should be completed for all newly located sites and updated for previously identified sites. No site forms need to be completed for isolated artifact find sites, or for non-historical structures.
- B. Site-By-Site Description: Each site should be briefly described; although, artifact type and find location are sufficient for isolated artifact find sites. It is recommended that the location and approximate boundaries of each site be depicted on appropriate portions of U.S.G.S. Quadrangle maps. These descriptions need not repeat the detailed information contained in the accompanying site forms. They should, however, contain information on the location size, cultural/temporal affiliation, artifact sample size, function (if apparent), and such other information needed to assess site significance. An opinion of site significance, the need for further work before a final determination of significance can be made and the need for mitigative excavation should be offered.
- C. Comparative Site Information: (Optional) The site distribution, chronological position and other related comparative information should be presented in tabular form and an effort made to generate or refine known site distribution models for the area in which the project occurs.

NOTE: It is recommended that an architectural historian or historic architect be consulted for describing and assessing the significance of historic structures. Furthermore, Sections IX and X are often combined as a single section in many projects.

XI. CONCLUSIONS AND RECOMMENDATIONS: (Formal in Formal Reports, Brief Informal in Letter Reports)

- A. Summary of Survey Results, Including Number of Significant and Potentially Significant Sites Identified: This would include a discussion of why each site so identified is deemed significant or potentially significant.
- B. Site-By-Site Discussion of Potential Project Impacts to Significant and Potentially Significant Sites.
- C. Specific Recommendations for Additional Survey Work (if any); Test Excavations or Additional Documentation at Potentially Significant Sites to Make a Final Determination of Significance; or, Mitigative Data Recovery at Significant Archaeological or Historic Sites.

Note: Such recommended additional work would only be necessary IF project activities will disturb and/or destroy the identified sensitive areas, rather than protect them through inclusion in passive recreation parks or preservation areas.

D. Other Cultural Resource Management Recommendations Such As:

- 1. Restoration, rehabilitation or retrofitting historic structures using "The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings";
- 2. Preservation of significant archaeological resources by inclusion in "green space" sensitive environment preservation areas.
- 3. Preservation of significant archaeological sites, or a representative sample of a larger site, by use as passive recreation parks.
- 4. Site preservation monitoring program for significant and potentially significant sites set aside for preservation.
- 5. Preparation of brochures describing the cultural resources represented in the project area, the significance of those resources, and directions to visit identified significant resources for which protective measures from vandalism and sites looting can be enforced.

XII. REFERENCES

(Optional in Letter Reports)

- A. Use American Antiquity's Style Guide (44:193-205)

XIII. APPENDICES

(Optional, Except For Florida Master Site File Site Forms.)

- A. Florida Master Site File Site Forms: (Required)
These should be completed for all previously unidentified sites, except for isolated artifact find sites and (with a few exceptions) post-1940's structures. Also, current data supplemental site form pages should be completed for previously recorded sites; and, a listing and location map of isolated find sites is suggested, as their distributional pattern may be culturally significant.
- B. Ancillary Studies: (e.g., paleo-environment, palynological, experimental lithic studies, hydrological, etc. reports)
- C. Supporting Data: (e.g., computer printouts)
- D. Peer Reviews
- E. Scope of Work
- F. Abbreviated Vita of Principal Investigator and Field Supervisor
- G. Location of Artifacts Fieldnotes, etc.

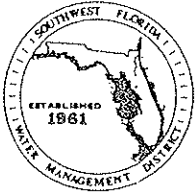
Note: The above information could be incorporated into the text of the main report.

Appendix 9
Surface and Groundwater
Related Information

Appendix 9-1

Well Construction Inventory

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

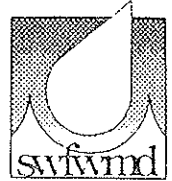


2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 · SUNCOM 684-1011

BRUCE A. SAMSON, Chairman, Tampa
Wm. O. STUBBS, JR., Vice Chairman, Dade City
JIM KIMBROUGH, Secretary, Brooksville
RONALD B. LAMBERT, Treasurer, Wauchula
DON CRANE, Assistant Secretary, St. Petersburg
ARCH UPDIKE, JR., Assistant Treasurer, Lake Wales

WALTER H. HARKALA, Plant City
MARY A. KUMPE, Sarasota
MICHAEL ZAGORAC, JR., Belleair

GARY W. KUHL, Executive Director



August 9, 1983

Mr. Tom Tetreavli
Comp, Dressler & McKee
1 Center Plaza
Boston, MA 02108

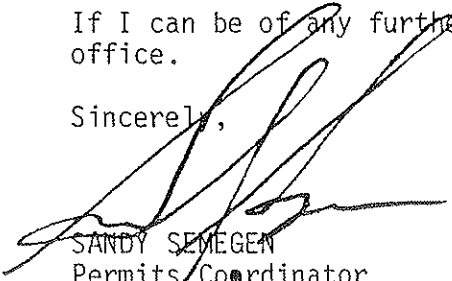
Re: Well Construction Permit Listing

Dear Mr. Tetreavli:

Enclosed you will find copies of the above referenced listing for Sections 17,18,19 & 20 in Township 29S, Range 20E. Also enclosed is a code sheet deciphering codes found under certain categories.

If I can be of any further assistance, feel free to contact this office.

Sincerely,


SANDY SEMEGEN
Permits Coordinator
Well Construction Permitting & Enforcement

SS:cm
Enclosure: as stated

WELL CONSTRUCTION LISTUSE CODE

DP USE - FIRST THREE CHARACTERS
/ PERMIT - WELL PERMIT NUMBER
2 DRILL - DRILLER'S NUMBER
3 USE - USE CODE
4 BASIN - BASIN NUMBER
5 CNTY - COUNTY CODE
6 LOCINT - (SEC/TWP/RGE)
7 DIAM - DIAMETER
8 D CASE - DEPTH OF CASING
9 D WELL - DEPTH OF WELL
10 GROUT - GROUTING
11 BAGS - BAGS
12 DRILLM - DRILLING METHOD
13 ELEV - ELEVATION
14 SWLLSD - STATIC WATER LEVEL
15 SP CAP - SPECIFIC CAPACITY
16 CL - CLORIDES
17 FE - IRON
18 SO - SULPHATE
19 SEDSZE - SEDIMENT SIZE
20 SEDCLR - SEDIMENT COLOR
21 DP1CLA - DEPTH TO 1ST CLAY
22 CL1CLA - COLOR OF 1ST CLAY
23 TH1CLA - THICKNESS OF 1ST CLAY
24 DP2CLA - DEPTH TO 2ND CLAY
25 CL2CLA - COLOR OF 2ND CLAY
26 TH2CLA - THICKNESS OF 2ND CLAY
27 1 CARB - 1ST SHOWING CARBONATE ROCK
28 CL1CRB - COLOR OF 1ST CARBONATE ROCK
29 DP RCK - DEPTH TO BEDROCK
30 CL RCK - COLOR OF BEDROCK
31 UN FEA - UNUSUAL FEATURES
32 OWNER - OWNER

D - DOMESTIC
E - ESSENTIAL SERVICES
I - INDUSTRIAL
A - IRRIGATION
L - LIVESTOCK
M - MINING
P - POWER
R - RECREATIONAL
A - SPRINKLING SAME AS IRRIGATION
B - PUBLIC SUPPLY
J - INJECTION WELL
G - RECHARGE WELL
T - TEST WELL
O - OBSERVATION/MONITOR
F - FOUNDATION TEST
Z - OTHER
H - REPAIR OR DEEPEN
C - DEWATERING
N - RETURN A/HEAT
K - CONNECTOR WELL
Q - DRAINAGE WELL
V - INVENTORY
Y - PLUGGED/ABANDONED
Z - SEALING WELL
PIEZOMETERS-T/WELL
SATELLITE-RECHARGE
W - AIR CONDITIONING
SUPPLIES-OTHER RETURN

COUNTY CODE

08 - CHARLOTTE
09 - CITRUS
14 - DESOTO
21 - GILCHRIST
25 - HARDEE
27 - HERNANDO
28 - HIGHLANDS
29 - HILLSBOROUGH
35 - LAKE
38 - LEVY
41 - MANATEE
42 - MARION
48 - ORANGE
51 - PASCO
52 - PINELLAS
53 - POLK
58 - SARASOTA
60 - SUMIER

Field # CC

32 80-81

Color of Bedrock -- Recording is the same as for Sediment
Color.

33 82-84

Unusual Features -- These are obtained from the comple-
tion report and are reported by using the following codes:
Features are recorded in block 82.

J - Boulders

C - Cavities

B - Chert (flint)

D - Dolomite

F - Fossil shell fragments

E - Lignite (carbonaceous deposits)

L - Limonite (iron oxide)

G - Loss of water

M - Muck

O - Oolitic deposits

P - Pebbles

A - Phosphate

K - Pisolithic deposits

Q - Quicksand

S - Sinkhole developed

I - Water gained

X - More than two unusual features.

The depth (block 83) and the thickness (block 84) are
recorded using the following codes:

WELL CONSTRUCTION LIST

DATE 6/02/83

O P	P E R	D R	B A C	L O C	D C	D W R	D B I	S W P	S E D	S E D	D P L	T H P	D C L	T H P	I C L	D C L	U N	D
U S E	M I T	I L E	N Y	T M S	A S	E L	O G L	A L E	S A C	F S Z	L L	L L	L L	L L	A C	R R	C C	E E
FPE315726	0064	D	13	29	162920	82	115		51						50	50		CROSSON
FPE319188	0067	D	13	29	162920	69	150		35						54	54		H HICKMAN
FPE326394	1099	D	13	29	162920	63	104		34	MS						45		R GRECUA
FPE330925	1160	D	13	29	162920	115	252		54	MS MY	20 MA	20	40 WH	71	30 MA	111 WH		R HQGAN
FPE329669	1233	A	13	29	162920	64	250		56	MS	18 HY	19			58 WH	58 WH COA		J W WALLACE
FPE333017	1358	D	13	29	162920	94	175		47	FS MA	35 PK	25			45 CR	80 WH		G R WEIHE
FPE334256	1271	D	13	29	162920	86	147		44	MS	35 ME	20			75	86 MA		CAUM W
FPE337119	1043	D	13	29	162920	138	210		48	MS LA	44 MR	29	77 LA	14	73 TA	136 WH		LOSCALZO,V
FPH342205	1358	A	13	29	162920	76	280		60									BROOKS,D E
FPE309754	0072	D	13	29	172920	51	150		27						51			
FPE308628	0056	D	13	29	172920	106	150		55						40			
FPE308791	0198	D	13	29	172920	45	65		31						43	43		C L SMITH
FPC348388	1043	D	13	29	172920	95	161		39									CAMPO, MARY
FPC346927	1094	D	13	29	172920	130	182		28									JOHNSON, MI
FPC348034	1043	D	13	29	172920	42	100		16									NASON, JOHN
FPC350291	1094	D	13	29	172920	147	252		33									POUND, LARR
FPC351913	1232	D	13	29	172920	95	200		47									ODIORNE, GE
FPC351718	1043	D	13	29	172920	52	106		15									SCOFIELD, C
FPC351305	1043	D	13	29	172920	53	90		15									MURROW, FRE
FPC356359	1043	D	11	29	172920	86	165		50									\$HIVER, Y.
FPN356561	1104	D	11	29	172920	***	CANCELLED	***										
FPC356431	1056	D	13	29	172920	57	195		35									GIBSON, CHA
FPC358326	1183	D	13	29	172920	60	90		35									D'BERRY, MR
FPC357735	1204	D	13	29	172920	42	215											FAULKNER, L
FPC357179	1204	D	11	29	172920	42	196											DAMON, RALP
FPC364072	1094	D	11	29	172920	147	310		30									HARRISON, D
FPC364848	1043	D	13	29	172920	105	195		34									KEARNEY, BA
FPC366845	2184	Y	11	29	172920	68												D O I
FPC366622	1160	D	11	29	172920	46	140		33									MILLER, MR.
FPN366513	1094	D	13	29	172920	***	CANCELLED	***										
FPC366846	2184	Y	11	29	172920	195												D O I
FPC366847	2184	Y	11	29	172920	17												D O I
FPC366884	1204	D	13	29	172920	42	217											WOOD, B. J.
FPE304833	0056	D	13	29	172920	113	145		35						85			
FPE304807	0119	L	13	29	172920	42	228		33						38			
FPE304948	0006	D	13	29	172920	87	220		29						42	58		A DAVIS
FPC367725	1160	D	11	29	172920	63	140		47									VIER, RAYM
FPE369134	1392	D	13	29	172920													DUKES, JOHN
FPC372159	1252	A	13	29	172920	180	260		20									COLESTOCK,
FPC371540	1043	B	13	29	172920	67	165	12	24									DEWRELL, L.
FPC373939	1817	I	13	29	172920	214	520											DAVIS, ALVI

DATE 6/02/93

D	P	P	D	B	O	D	D	G	R	I	E	L	S	S	S	O	C	T	D	C	T	H	P	L	H	I	C	D	C	U	D				
U	M	I	U	S	N	T	I	A	E	O	A	L	L	C	S	C	C	C	C	C	C	C	C	C	C	C	A	C	R	R	F	M			
S	I	L	S	I	T	N	A	S	L	U	G	L	E	S	A	C	F	S	Z	L	L	L	L	L	L	R	R	C	C	E	E				
E	T	L	E	N	Y	S	E	T	N	R	G	M	V	D	P	L	E	O	E	R	A	A	A	A	A	A	B	B	K	K	A	R			
																																MOTLEY, W.			
																																POUND, LARR			
WPE382144	1043	D	13	29	172920	3																													
WPI382674	2250	D	13	29	172920	2																													
WPE306183	0016	D	13	29	SWSE172920	3	72	92																											
WPE305519	0012	D	13	29	172920	4	95	130																											
WPE312360	0067	D	13	29	172920	4	64	160																											
WPE314122	0144	D	13	29	172920	4	91	175																											
WPE322673	1043	D	13	29	172920	4	53	105																											
WPE322671	1244	D	13	29	172920	4	87	169																											
WPE324497	1589	D	13	29	172920	4	70	190																											
WPH326206	1056	B	13	29	172920	4	56	125																											
WPH332417	1232	B	11	29	172920	4	75	198																											
WPH332479	1010	B	13	29	172920	6	73	300																											
WPE331884	1160	D	13	29	172920	3	58	172																											
WPH334099	1232	B	13	29	172920	4	90	280																											
WPE334179	1094	D	13	29	172920	4	135	233																											
WPE336394	1233	D	13	29	172920	4	48	200																											
WPE337206	1056	D	13	29	172920	4		142																											
WPH339766	1855	B	13	29	172920	4	76	100																											
WPH342594	1598	D	13	29	172920	4	84	130																											
WPE343293	1056	D	13	29	172920	4	65	151																											
WPH345146	1232	D	13	29	172920	4	63	137																											
WPH309198	0086	D	13	29	182920	3	50	84																											
WPC361444	1855	D	13	29	182920	4	52	130																											
WPC366166	1232	B	13	29	182920	4	97	220																											
WPE303142	0000	I	13	29	182920	8	25	300																											
WPC369077	2168	D	13	29	182920	2		72																											
WPC367856	1855	B	13	29	182920	4	84	230																											
WPE312326	0332	D	13	29	NENW182920	3	46	100																											
WPC323186	1252	D	13	29	182920	4	84	163																											
WPH326863	1232	B	13	29	182920	4	93	238																											
WPE334981	1160	D	13	29	182920	4	164	289																											
WPE309314	0067	D	13	29	192920	4	43	150																											
WPC371869	1126	A	11	29	192920	2	42	68																											
WPC376256	1598	A	13	29	192920	4	28	70																											
WPC379929	1232	A	13	29	192920	4	124	225																											
WPE382204	2088	D	13	29	192920	4																													
WPE305490	0086	D	13	29	NWNE192920	4	63	440																											
WPH307782	0003	D	13	29	NWSW192920	3	63	100																											
WPE316141	0253	D	13	29	192920	4	31	125																											
WPE320797	1233	M	13	29	192920	6	79	400																											
WPE329352	1686	D	13	29	192920	4	42	203																											
																																SEAL CORP			
																																ENGINEERED			
																																RUSSO, NICK			
																																BEST IRRIGA			
																																CENTRAL FLO			
																																GREESON, FR			
																																MORGAN CONS			
																																CARL SMITH			
																																ADMO CL STR			
																																GADD CONC I			
																																SALABARRIA			

DATE 6/02/83

[illegible]

Appendix 9-2
Consumptive Use Permits
Inventory

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

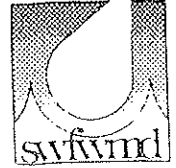


2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 SUNCOM 684-1011

BRUCE A. SAMSON, Chairman, Tampa
Wm. O. STUBBS, JR., Vice Chairman, Dade City
JIM KIMBROUGH, Secretary, Brooksville
RONALD B. LAMBERT, Treasurer, Wauchula
DON CRANE, Assistant Secretary, St. Petersburg
ARCH UPDIKE, JR., Assistant Treasurer, Lake Wales

WALTER H. HARKALA, Plant City
MARY A. KUMPE, Sarasota
MICHAEL ZAGORAC, JR., Belleair

GARY W. KUHL, Executive Director



August 25, 1983

Camp, Dresser, and McKee, Inc.
Attn: Mr. Tetreault
4100 W. Kennedy Blvd.
Suite 109
Tampa, FL 33609

Re: Computer Print-Out

Dear Mr. Tetreault:

Enclosed is a print-out listing the consumptive use permits within the latitude/longitude boundaries delineated (27 59 45, 27 55 00, 82 22 30, 82 18 45) as an area of concern in your attempt to help Hillsborough County complete its application.

Please feel free to contact me at Extension 1322 if you have any questions or require additional assistance.

Sincerely,

SUSAN E. AMES
Supervisor
Processing & Records

SEA:aa
Enclosure: as stated

cc: L.M. Blain
J.E. Curren

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 3

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

0134C OC P CAMPOAMOR MODERN DAIRY INC.

501 US HWY 301 SOUTH

TAMPA

FL 33619

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVE	PERMITTEE FAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
143,400	205,100	2	6	0	180.0	00 00 00	83/02/01

SOURCE NAME

DIAMETER

WD PER MAX

W/O DESCRIPTION

WD TYPE	W/LAT	W/LONG	USE CODE	USE DESCRIPTION
G	275648	822134	532	DAIRY FARMING
G	275654	822135	010	DOMESTIC
G	275646	822130		
G	275638	822138		
G	275654	822132		
G	275656	822133		

0

200,000

MISSING USE CODE

0

0

MISSING USE CODE

0

0

MISSING USE CODE

0

5,100

MISSING USE CODE

0

0

MISSING USE CODE

0

0

MISSING USE CODE

USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES
532	DAIRY FARMING	140,572	180.0
010	DOMESTIC	2,868	0.0

USE PUMPAGE

USE ACRES

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
COC	071	06	77/65	00/00	NO RUNOFF

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 4

DATE 83/08/24

REPORT NUMBER 41-099
 PERMIT NUM STAI NAME
 01416 00 P BROWNLEE, J. C.
 ADDRESS
 716 S EVERS ST
 CITY
 PLANT CITY
 FL 33566

BASIN
 HILLSBOROUGH
 COUNTY
 HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
17,100	480,000	1	1	0	17.0	05 29 20	83/02/01
WC TYPE G	W/LAY 275924	SOURCE NAME 821925			DIAMETER 0	WD PER AVG 17,100	WD PER MAX 480,000
USE CODE 125	USE DESCRIPTION CITRUS				USE PLUMPAGE 17,100	USE ACRES 17.0	W/D DESCRIPTION MISSING USE CODE

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	071	06	77/05	00/00	NO RUNOFF

REPORT NUMBER 41-099 DATE 83/08/24

PERMIT NUM STAT NAME CITY ST ZIP
 02024 00 F C.C.C. CO PLANT CITY FL 33566

BASIN COUNTY

HILLSBOROUGH HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
23,671	288,000	1	1	0	85.0	05 29 20	83/04/06

WC TYPE W/LAT W/LONG SOURCE NAME DIAMETER WD PER AVG WD PER MAX W/D DESCRIPTION
 G 275909 821933 GROUNDWATER 0 23,671 288,000 MISSING USE CODE

USE CODE USE DESCRIPTION USE PLMPAGE USE ACRES
 125 CITRUS 23,671 40.8

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT CUE	DESCRIPTION
COC	071	06	77/05	00/00	NO RUNOFF

DATE 83/08/24

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

REPORT NUMBER 41-099

PERMIT NUM STAT NAME

02285 01 P SPRINGER, CHARLES E.

BASIN

HILLSBOROUGH

ADDRESS

7001 INTERBAY BLVD

COUNTY

HILLSBOROUGH

CITY

TAMPA

ST FL

ZIP 33616

PERMITTED AVE	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
127,000	254,000	1	2	0	71.2	04 29 20	89/03/02
WC TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	275907	821907		6	63,500	127,000	PUBLIC SUPPLY
WD#002	275856	821904		12	63,500	127,000	PUBLIC SUPPLY
USE CODE	USE DESCRIPTION	ON-SITE PERCOLATION & FONDING	USE PUMPAGE	USE ACRES			
026			127,000	100.0			

WELL ALM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	073	06	83/05	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
000	087	72	89/05	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
000	095	06	83/05	00/00	DISTRICT RESERVES RIGHT TO REQUIRE PUMPAGE RECOPDS
000	097	06	83/05	00/00	WATER CONSERVATION METHODS

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 6

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS CITY

ST ZIP

02205 01 P SPRINGER, CHARLES E.

TAMPA

FL 33616

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SNO PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXP. DATE
127,000	254,000	1	2	0	71.2	04 29 20	89/03/02
WC TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	2759C7	821907		6	63,500	127,000	PUBLIC SUPPLY
WC#002	275856	821904		12	63,500	127,000	PUBLIC SUPPLY
USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES				
026	ON-SITE PERCOLATION & FONDING	127,000	100.0				

WELL ALN	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	073	06	83/05	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
000	082	72	89/05	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
000	095	06	83/05	00/00	DISTRICT RESERVES RIGHT TO REQUIRE PUMPAGE RECORDS
000	097	06	83/05	00/00	WATER CONSERVATION METHODS

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

DATE 83/08/24

REPORT NUMBER 41-099

PERMIT NUM STAT NAME

02840 01 P SEABORD UTILITIES CORP

ADDRESS

3250 SW 3RD AVE

CITY

MIAMI

ST ZIP

FL 33129

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG PERMITTED MAX NUM USES NUM GWD PTS NUM SWD PTS TOT-ACRES SFC/TWNSHP/RGE EXPIRE DATE

720,000 2,260,000 1 9 0 1,495.4 25 19 83/12/07

WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIA/FT	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	27561C	822138		4	68,000	172,000	PUBLIC SUPPLY
WD#002	27561C	822133		8	68,000	172,000	PUBLIC SUPPLY
WD#003	27561C	822127		8	0	0	PUBLIC SUPPLY
WD#004	27561C	822122		8	172,000	605,000	PUBLIC SUPPLY
WD#005	27561C	822113		6	63,000	156,000	PUBLIC SUPPLY
WD#006	27561C	822117		6	63,000	156,000	PUBLIC SUPPLY
WD#007	27561C	822116		8	143,000	500,000	PUBLIC SUPPLY
WD#008	27561C	822146		8	143,000	500,000	PUBLIC SUPPLY
WD#009	275613	822133		8			PUBLIC SUPPLY

USE PLMPAGE USE ACRES
720,000 0.0

USE CODE USE DESCRIPTION ON-SITE SPRAY IRRIGATION
034

USER01

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
C0C	C73	06	81/05	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
C00	082	72	84/05	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
C0C	112	72	82/12	88/12	REPORT ANALYSIS OF EFFECTS UPON HYDROLOGIC SYSTEM
C01	C05	01	81/02	83/10	METER PUMPAGE-REAC AND SUBMIT MONTHLY
C01	C38	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C02	C05	01	81/02	83/10	METER PUMPAGE-REAC AND SUBMIT MONTHLY
C02	C38	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C04	C05	01	81/02	83/10	METER PUMPAGE-REAC AND SUBMIT MONTHLY
C04	C38	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C05	C05	01	81/02	83/10	METER PUMPAGE-REAC AND SUBMIT MONTHLY
C05	C38	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C06	C05	01	81/02	83/10	METER PUMPAGE-REAC AND SUBMIT MONTHLY
C06	C38	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C08	C05	01	81/06	83/10	METER PUMPAGE-REAC AND SUBMIT MONTHLY
C08	C38	01	81/06	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C09	C05	01	82/01	83/10	METER PUMPAGE-REAC AND SUBMIT MONTHLY
C09	C38	01	82/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 8

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

02916 DC P FEATHEROCK MOBILE HOME PARK

220C HWY 60 E

VALPICO

FL 33594

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVE PERMITTED MAX NUM USES NUM 6WD PTS NUM SWG PTS TOT-ACRES SEC/TWNSHP/RGE EXPIRE DATE

45,000 432,000 1 1 1 0 73.0 29 29 20 83/06/01

WC TYPE G

W/LAT 275619 W/LONG 822035

DIAHETER 0

WC PER AVG 45,000

WD PER MAX 432,000

W/E DESCRIPTION MISSING USE CODE

USE CODE 034 USE DESCRIPTION ON-SITE SPRAY IRRIGATION

USE PLMPAPE 45,000 USE ACRES 0.0

USE#01

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 9

DATE 83/08/24

REPORT NUMBER 41-099

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

02969 00 P L.C. CASSIDY & SONS OF FLA., INC 1090 STANLEY PD.

LAREC

FL 33541

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVE	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/THNSHP/RGE	EXPIRE DATE
1,000	2,300	1	1	0	1.0	17	83/05/04
WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WC PFR AVG	WD PER MAX	W/P DESCRIPTION
G	275725	822005		0	1,000	2,300	MISSING USE CODE
USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES				
009	INDIVIDUAL SEPTIC TANKS	1,000	0.0				

USE#01

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME ADDRESS CITY ST ZIP

03281 OC P ROZIER MACHINERY CO, JOSEPH L. 1710 HWY 301 N TAMPA FL 33609

BASIN

CCLNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
55,200	360,000	1	1	0	21.2	CC CC	83/05/04
WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
G	275724	822117		C	55,200	360,000	MISSING USE CODE
USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES				
900	MISCELLANEOUS (100% CONSUMPTIVE)	55,200	0.0				

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

DATE 83/08/24

REPORT NUMBER 41-059

PERMIT NUM STAT NAME ADDRESS CITY ZIP
 03406 00 P FLA STATE FAIR AUTHORITY PO BOX 11766 TAMPA FL 33680

BASIN COUNTY
 HILLSBOROUGH HILLSBOROUGH

PERMITTED AVG	PERMITTED PAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXP. DATE
235,000	604,000	2	2	0	278.6	00 00 00	83/08/03

WC TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	275928	822149		0	168,000	504,000	MISSING USE CODE
WD#002	275912	822216		0	67,000	100,000	MISSING USE CODE

USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES
102	LAWNS/SPRINGS FOR RECREATION/ATTRACHIONS	150,400	222.9
082	LAKE AUGMENTATION	84,600	2.8

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
CO0	C71	06	77/11	00/00	NO RUNOFF
CO1	003	03	78/04	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
CO2	003	03	78/04	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY

DATE 83/08/24

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

REPORT NUMBER 41-099

PERMIT NUM STAT NAME ADDRESS CITY ZIP
 04352 CC P HILLSBOROUGH CO UTILITIES DEPT PO DRAWER 3292 TAMPA FL 33601

BASIN

COUNTY

ALAFIA

HILLSBOROUGH

PERMITTED AVE	PERMITTED PAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXP. DATE
13,078,000	27,440,000	5	55	0	1.1	QC CO CO	83/08/03
WC TYPE	W/LAY	W/LONG	SOURCE NAME	CIAMETFR	WD PER AVG	WD PER MAX	WD DESCRIPTION
WD#001	274252	822317		0	300,000	600,000	MISSING USE CODE
WD#002	274252	822324		0	300,000	600,000	MISSING USE CODE
WD#003	274318	822028		0	300,000	600,000	MISSING USE CODE
WD#004	274318	822030		0	300,000	600,000	MISSING USE CODE
WD#005	274319	822033		0	350,000	500,000	MISSING USE CODE
WD#006	274301	822035		0	250,000	500,000	MISSING USE CODE
WD#007	274322	822026		0	350,000	600,000	MISSING USE CODE
WD#008	274315	822017		0	370,000	600,000	MISSING USE CODE
WD#009	274256	822016		0	0	0	MISSING USE CODE
WD#010	274303	822009		0	250,000	500,000	MISSING USE CODE
WD#011	274442	822009		0	250,000	500,000	MISSING USE CODE
WD#012	274907	821953		0	550,000	800,000	MISSING USE CODE
WD#013	274903	821953		0	300,000	500,000	MISSING USE CODE
WD#014	274857	821953		0	0	0	MISSING USE CODE
WD#015	274857	821947		0	250,000	300,000	MISSING USE CODE
WD#016	274901	821941		0	550,000	700,000	MISSING USE CODE
WD#017	274904	821947		0	300,000	400,000	MISSING USE CODE
WD#018	274909	821947		0	400,000	400,000	MISSING USE CODE
WD#019	274914	821947		0	250,000	400,000	MISSING USE CODE
WD#020	275323	821608		0	500,000	1,000,000	MISSING USE CODE
WD#021	275337	821713		0	500,000	1,000,000	MISSING USE CODE
WD#022	275414	821707		0	100,000	500,000	MISSING USE CODE
WD#023	275427	821534		0	800,000	2,000,000	MISSING USE CODE
WD#024	275428	821750		0	500,000	150,000	MISSING USE CODE
WD#025	275429	821732		0	100,000	150,000	MISSING USE CODE
WD#026	275507	821754		0	150,000	350,000	MISSING USE CODE
WD#027	275508	821644		0	150,000	500,000	MISSING USE CODE
WD#028	275510	821712		0	150,000	340,000	MISSING USE CODE
WD#029	275556	821611		0	350,000	750,000	MISSING USE CODE
WD#030	275623	821519		0	750,000	1,750,000	MISSING USE CODE
WD#031	275634	821838		0	0	0	MISSING USE CODE
WD#032	275634	821839		0	850,000	2,000,000	MISSING USE CODE
WD#033	275639	821634		0	0	0	MISSING USE CODE
WD#034	275638	821631		0	250,000	450,000	MISSING USE CODE
WD#035	275707	821807		0	200,000	900,000	MISSING USE CODE
WD#036	275718	821649		0	450,000	550,000	MISSING USE CODE
WD#037	275722	821612		0	0	0	MISSING USE CODE
WD#038	275722	821612		0	0	0	MISSING USE CODE

WD#039 G 275759 821711 0 50,000 400,000 MISSING USE CODE

007 042 03 79/01 83/10 CHLORIDE ANALYSIS MONTHLY, SUPMIT QUARTERLY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

REPORT NUMBER	NUMBER	41-095	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C07	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C07	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C07	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C08	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C08	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C08	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C10	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C10	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C10	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C10	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C11	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C11	042		03	80/07	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C11	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C11	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C12	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C12	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C12	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C12	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C15	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C15	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C15	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C15	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C16	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C16	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C16	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C16	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C17	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C17	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C17	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C17	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C18	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C18	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C18	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C18	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C19	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C19	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C19	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C19	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C20	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C20	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C20	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C20	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C21	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY
C21	042		03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C21	280		03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C21	293		03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C22	003		03	79/01	83/10	METER PUMPAGE-REAC MONTHLY, SUBMIT QUARTERLY

022 280 03 79/01 83/10 SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY

035 293 03 79/01 83/10 SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY

04# 063 03 78/07 83/10 MEASURE WATER LFVEL DAILY, SUBMIT QUARTERLY

DATE 83/08/24

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

REPORT NUMBER 41-099	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C48	139	03	79/01	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C49	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C50	139	03	79/01	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C51	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C52	139	03	79/01	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C53	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C54	139	03	79/01	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C55	300	72	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C56	300	72	79/01	83/10	CONSTRUCT 1 MONITOR WELL
C57	139	03	79/01	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C58	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

DATE 8/3/08/24

REPORT NUMBER 41-009

PERMIT NUM STAT NAME ADDRESS CITY ST ZIP
05244 00 P WOODBERRY ESTATES, ELIZABETH 124 KNIGHTS AVE BRANDON FL 33511

BASIN
HILLSBOROUGH
COUNTY
HILLSBOROUGH

PERMITTED AVG	PERMITTED PAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
14,500	240,000	2	1	0	220.0	20 29 20	85/07/10
WD TYPE G	W/LAT 275702	W/LONG 821902	SOURCE NAME	DIAMETER 6	WC PER AVG 14,500	WD PER MAX 240,000	W/D DESCRIPTION MISSING USE CODE
USE CODE 250 115	USE DESCRIPTION VEGETABLES PASTURE-HAY	USE PUMPAGE 13,775 725	USE ACRES 15.0 10.0				

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
COC	C71	06	79/11	00/00	NO RUNOFF
COC	073	06	79/11	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
COC	082	72	85/07	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
000	086	06	79/11	80/11	NOTIFY IF PERMANENT TERMINATION OF WITHDRAWAL

DATE 83/08/24

ST ZIP
FL 33569

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

REPORT NUMBER 41-099

PERMIT NUM STAT NAME

06390 CC P PULIDO INC., R. M.

RASIN

ADDRESS

3601 PROVIDENCE RD

CITY

RIVERVIEW

COUNTY

HILLSBOROUGH

PERMITTED AVG PERMITTED MAX NUM USES NUM GWD PTS NUM SWD PTS TOT-ACRES SFC/TWNSHP/RGE EXPIRE DATE

242,000 1,440,000 3 1 0 240-C 32 29 20 87/07/01

WD TYPE G W/LAT 275508 W/LONG 821933 DIAMETER WD PER AVG WD PER MAX W/D DESCRIPTION
12 242,000 1,440,000 IRRIGATION

WD#001

USE CODE USE DESCRIPTION
355 SMALL GRAINS
250 VEGETABLES
250 VEGETABLES

USE PLUMPAGE USE ACRES
77,924 34.8
46,948 34.8
117,128 34.8

WELL NUM STIP CODE FREQ CODE DUE DATE NEXT DUE DESCRIPTION
CCG C71 06 81/11 OC/CO NO RUNOFF
CCG C73 06 81/11 OC/CO DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
CCG C82 72 87/11 OC/CO MINIMUM AQUIFER LEVEL MAY BE SET

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

CITY

ST ZIP

06713 00 P TAMPA WATER DEPT, CITY OF

1 CITY HALL PLAZA, 5TH FLOOR

TAMPA

FL 33602

RASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG PERMITTED MAX NUM USES NUM GND PTS NUM SWD PTS TOT-ACRES SEC/TWNSHP/RSE EXPIRE DATE

58,000 100,000 1 1 0 4A.C 06 29 20 83/05/05

WC TYPE W/LAT W/LONG SOURCE NAME

822008

DIAMETER WD PER AVG

6

58,000

WD PER MAX

100,000

W/C DESCRIPTION

PUBLIC SUPPLY

USE CODE USE DESCRIPTION USE PUMPAGE USE ACRES

009

INDIVIDUAL SEPTIC TANKS

58,000

0.0

08

WELL NUM STIP CODE FREQ CODE DUE DATE NEXT DUE DESCRIPTION

C00 C70

82/11

00/00

METER CONNECTIONS; DATA AVAILABLE ON REQUEST

C00 C73

82/11

00/00

DISTRICT RESERVES RIGHT TO COLLECT SAMPLES

C00 C82

83/05

00/00

MINIMUM AQUIFER LEVEL MAY BE SET

C00 C95

82/11

00/00

DISTRICT RESERVES RIGHT TO REQUIRE PUMPAGE RECORDS

C00 C97

82/11

00/00

WATER CONSERVATION METHODS

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

DATE 83/08/24

REPORT NUMBER 41-099

PERMIT NUM STAT NAME CITY ST ZIP
 06783 OC P DAVIS, ALVIN ZEPHYRHILLS FL 33599

BASIN COUNTY
 HILLSBOROUGH HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USFS	NUM GWD PTS	NUM SWG PTS	TOT-ACRES	SEC/TWNSHP/ROF	EXPIRE DATE
14,400	32,000	1	1	0	6.2	17 29 20	82/11/30
WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
6	275732	821940		6	14,400	32,000	INDUSTRIAL
USE CODE	USE DESCRIPTION	USE PLMPAGE	USE ACRES				
890	MISCELLANEOUS 1901 CONSUMPTIVE	14,400	0.0				

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	073	06	82/11	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
000	082	06	82/11	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
000	097	06	82/11	00/00	WATER CONSERVATION PFTPCDS

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 22

DATE 83/08/24

REPORT NUMBER 41-099

TOTAL SURFACE WITHDRAWALS	0
TOTAL GROUND WITHDRAWALS	83
NUMBER OF USES	23
TOTAL USE ACRES	694.0
TOTAL USE PUMPAGE	14,774,271
TOTAL PERMIT ACRES	3,137.8
PERMITTED AVERAGE PUMPAGE	14,774,271
PERMITTED MAXIMUM PUMPAGE	34,137,400
TOTAL CONSUMPTIVE USE	8,903,897

Appendix 9-3
Surface Water Quality Sampling
Lab Analysis
(Sampling Locations are presented
in Section 2.3.4 of the Application)



Orlando Laboratories, Inc.

P. O. Box 19127 • Orlando, Florida 32814 • 305/896-6645

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83

Page 1 of 7

IDENTIFICATION: Station #1 @ 0940 hrs, Weather conditions: Sunny/no clouds,
Water condition: Turbid/grey-white suspended. Water temper-
ature: 24°C, pH: 7.35, Open area, grass field with erosion
on culvert.

RESULTS OF ANALYSIS

<u>DETERMINATION</u>	<u>SAMPLE</u>
Turbidity, NTU	196
Total Alkalinity, CaCO ₃	29
Ammonia Nitrogen, N (NH ₃ -N)	0.08
Total Kjeldahl Nitrogen, TKN	1.1
Nitrate Nitrogen, N (NO ₃ -N)	0.10
Nitrite Nitrogen, N (NO ₂ -N)	<0.01
Total Phosphate, P (T-PO ₄ -P)	0.58
Total Suspended Solids, TSS	27
Dissolved Oxygen, DO (Field-Fixed)	10.1
Total Hardness, CaCO ₃	111

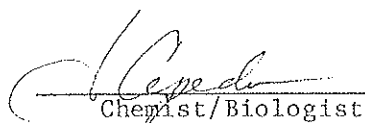
SIEVE SIZING

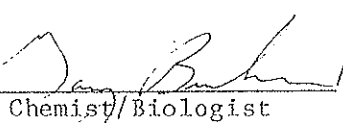
Percentages expressed as dry weight basis. Sample sediments dried at 105°C for 24 hours. Percentage of sample sediment retained at given sieve sizes:

Sieve Size:	#20	Percentage retained:	0.364
	#40		9.09
	#70		62.3
	#140		26.0
	#200		1.93
Percent passed through #200 sieve			0.176

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist


Chemist/Biologist

Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83
Page 2 of 7

IDENTIFICATION: Station #1 @ 0940 hrs, Weather conditions: Sunny/no clouds,
Water condition: Turbid/grey-white suspended. Water temper-
ature: 24°C, pH: 7.35, Open area, grass field with erosion
on culvert.

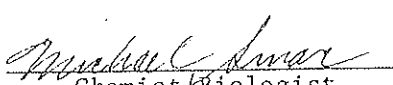
RESULTS OF ANALYSIS

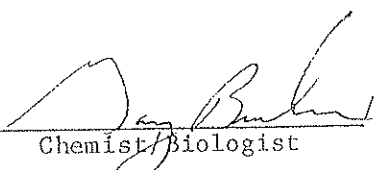
Benthic counts based on a single grab (6" X 6") per sampling site.

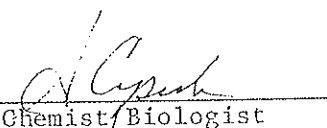
<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
Chironomus	8	
Hyallolella azteca	2	
Lumbriculus inconstans	5	
Tubifex	2	
		0.528

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist


Chemist/Biologist


Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83
Page 3 of 7

IDENTIFICATION: Station #2 @ 1040 hrs, Weather conditions: Sunny/no clouds,
Water condition: Clear. Wooded area. Water temperature:
22.5°C, pH: 6.90.

RESULTS OF ANALYSIS

DETERMINATION

SAMPLE

Turbidity, NTU	4.9
Total Alkalinity, CaCO ₃	151
Ammonia Nitrogen, N (NH ₃ -N)	0.31
Total Kjeldahl Nitrogen, TKN	0.77
Nitrate Nitrogen, N (NO ₃ -N)	0.03
Nitrite Nitrogen, N (NO ₂ -N)	<0.01
Total Phosphate, P (T-PO ₄ -P)	0.15
Total Suspended Solids, TSS	9.0
Dissolved Oxygen, DO (Field-Fixed)	2.60
Total Hardness, CaCO ₃	238

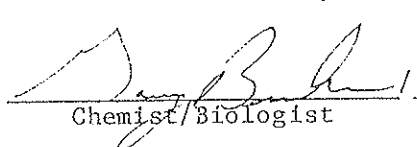
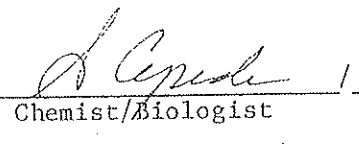
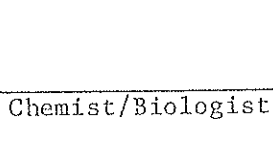
SIEVE SIZING

Percentages expressed as dry weight basis. Sample sediments dried at 105°C for 24 hours. Percentage of sample sediment retained at given sieve sizes:

Sieve Size: #20	Percentage retained: 0.866
#40	12.9
#70	57.5
#140	26.6
#200	1.90
Percent passed through #200 sieve	0.186

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

 Chemist/Biologist  Chemist/Biologist  Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83
Page 4 of 7

IDENTIFICATION: Station #2 @ 1040 hrs, Weather conditions: Sunny/no clouds,
Water condition: Clear. Wooded area. Water temperature:
22.5°C, pH: 6.90.

RESULTS OF ANALYSIS

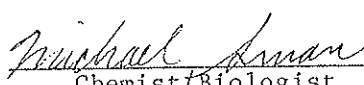
Benthic counts based on a single grab (6" X 6") per sampling site.

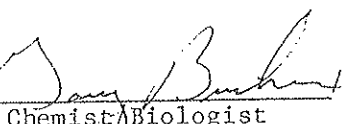
<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
Chironomus	2	
Pentaneura monilis	2	
Stenelmis	10	
Caenis diminuta	9	
Lumbriculus inconstans	9	
(Bivalve) too immature to identify	2	
		0.762

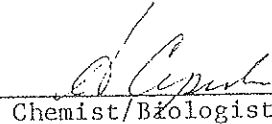
3 Gambusia affinis also collected in sample.

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist


Chemist/Biologist


Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83
Page 5 of 7

IDENTIFICATION: Station #3 @ 1240 hrs, Weather conditions: Sunny/no clouds, Water Temperature: 22°C, pH: 7.2, Cow pasture ditches, soft ground, black muck ditch, turbid water, large amount of leaf matter (detritus), Loral oaks predominant, scrub forest fauna, cattle feces present.

RESULTS OF ANALYSIS

<u>DETERMINATION</u>	<u>SAMPLE</u>
Turbidity, NTU	31
Total Alkalinity, CaCO ₃	92
Ammonia Nitrogen, N (NH ₃ -N)	0.29
Total Kjeldahl Nitrogen, TKN	1.2
Nitrate Nitrogen, N (NO ₃ -N)	0.28
Nitrite Nitrogen, N (NO ₂ -N)	<0.01
Total Phosphate, P (T-PO ₄ -P)	2.0
Total Suspended Solids, TSS	60
Dissolved Oxygen, DO (Field-Fixed)	4.80
Total Hardness, CaCO ₃	182

Benthic counts based on a single grab (6" X 6") per sampling site.

<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
Perithemis domitia	1	
Lumbriculus inconstans	16	
Actinolaimus	23	
Pentaneura monilis	1	
		0.378

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

Michael L. Lauer *Dana Bircher* *J. Lepore*
Chemist/Biologist Chemist/Biologist Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83

Page 6 of 7

IDENTIFICATION: Station #4 @ 1300 hrs, Weather conditions: Sunny/no clouds, Water Temperature: 22°C, pH: 7.9, Cow pasture ditches, soft ground, black muck ditch, white-grey turbid water, large amount of leaf matter (detritus), Laurel oaks predominant, scrub forest fauna, cattle feces present, second feed in ditch.

RESULTS OF ANALYSIS

<u>DETERMINATION</u>	<u>SAMPLE</u>
Turbidity, NTU	126
Total Alkalinity, CaCO ₃	33
Ammonia Nitrogen, N (NH ₃ -N)	0.43
Total Kjeldahl Nitrogen, TKN	1.4
Nitrate Nitrogen, N (NO ₃ -N)	0.07
Nitrite Nitrogen, N (NO ₂ -N)	<0.01
Total Phosphate, P (T-PO ₄ -P)	0.38
Total Suspended Solids, TSS	61
Dissolved Oxygen, DO (Field-Fixed)	6.40
Total Hardness, CaCO ₃	85.6

Benthic counts based on a single grab (6" X 6") per sampling site.

<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
Tupifex	2	
Lumbriculus inconstans	6	
		0.244

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

Michael L. Lauer *Sam Bircher* *D. L. Lauer*
Chemist/Biologist Chemist/Biologist Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83
Page 7 of 7

IDENTIFICATION: Station #5 @ 1430 hrs, Weather conditions: Sunny/no clouds, Water Temperature: 24°C, pH: 7.4, culvert near Tampa By-pass canal, hard bottom, possible lime or clay substrate, sampled with Kemmerer for water sample from roadway, Ekman grab sample taken from side of ditch, white-grey clay sediment, very hard, small amount of sample taken.

RESULTS OF ANALYSIS

<u>DETERMINATION</u>	<u>SAMPLE</u>
Turbidity, NTU	39
Total Alkalinity, CaCO ₃	129
Ammonia Nitrogen, N (NH ₃ -N)	0.16
Total Kjeldahl Nitrogen, TKN	1.2
Nitrate Nitrogen, N (NO ₃ -N)	2.2
Nitrite Nitrogen, N (NO ₂ -N)	0.04
Total Phosphate, P (T-PO ₄ -P)	0.50
Total Suspended Solids, TSS	26
Dissolved Oxygen, DO (Field-Fixed)	8.35
Total Hardness, CaCO ₃	227

Benthic counts based on a single grab (6" X 6") per sampling site.

<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
No macroinvertebrates found.		0

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

Michael Lauer Jay Bircher A. Cepa
Chemist/Biologist Chemist/Biologist Chemist/Biologist

Appendix 10

Soils and Related Geotechnical Information

Appendix 10-1
Summary of Important Soil
Characteristics

SUMMARY OF IMPORTANT CHARACTERISTICS

60

SOIL SURVEY SERIES 1950, NO. 3

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Aa	Adamsville fine sand . . .	0-2	Slow . . .	Rapid when freed of the high water table.	Slightly acid to neutral or alkaline.	Dark-gray to gray fine sand, 3 to 8 inches thick.	Light-gray to brownish-yellow fine sand.	Vegetables, truck crops, pasture, and forest.	Pines; saw-palmettos; cabbage palmettos; wiregrass.	IVs-2.
Ab	Alachua loamy fine sand	0-2	Medium	Medium . . .	Medium acid . . .	Very dark grayish-brown to grayish-brown loamy fine sand, 6 to 8 inches thick. Contains a few small pebbles.	Dark-brown or pale-brown to yellowish-brown, brown, or strong-brown loamy fine sand. Contains a few small pebbles.	General crops, a few acres of vegetables, and pasture.	Hardwoods; a few shrubs and grasses.	IW-1.
Ac	Alluvial land	Nearly level . . .	Very slow . . .	Very slow . . .	Strongly acid to neutral or alkaline.	Variable	Variable	Forest, pasture, and refuges for wildlife.	Hammock vegetation of hardwoods; shrubs; vines; cypress; a few pines.	Vw-1.
Ad	Arredondo fine sand: Level phase	0-2	Medium . . .	Rapid . . .	Medium to slightly acid.	Very dark grayish-brown to grayish-brown fine sand, 6 to 8 inches thick. Contains a few small pebbles.	Dark yellowish-brown to yellowish-brown or brownish-yellow fine sand. Contains a few phosphatic pebbles.	Citrus fruits, general crops, pasture, and forest.	Pines; live and blue-jack oaks; hickory; various grasses.	IIIs-1.
Ae	Gently undulating phase.	2-8	Medium to rapid.	Rapid . . .	Same	Same	Same	Citrus fruits, general crops, vegetables, pasture, and forest.	Same	IIIs-1.
Ba	Blanton fine sand: Level phase	0-2	Slow . . .	Rapid . . .	Medium acid	Dark-gray or gray fine sand, 4 to 8 inches thick.	Grayish-brown or light brownish-gray to very pale brown or light-gray fine sand, lower part spotted with pale yellow or yellow.	Citrus fruits, general crops, vegetables, pasture, and forest.	Oaks; pines; a few saw-palmettos; grasses.	IIIs-1.
Bb	Gently undulating phase.	2-5	Medium to rapid.	Rapid . . .	Medium acid . . .	Same	Same	Same	Same	IIIs-1.
Bc	Undulating phase	5-12	Rapid	Rapid . . .	Medium acid	Same	Same	Forest, pasture, citrus fruits, and general crops.	Same	IIIs-1.
Bd	Brown-layer phase . . .	0-2	Slow	Medium	Medium acid	Same	Gray or light brownish-gray fine sand over dark grayish-brown, organic stained layer; grayish-brown or pale-brown to very pale brown or light-gray fine sand, spotted with yellow at depths between 22 and 42 inches.	Pasture, general crops, and forest.	Oaks; a few pines and saw-palmettos; grasses.	IIIs-1.
Be	Brighton fine sand . . .	0-8	Slow to medium.	Slow to medium.	Medium acid to strongly acid.	Dark-gray fine sand, 6 to 9 inches thick.	Grayish-brown or gray fine sand, containing a few pebbles and rounded stones, to mottled light yellowish-brown and yellow fine sandy clay or fine sandy clay loam con-	General crops, citrus fruits, pasture, and forest.	Hardwoods; pines; a few cabbage palmettos and saw-palmettos; grasses.	IIC-1.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

HILLSBOROUGH COUNTY, FLORIDA

61

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Bf	Bradenton fine sand.....	0-2	Same.....	Same.....	Sand layers strongly acid to medium acid; clayey materials slightly acid to neutral.	Dark-gray fine sand, 4 to 9 inches thick.	taining many pebbles and rounded stones. Light grayish-brown or light-gray to pale-brown or grayish-brown fine sand over grayish-brown fine sandy clay; light-gray marl at depths between 32 and 42 inches.	Vegetables, truck crops, pasture, and forest.	Live oak; cabbage palmettos and saw-palmettos; pines; vines; shrubs; a few grasses.	IIIa-2.
Bg	Thin surface phase.....	0-2	Same.....	Slow.....	Same.....	Same.....	Light grayish-brown or light-gray to pale-brown or grayish-brown fine sand over grayish-brown fine sandy clay at depths within 18 inches of the surface; gray marl at depths between 20 and 30 inches.	Pasture and forest.	Live oak, gum, elm, hickory, magnolia, and cabbage palmettos; rank growth of saw-palmettos, shrubs, and vines; a few grasses.	IIIa-2.
Bh	Brighton peat.....	Nearly level or slightly depressed.	Very slow or ponded.	Slow.....	Strongly to very strongly acid.	Very dark brown fibrous peat.	Dark grayish-brown or brown fibrous peat, underlain by dark-gray or gray fine sand at depths between 20 and 48 inches.	Pasture and truck crops; used as organic fertilizer or as filler in mixed fertilizer.	Water plants and grasses.	IIIa-4.
Bk	Brighton mucky peat.....	Same.....	Same.....	Slow.....	Same.....	Black nonfibrous mucky peat.	Dark-brown or grayish-brown fibrous felty peat underlain at depths between 15 and 40 inches by gray or light-gray fine sand.	Same.....	Same.....	IIIa-4.
Bi	Broward fine sand.....	0-2	Slow.....	Medium to rapid if freed of high water table.	Sand layers slightly acid to alkaline.	Dark-gray or gray fine sand, 3 to 8 inches thick.	Light-gray to yellowish-brown fine sand. Limestone at 12 to 36 inches.	Pasture and forest.	Second-growth pine; cabbage palmettos, saw-palmettos, and runner oaks; gallberry and other shrubs; wiregrass.	IVa-2.
Co	Charlotte fine sand.....	Level or slightly depressed.	Very slow or ponded.	Rapid when freed of high water table.	Same.....	Grayish-brown fine sand, 3 to 8 inches thick.	Yellowish-brown to brownish-yellow fine sand at depths of 12 to 24 inches over light-gray or white fine sand, underlain by limestone or marl.	Pasture and a few acres of vegetables.	Grasses; a few pines; cabbage palmettos.	IVa-3.
Do	Delray fine sand.....	Same.....	Same.....	Same.....	Same.....	Black fine sand, 7 to 20 inches thick.	Very dark gray or dark-gray to light-gray or gray fine sand, lower part streaked with pale yellow and brown.	Same.....	Grasses; gallberry and myrtle bushes; a few cabbage palmettos; pines; hardwoods.	IIIa-3.
Db	Shallow phase.....	Same.....	Same.....	Same.....	Same.....	Same.....	Dark-gray to gray or light-gray fine sand underlain, at depths between 30 and 42 inches, by gray to light-gray fine sandy clay loam or fine sandy clay, mottled with pale	Pasture and a few acres of vegetables and truck crops.	Same.....	IIIa-3.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

62

SOIL SURVEY SERIES 1950, NO. 3

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Eo	Eustis fine sand: Level phase.....	0-2	Slow to medium.	Rapid.....	Strongly acid.	Dark grayish-brown or grayish-brown fine sand, 2 to 6 inches thick.	Strong-brown to reddish-yellow, or yellowish-red loose fine sand.	Citrus fruits, pasture, and a few acres of watermelons and general crops.	Oaks; sand pines; a few saw-palmettos; rosemary; grasses.	IIIs-1.
Eb	Gently undulating phase.	2-8	Medium to rapid.	Rapid ...	Strongly acid	Same.....	Same.....	Same.....	Same.....	IIIs-1.
Fo	Felda fine sand.....	Level or slightly depressed.	Very slow or ponded.	Medium when freed of high water table.	Sand layers slightly acid; clayey materials slightly acid to alkaline.	Very dark gray or dark-gray fine sand, 3 to 9 inches thick.	Grayish-brown to light-gray fine sand over slightly mottled light brownish-gray or light-gray fine sandy clay loam; mottled light-gray, brownish-yellow, and yellow fine sandy clay loam containing a few lime and iron concretions at depths between 30 and 48 inches.	Pasture, vegetables, truck crops, and forest.	Grasses; a few pines; saw-palmettos; cabbage palmettos; gallberry bushes, myrtle bushes, and other shrubs.	IIIs-3.
Fb	Fellowship loamy fine sand.	0-8	Medium....	Slow.....	Strongly acid...	Very dark gray loamy fine sand containing a few pebbles; 4 to 8 inches thick.	Dark-gray loamy fine sand containing many pebbles to mottled gray, yellowish-brown, and yellow fine sandy clay, containing many pebbles and stones.	Pasture, general crops, forest.	Live oaks; pines; shrubs; grasses.	IIc-1.
Fc	Fort Meade loamy fine sand: Level phase.....	0-2	Slow to medium.	Medium to rapid.	Medium acid...	Black loamy fine sand containing a few phosphatic pebbles; 10 to 20 inches thick.	Dark grayish-brown to grayish-brown or brown loamy fine sand containing many pebbles and small rounded stones in lower part.	Citrus fruits, vegetables, general crops, improved pasture, forest.	Oaks; hickory and other hardwoods; pines; grasses.	IIs-2.
Fd	Undulating phase.....	2-12	Medium to rapid.	Medium to rapid.	Medium acid...	Same.....	Same.....	Same.....	Same.....	IIs-2.
Fe	Fresh water swamp (unclassified soils).	Level or depressions.	Soil covered by water during much of year.	Medium to rapid if freed of high water table.	Variable.....	Variable.....	Variable.....	Forest, refuges for wildlife.	Hardwoods; cypress; vines; shrubs; grasses.	Unclassified.
Go	Gainesville loamy fine sand: Level phase.....	0-2	Slow to medium.	Medium to rapid.	Medium acid...	Very dark grayish-brown loamy fine sand containing a few small phosphatic pebbles; 6 to 9 inches thick.	Dark-brown to strong-brown loamy fine sand containing a few pebbles and small stones.	Citrus fruits, general crops, improved pasture, forest.	Oaks; hickory; mangrovia; pines; shrubs; grasses.	IIs-2.
Gb	Gently undulating phase.	2-5	Rapid ...	Medium to rapid.	Medium acid...	Same.....	Same.....	Same.....	Same.....	IIs-2.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
la	Immokalee fine sand.....	0-2	Slow.....	Medium to rapid when freed of high water table.	Strongly to very strongly acid.	Dark-gray fine sand, 3 to 8 inches thick.	Gray to light-gray fine sand, between depths of 30 and 42 inches, overlying a very dark brown fine sand, weakly cemented layer grading to lighter color with depth.	Pasture, forest, and a few acres of vegetables.	Second-growth pine; saw-palmettos; runner oak; gallberry bushes; grasses.	IVa-2.
lb	Alkaline variant.....	0-2	Slow.....	Same.....	Upper part of profile strongly to very strongly acid; lower part, immediately below the hardpan, neutral to alkaline.	Same.....	Same.....	Pasture and forest.	Pines; saw-palmettos; shrubs; grasses.	IVa-2.
lc	Istokpoga peat.....	Level or slightly depressed.	Very slow or ponded.	Slow.....	Strongly to very strongly acid.	Black or very dark brown woody peat, 8 to 15 inches thick.	Dark reddish-brown to dark-brown woody peat underlain by gray or light-gray fine sand at depths of 30 to 60 inches.	Pasture, forest, and wildlife.	White and red bays; cypress; maple and other hardwoods; myrtle bushes; briars; vines; ferns; grasses.	IVa-4.
ld	Istokpoga mucky peat.....	Same.....	Same.....	Slow.....	Same.....	Black mucky peat, 6 to 10 inches thick.	Dark grayish-brown or reddish-brown woody peat over gray or light-gray fine sand.	Same.....	Same.....	IVa-4.
Ka	Kanapaha fine sand.....	0-2	Slow to medium.	Slow to medium.	Strongly acid...	Dark-gray fine sand, 3 to 6 inches thick.	Light-gray or light yellowish-brown to very pale brown fine sand containing a few pebbles. Streaked in lower part with yellowish brown and brownish yellow.	Vegetables, citrus fruits, pasture, and forest.	Gums; hickory; magnolia; oak; cabbage palmettos; saw-palmettos; pines; grasses.	IIIa-1.
Kb	Keri fine sand.....	0-2	Slow.....	Medium.....	Fine sand layers strongly acid to slightly acid. Marl layer strongly alkaline and overlies neutral to mildly alkaline fine sand.	Dark-gray or gray fine sand, 3 to 8 inches thick.	Light-gray or light brownish-gray fine sand over light-gray marl, streaked in places with yellow. Underlying layer mottled light-gray, brownish-yellow, and yellow fine sand.	Pasture, forest, and a few acres of vegetables.	Pines; runner oak; gallberry bushes; saw-palmettos; a few cabbage palmettos; grasses.	IVa-2.
Lb	Lakeland fine sand: Level phase.....	0-2	Slow to medium.	Rapid.....	Strongly to very strongly acid.	Dark-gray fine sand, 3 to 8 inches thick.	Yellowish-brown or brownish-yellow to light yellowish-brown loose fine sand.	Citrus fruits, watermelons, general crops, pasture, and forest.	Pines; a few shrubs and grasses; and bluejack oaks.	IIIa-1.
Ld	Gently undulating phase.....	2-6	Medium to rapid.	Rapid.....	Same.....	Same.....	Same.....	Same.....	Same.....	IIIa-1.
Le	Undulating phase.....	5-8	Rapid.....	Rapid.....	Same.....	Same.....	Same.....	Same.....	Oaks; a few pines; shrubs; grasses.	IIIa-1.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

64

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Lc	Shallow phase.....	0-5	Slow to medium.	Rapid through sandy layer; medium to slow through clayey materials.	Same.....	Same.....	Yellowish-brown to brownish-yellow fine sand underlain at depths of 30 to 42 inches by fine sandy clay loam or sandy clay.	Citrus fruits, general crops, and pasture.	Same.....	IIIc-1.
Lc	Level deep phase.....	0-5	Slow to rapid.	Rapid.....	Same.....	Gray or light-gray fine sand, 4 to 8 inches thick.	Yellowish-brown to pale-yellow fine sand; finer textured materials at depths greater than 72 inches.	Pasture.....	Scrub live oaks; a few turkey oaks; sand pines; rosemary; grasses.	IIIc-1.
Lf	Undulating deep phase	Undulating...	Same.....	Rapid.....	Same.....	Same.....	Same.....	Pasture.....	Scrub live oaks; sand pines; rosemary; saw-palmettos; a few grasses.	IIIc-1.
Lq	Lakewood fine sand.....	0-2	Very slow because of rapid infiltration.	Medium to rapid.	Strongly acid throughout.	Light-gray or gray fine sand, 2 to 4 inches thick.	White fine sand to depths of 12 to 24 inches over yellow or brownish-yellow fine sand that grades to light gray and white with increasing depth.	Pasture, forest, and building sites.	Sand pine; scrub oak; undergrowth of saw-palmettos, rosemary, runner oak, pricklypear cactus, and wiregrass; few turkey and bluejack oaks.	IVs-1.
Lh	Leon fine sand.....	0-2	Slow.....	Medium to rapid if freed of high water table.	Very strongly acid.	Dark-gray fine sand, 3 to 8 inches thick.	Light-gray fine sand over the very dark grayish-brown or black pan that begins at depths of 14 to 30 inches; dark-brown to yellowish-brown fine sand below the organic pan.	Pasture, forest, vegetables, and strawberries.	Second-growth pine; saw-palmettos; a few gallberry bushes and runner oaks; wiregrass.	IVs-2.
Lf	Heavy substratum phase.	0-2	Slow.....	Same.....	Strongly acid; lower part of clayey material strongly acid to neutral or alkaline.	Same.....	Light-gray fine sand over very dark grayish-brown organic pan that begins at depths of 24 to 32 inches; light-gray to yellowish-brown sandy clay loam or sandy clay below organic pan.	Pasture and forest.	Pine; runner oaks, gallberry bushes, a few myrtle bushes; grasses.	IVs-2.
Lk	Light-colored surface phase.	0-2	Slow to medium.	Same.....	Very strongly acid.	Light-gray or gray fine sand, 1 to 3 inches thick.	Light-gray fine sand over the very dark grayish-brown or black organic pan; dark-brown to yellowish-brown fine sand below the pan.	Pasture and forest.	Pines; saw-palmettos; a few gallberry bushes and runner oaks; wiregrass.	Vs-1.
Ma	Made land.....	Variable...	Variable...	Variable...	Variable...	Variable.....	Variable.....	Roadbuilding material, building sites, pasture, and forest.	Pines; grasses.....	Unclassified.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Mc	Manatee fine sandy loam.	Level or slightly depressed.	Very slow or ponded.	Medium to slow when freed of high water table.	Upper layers slightly acid to neutral; lower layers neutral to alkaline.	Black fine sandy loam, 6 to 15 inches thick.	Black or very dark gray to mottled dark-gray or gray fine sandy clay underlain at depths within 42 inches by light-gray marl, streaked with pale yellow and gray.	Vegetables, pasture, and forest.	Hardwoods; cypress; a few cabbage palmettos; vines; shrubs; grasses; aquatic plants.	IIIa-3.
Md	Manatee loamy fine sand.	Same.....	Same.....	Same.....	Same.....	Black loamy fine sand, 9 to 20 inches thick.	Dark-gray or very dark gray fine sandy clay loam to mottled gray or light-gray fine sandy clay, in places underlain by marl that begins at depths of 30 to 36 inches.	Pasture, vegetables, and forest.	Hammock vegetation of oaks; cabbage palmettos; saw-palmettos; a few pines and cypress trees; aquatic plants.	IIIa-3.
Mb	Manatee fine sandy clay, heavy variant.	Same.....	Very slow..	Very slow..	Upper layers slightly acid to neutral; lower layer alkaline.	Very dark gray or dark-gray fine sandy clay, 8 to 14 inches thick.	Gray or grayish-brown fine sandy clay, or streaked or mottled gray or grayish-brown fine sandy clay.	Pasture and forest.	Grasses; shrubs; a few pines and hardwoods.	IIIa-3.
Me	Mines, pits, and dumps..	Variable.....	Variable.....	Variable.....	Variable.....	Variable.....	Variable.....	Variable.....	Pines; saw-palmettos; shrubs; grasses.	Unclassified.
Mf	Mixed alluvium, high bottom phase.	0-2	Slow.....	Slow to medium.	Upper layers slightly acid; lower layers strongly acid to neutral or mildly alkaline.	Dark-gray fine sand, 3 to 8 inches thick.	Grayish-brown to light-gray or very pale brown fine sand overlying mottled gray, light-gray, and yellowish-brown fine sandy clay loam; light brownish-gray fine sand at depths between 20 and 38 inches.	Pasture and forest.	Oaks; pines; saw-palmettos; shrubs; grasses.	IVs-2.
Oa	Ona fine sand.....	0-2	Slow.....	Rapid if freed of high water table.	Strongly acid...	Dark gray to black fine sand, 6 to 12 inches thick.	Dark-brown fine sand, color grading to light yellowish brown, and light gray with increasing depth.	Vegetables, strawberries, pasture, forest, and citrus fruits.	Pines; saw-palmettos; gullberry and myrtle bushes; grasses.	IIa-1.
Ob	Light-colored surface phase.	0-2	Slow.....	Same.....	Strongly acid...	Light-gray to gray fine sand, 4 to 10 inches thick.	Same.....	Pasture, vegetables, strawberries, citrus fruits, and forest.	Pines; oaks; saw-palmettos; grasses.	IIIa-2.
Oc	Orlando fine sand.....	0-2	Slow...	Rapid....	Strongly acid.	Very dark gray fine sand, 9 to 15 inches thick.	Dark grayish-brown to yellowish-brown or light yellowish-brown fine sand.	Citrus fruits, vegetables, general crops, pasture, and forest.	Oaks; pines; grasses...	IIIa-1.
Pe	Pamlico muck.....	Level or depressed.	Very slow or ponded. Covered by water much of the time.	Medium when freed of the high water table.	Strongly acid	Black muck, 6 to 15 inches thick.	Black muck or mucky fine sand over dark-gray or gray fine sand, color grading to light gray with increasing depth.	Pasture, wildlife...	Aquatic plants.....	IIIa-4.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

66

SOIL SURVEY SERIES 1950, NO. 3

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Pb	Parkwood fine sand.....	0-2	Slow.....	Medium to slow.	Sand layers slightly acid to mildly alkaline; marl slightly alkaline.	Dark-gray or grayish-brown fine sand, 4 to 8 inches thick.	Gray to light brownish-gray fine sand over light-gray marl.	Vegetables, pasture, and forest.	Cabbage palmettos; oaks and other hardwoods; pines; vines; bamboo briars; a few saw-palmettos.	IIIs-2.
Pc	Peace River soils.....	0-2	Slow.....	Slow.....	Loamy fine sand layers slightly acid to neutral; clayey materials neutral to alkaline.	Black loamy fine sand, 8 to 14 inches thick.	Very dark gray or very dark grayish-brown loamy fine sand over dark-gray fine sandy clay streaked in a few places with yellowish brown; mottled gray, light-gray, and yellowish-brown fine sandy clay at depths between 26 and 40 inches.	Pasture, forest, wildlife.	Hardwoods; cypress; cabbage palmettos; vines; shrubs; grasses.	Unclassified.
Pd	Plummer fine sand.....	Nearly level or slightly depressed.	Very slow or ponded; sometimes under water.	Rapid when freed of high water table.	Strongly acid...	Dark-gray or gray fine sand, 4 to 8 inches thick.	Light brownish-gray to light-gray or very pale brown fine sand.	Pasture and forest.	Grasses; a few saw-palmettos; shrubs; and pines.	IVs-3.
Po	Shallow phase.....	Same.....	Same.....	Same.....	Strongly acid...	Same.....	Same.....	Pasture and forest.	Same.....	IVs-3.
Pf	Pomello fine sand.....	0-2	Slow to medium.	Rapid.....	Strongly acid...	Gray or dark-gray fine sand, 3 to 6 inches thick.	Light-gray through white fine sand to depths of 42 inches.	Pasture, gladioli, and building sites.	Saw-palmettos; oaks; grasses.	Vs-1.
Pg	Pompano fine sand.....	Level or nearly level.	Slow or ponded; sometimes covered by water.	Rapid when freed of high water table.	Upper part slightly acid to neutral; lower part neutral to alkaline.	Dark-gray or dark grayish-brown fine sand, 4 to 8 inches thick.	Grayish-brown to light brownish-gray or light-gray fine sand.	Pasture, vegetables, truck crops.	Grasses; pines; cabbage palmettos; saw-palmettos.	IVs-3.
Ph	Shallow phase.....	Level areas or slightly depressed.	Same.....	Rapid to medium when freed of high water table.	Same.....	Same.....	Grayish-brown to light brownish-gray or light-gray fine sand underlain, at depths between 30 and 42 inches, by grayish-brown to light-gray fine sandy clay loam or fine sandy clay, mottled yellowish brown and yellow.	Pasture and vegetables.	Same.....	IVs-3.
Pk	Portsmouth fine sand....	Level or slightly depressed.	Very slow or ponded.	Medium to slow when freed of high water table.	Strongly acid...	Black to very dark gray fine sand, 10 to 15 inches thick.	Gray to light-gray fine sand over mottled light-gray, yellowish-brown, and yellow fine sandy clay loam.	Pasture, forest, and vegetables.	Grasses; shrubs; pines; a few cypress and hardwood trees.	IVs-3.
Pl	Portsmouth mucky fine sand.	Same.....	Same.....	Same.....	Strongly acid...	Black to very dark gray mucky fine sand, 8 to 15 inches thick.	Very dark gray or black fine sand, underlain by gray and yellowish-brown fine sandy clay or fine sandy clay loam.	Same.....	Grasses; shrubs; hardwoods; vines.	IVs-3.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

HILLSBOROUGH COUNTY, FLORIDA

67

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Ra	Rains fine sand.....	Same.....	Very slow..	Medium when freed of high water table.	Strongly acid...	Dark-gray or gray fine sand, 4 to 8 inches thick.	Light-gray or light brownish-gray fine sand over gray or grayish-brown fine sandy clay, streaked with strong brown and yellow; mottled light brownish-gray fine sandy clay at depths between 28 and 48 inches.	Same.....	Grasses; shrubs; a few pines.	IVs-3.
Rb	Ruskin fine sand.....	Level or nearly level.	Slow.....	Same.....	Medium acid in upper part to slightly acid or neutral in lower part.	Dark-gray fine sand, 4 to 9 inches thick.	Light-gray fine sand, over mottled brownish-yellow or yellowish-brown fine sandy clay loam; white and pale-yellow shell marl at depths between 24 and 42 inches.	Vegetables, truck crops, pasture, and forests.	Pines; saw-palmettos; runner oaks; grasses.	IIIs-2.
Rc	Rutlege fine sand.....	Nearly level or slightly depressed.	Very slow to ponded.	Rapid when freed of high water table.	Strongly acid...	Black fine sand, 9 to 15 inches thick.	Very dark gray to dark-gray fine sand over mottled light-gray, pale-yellow, and brownish-yellow fine sand.	Pasture, vegetables, and strawberries.	Grasses; shrubs; pines; hardwoods; cypress trees.	IIIs-3.
Rd	Shallow phase.....	Same.....	Same.....	Moderate when freed of high water table.	Strongly acid...	Same.....	Very dark gray to light gray or light brownish-gray fine sand over mottled grayish-brown, light olive-brown, and yellowish-brown fine sandy clay at depths between 30 and 42 inches.	Same.....	Same.....	IIIs-3.
Re	Rutlege mucky fine sand.	Same.....	Same.....	Rapid when freed of high water table.	Strongly acid...	Black mucky fine sand, 6 to 15 inches thick.	Black or very dark gray fine sand, grading to lighter colors with increasing depth.	Same.....	Grasses; shrubs; cypress and hardwood trees.	IIIs-3.
Sd	St. Lucie fine sand.....	Nearly level	Very slow because of rapid infiltration.	Rapid....	Strongly acid...	Light-gray or gray fine sand, 2 to 4 inches thick.	Light-gray to white fine sand.	Pasture and refuges for wildlife.	Live oaks; sand pines; rosemary; saw-palmettos; prickly-pear cactus; grasses.	VIIs-1.
Sa	Sandy local alluvium.....	Small depressions on bases of slopes.	Medium to slow.	Rapid.....	Strongly acid...	Very dark gray fine sand, 6 to 12 inches thick.	Gray to mottled very pale brown fine sand.	General crops, pasture.	Oaks; pines; shrubs; grasses.	IIIs-1.
Sb	Scranton fine sand.....	0-2	Slow.....	Medium if freed of high water table.	Strongly acid...	Black fine sand, 9 to 15 inches thick.	Dark grayish-brown to pale-yellow, very pale brown, and brownish-yellow fine sand mottled in lower part.	Vegetables, strawberries, citrus fruits, pasture, forest.	Pine; saw-palmettos; shrubs; grasses.	IIIs-1.
Sc	Shallow ponds with grass.	Depressions...	Covered by water during much of year.	Covered by water during much of year.	Surface layer strongly acid; lower part strongly acid to alkaline.	Variable.....	Light-gray or gray fine sand.	Refuges for wildlife, pasture.	Water-tolerant plants	Unclassified.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

68

SOIL SURVEY SERIES 1950, NO. 3

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Se	Sunniland fine sand: Moderately shallow over marl.	Level or nearly level.	Slow.....	Medium to slow through the sandy clay loam layer.	Upper part strongly acid; lower part neutral to alkaline.	Dark-gray fine sand, 3 to 8 inches thick.	Light-gray fine sand over mottled yellowish-brown, strong-brown, and light-gray fine sandy clay or fine sandy clay loam; white marl at depths between 40 and 48 inches.	Pasture, forest, vegetables.	Pines; cabbage palmettos; saw-palmettos; oaks; waxmyrtle bushes; grasses.	IIIs-2.
Sf	Shallow over marl.....	Same.....	Slow.....	Medium to slow.	Same.....	Same.....	Light-gray fine sand over brown, stained layer; brownish-yellow and yellowish-brown fine sandy clay at depths between 14 and 22 inches, underlain by white marl, streaked with yellow.	Pasture, forest, and vegetables.	Pines; oaks; cabbage palmettos; saw-palmettos; shrubs; grasses.	IIIs-2.
Ta	Terra Ceia peaty muck.....	Level or slightly depressed.	Very slow or ponded.	Rapid when freed of high water table. Covered by water for long periods.	Slightly acid to neutral in upper part; neutral or mildly alkaline in lower part.	Black peaty muck, 10 to 15 inches thick.	Black or very dark brown muck over dark gray or very dark gray fine sandy clay loam; light gray fine sandy clay at depths between 20 and 36 inches.	Pasture and vegetables.	Water-tolerant plants	IIIs-4.
Tb	Tidal marsh (unclassified soils).	Level or nearly level.	Covered by high tides.	Covered by high tides.	Variable.....	Nearly black mucky fine sand to dark-gray fine sand, 3 to 8 inches thick.	Light-gray or gray fine sand, mixed with shells.	Refuges for wildlife.	Salt-tolerant grasses.	Unclassified.
Tc	Tidal swamp (unclassified soils).	Same.....	Same.....	Same.....	Variable.....	Variable.....	Light-gray or gray fine sand or sandy clay loam.	Same.....	Salt-tolerant grasses.	Unclassified.

Appendix 10-2

Estimated Soil Properties for Engineering

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 1
Page - 1

Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Aa	Adamsville fine sand	Infrequent Brief	Shallow Brief	45	0-42+	6.3	.05
Ab	Alachua loamy fine sand	Frequent Brief	Mod. deep Long	45	0-42+	6.3	.05-.10
Ac	Alluvial land	Frequent Brief	Variable	Variable	0-60	Variable	Variable
Ad	Arredondo fine sand, level	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Ae	Arredondo fine sand, gently undulating	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Ba	Blanton fine sand, level	None	Shallow V. brief	45	0-42+	6.3	.05
Bb	Blanton fine sand, gently undulating	None	Shallow V. brief	45	0-42+	6.3	.05
Bc	Blanton fine sand, undulating	None	Shallow V. brief	45	0-42+	6.3	.05
Bd	Blanton fine sand, brown layer	None	Shallow	45	0-42+	6.3	.05
Be	Blichton fine sand	Infrequent Brief	Shallow V. brief	75	0-8 8-25 25-42+	6.3 2.0-6.3 .06-.20	.05-.10 .05-.10 .15-.20
Be	Bradenton fine sand	Infrequent Brief	Shallow Brief	45-75	0-22 22-32 32-42+	6.3 .63-2.0 .20-.63	.05-.10 .10-.15 .10-.15

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2B
Page - 1

Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHTO		
Aa	Adamsville fine sand	0-42+	fs	SP-SM	A-3	Low	C
Ab	Alachua loamy fine sand	0-42+	lfs	SM	A-2-3	Low	
Ac	Alluvial land	0-60	Variable	Variable	Variable	Variable	
Ad	Arredondo fine sand, level	0-42+	fs	SP-SM, SM	A-2-4, A-3	Low	A
Ae	Arredondo fine sand, gently undulating						
Ba	Blanton fine sand, level	0-42+	fs	SP, SP-SM	A-3	Low	A
Bb	Blanton fine sand, gently undulating						
Bc	Blanton fine sand, undulating						
Bd	Blanton fine sand, brown layer						
Be	Blichton fine sand	0-8	fs, lfs	SM	A-2-4	Low	D
		8-25	lfs	SM, SC-SM	A-2-4	Low	
		25-42+	fscl-fsc	SC	A-6	Moderate	
Bf	Bradenton fine sand	0-22	fs	SP-SM	A-2	Low	B/D
		22-32	fscl	SM-SC, SC	A-2, A-6	Moderate	
		32-42+	fscl-fsc	SC	A-6	Moderate	
Bg	Bradenton fine sand, thin surface	0-12	fs	SP-SM	A-2	Low	B/D
		12-28	fscl	SM-SC, SC	A-2, A-6	Moderate	
		28-42+	scl	SC	A-6	Moderate	
Bh	Brighton peat	0-40	pt	pt	Organic	High	A/D
Bk	Brighton mucky peat	40-60	fs	SP	A-3	Low	

ESTIMATED SOIL PROPE FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE .
Page - 2

Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
15	Bg Bradenton fine sand, thin surface	Infrequent Brief	Shallow Brief	45-75	0-12 12-28 28-42+	6.3 .63-2.0 .20-.63	.05-.10 .10-.15 .10-.15
	Bh Brighton peat	V. frequent V. long	V. shallow Continuous	45	0-40 40-60	6.3 6.3	.20 .05
	Bk Brighton mucky peat	V. frequent V. long	V. shallow Continuous	45	0-40 40-60	6.3 6.3	.20 .05
	Bl Broward fine sand	Infrequent Brief	V. shallow Brief	45	0-28 28+	6.3	.05
	Ca Charlotte fine sand	V. frequent Long	V. shallow V. long	45	0-48+	6.3	.05
	Da Delray fine sand	V. frequent V. long	V. shallow V. long	45	0-12 12-48+	6.3 6.3	.20 .05-.10
	Db Delray fine sand, shallow	V. frequent V. long	V. shallow V. long	45	0-12 12-36 36-48+	6.3 6.3 .63-2.0	.20 .05-.10 .10-.15
	Ea Eustis fine sand, level level	None	Deep Continuous	45	0-48+	6.3	.05
	Eb Eustis fine sand, gently undulating	None	Deep	45	0-48+	6.3	.05
	Fa Felda fine sand	V. frequent Long	V. shallow Long	45-75	0-22 22-48+	6.3 .63-2.0	.05-.10 .10-.15

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2B
Page - 2

Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHO		
Ca	Charlotte fine sand	0-48+	fs	SP	A-3	Low	A/D
Da	Delray fine sand	0-12	fs	SP-SM	A-2	Low	A/D
		12-48+	fs	SP	A-3	Low	
Db	Delray fine sand, shallow	0-12	fs	SP-SM	A-3	Low	A/D
		12-36	fs	SP	A-3	Low	
		36-48+	fscl, fsc	SM-SC, SC	A-2, A-6	Moderate	
Ea	Eustis fine sand, level	0-48+	fs	SP	A-3	Low	A
Eb	Eustis fine sand, gently undulating						
Fa	Felda fine sand	0-22	fs	SP	A-3	Low	B/D
		22-48+	fscl	SM SC	A-2-4	Mod-Low	
Fb	Fellowship loamy fine sand	0-12	lfs	SM-SC	A-2	Low	D
		12-42+	sc, c	SC, CL, CH	A-7	High	
Fc	Ft. Meade loamy fine sand, level	0-42+	lfs	SM, SM-SC	A-2	Low	A
Fd	Ft. Meade loamy fine sand, undulating						
Fe	Fresh water swamp	---	---	---	---	---	---
Ga	Gainesville loamy fine sand level	0-42+	lfs	SM	A-2	Low	A
Gb	Gainesville loamy fine sand, gently undulating						

ESTIMATED SOIL PROPER. FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2.
Page - 3

Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Fb	Fellowship loamy fine sand	None	V. shallow Brief	75	0-12 12-42+	2.0-6.3 .06	.15-.20 .15-.20
Fc	Ft. Meade loamy fine sand, level	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Fd	Ft. Meade loamy fine sand, undulating	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Fe	Fresh water swamp	--	--	--	--	--	---
Ca	Gainesville loamy fine sand, level	None	Mod. deep Long	45	0-42+	6.3	.05-.10
17 Gb	Gainesville loamy fine sand, gently undulating	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Ia	Immokalee fine sand	Infrequent Brief	V. shallow Brief	45	0-32 32-38 38-42+	6.3 .63-2.0 6.3	.05 .05-.10 .05
Ib	Immokalee fine sand, alkaline variant	Infrequent Brief	V. shallow Brief	45	0-32 32-38 38-42+	6.3 .63-2.0 6.3	.05 .05-.10 .05
Ic	Istokpoga peat	V. frequent V. long	V. shallow Continuous	45	0-40 40-60+	6.3 6.3	.20 .05
Id	Istokpoga mucky peat	V. frequent V. long	V. Shallow Continuous	45	0-40 40-60+	6.3 6.3	.20 .05
Ka	Kanapaha fine sand	None	Shallow V. brief	45	0-42+	6.3	.05

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2B
Page - 3

Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHTO		
Ia	Immokalee fine sand	0-32	fs	SP	A-3	Low	B/D
Ib	Immokalee fine sand,	32-38	fs	SP-SM	A-3, A-2	Low	
	alkaline variant	38-42+	fs	SP	A-3	Low	
Ic	Istokpoga peat	0-40	P	Pt	Organic	High	A/D
Id	Istokpoga mucky peat	40-60+	fs	PS	A-3	Low	
Ka	Kanapaha fine sand	0-42+	fs	SP, SP-SM	A-3, A-2	Low	A/D
Kb	Keri fine sand	0-22	fs	SP, SP-SM	A-3	Low	A/D
		22-30	fsl, fsc1	SC	A-2-6	Low	
		30-42+	fs	SP	A-3	Low	
La	Lakeland fine sand, shallow	0-60	fs	SP, SP-SM	A-3, A-2	Low	A
	Lakeland fine sand, level	60+	fsc1	SC	A-4, A-6	Low	
	Lakeland fine sand, gently undulating						
	Lakeland fine sand, undulating						
Lc	Lakeland fine sand, level, deep	0-72+	fs	SP	A-3	Low	A
Lf	Lakeland fine sand, undulating deep						
Lg	Lakewood fine sand	0-48+	fs	SP	A-3	Low	A/D
Lh	Leon fine sand	0-20	fs	SP	A-3	Low	
Lk	Leon fine sand, light colored surface	20-26 26-42+	fs fs	SP-SM SP	A-3, A-2 A-3	Low Low	

ESTIMATED SOIL PROPER FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2.
Page - 4

Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Kb	Keri fine sand	Infrequent Brief	V. shallow Brief	45	0-22	6.3	.05
					22-30	.20-.63	.10-.15
					30-42+	6.3	.05
La	Lakeland fine sand, shallow	None	Deep Continuous	45	0-60	6.3	.05
Lb	Lakeland fine sand, level				60+	.20-.63	.10-.15
Ld	Lakeland fine sand, gently undulating						
Le	Lakeland fine sand, undulating						
Lc	Lakeland fine sand, level, deep	None	Deep Continuous	45	0-72+	6.3	.05
Lf	Lakeland fine sand, undulating deep						
Lg	Lakewood fine sand				0-48+	6.3	.05
Lh	Leon fine sand	Infrequent Brief	V. shallow Brief	45	0-20	6.3	.05
Lk	Leon fine sand, light colored surface				20-26	.63-2.0	.05-.10
					26-42+	6.3	.05
Ll	Leon fine sand heavy substratum	Infrequent Brief	V. shallow Brief	45-75	0-20	6.3	.05
					20-26	.63-2.0	.05-.10
					26-42+	.63-2.0	.10-.15
Ma	Made land	Variable	Variable	Variable	0-60	Variable	Variable
Me	Mines, pits and dumps						
Mb	Manatee fine sandy clay, heavy variant	V. frequent V. long	V. shallow V. long	75 8-42+	0-8 .06-.20	.63-2.0 .15-.20	.20

61

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2B
Page - 4

Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHO		
L1	Leon fine sand, heavy substratum	0-20	fs	SP	A-3	Low	A/D
		20-26	fs	SP-SM	A-3, A-2	Low	
		26-42+	scl	SC	A-2, A-6	Moderate	
Ma	Made land	0-60	Variable	Variable	Variable	Variable	Variable
Me	Mines, pits and dumps						
Mb	Manatee fine sandy clay, heavy variant	0-8	l, sc	ML, CL	A-2, A-4	High	B/D
		8-42+	c	CH	A-6, A-7	High	
Mc	Manatee fine sandy loam	0-10	lfs, fsl	SM, SP-SM	A-2	Low	B/D
Md	Manatee loamy fine sand	10-24	scl	SC	A-2, A-6	Moderate	
		24-42+	scl	SC	A-2, A-4	Moderate	
20 Me	Mixed alluvium, high bottom	0-60	Variable	Variable	Variable	Variable	Variable
Oa	Ona fine sand	0-14	fs	SM, SP-SM	A-2	Low	A/D
		14-42+	fs	SP, SP-SM	A-3	Low	
Ob	Ona fine sand, light colored surface						
Oc	Orlando fine sand	0-15	fs	SM, SP-SM	A-2	Low	A
		15-42+	fs	SP, SP-SM	A-3	Low	
Pa	Pamlico muck	0-36	muck	OL	Organic	High	D
		36-48+	fs	SP, SP-SM	A-3, A-2	Low	
Pb	Parkwood fine sand	0-18	fs	SP, SP-SM	A-3, A-2	Low	A/D
		18-42+	marl	---	---	-	
Pc	Peace River soils	0-60	Variable	Variable	Variable	Variable	Variable

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2.
Page - 5

Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Mc	Manatee fine sandy loam	V. frequent	V. shallow	45-75	0-10	2.0-6.3	.20
Md	Manatee loamy fine sand	V. long	V. long		10-24	.20-.63	.10-.15
					24-42+	.20-.63	.10-.15
Me	Mixed alluvium, high	Frequent Brief	Variable	Variable	0-60	Variable	Variable
Oa	Ona fine sand	Frequent	V. shallow	45	0-14	6.3	.10-.15
Ob	Ona fine sand, light colored surface	Brief	Brief		14-42+	6.3	.05-.10
Oc	Orlando fine sand	None	Deep Continuous	45	0-15	6.3	.10-.15
					14-42+	6.3	.05-.10
Pa	Pamlico muck	V. frequent V. long	V. shallow V. long	45	0-36	6.3	.20
					36-48+	6.3	.05-.10
Pb	Parkwood fine sand	Infrequent Brief	V. shallow Brief	45	0-18	6.3	.05-.10
					18-42+	-	-
Pc	Peace River soils	V. frequent Brief	Variable	Variable	0-60	Variable	Variable
Pd	Plummer fine sand	V. frequent Long	V. shallow Long	45	0-48+	6.3	.05
Pe	Plummer fine sand, shallow	V. frequent Long	V. shallow Long	45	0-36	6.3	.05
					36-48+	.63-2.0	.10-.15
Pf	Pomello fine sand	None	Mod. shallow Brief	45	0-38	6.3	.05
					38-60+	6.3	.05-.10

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2B
Page - 5

Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHO		
Pd	Plummer fine sand	0-48+	fs	SP, SP-SM	A-3	Low	B/D
Pe	Plummer fine sand, shallow	0-36	fs	SP, SP-SM	A-3	Low	B/D
		36-48+	fscl	SC	A-2, A-6	Low-Mod.	
Pf	Pomello fine sand	0-38	fs	SP	A-3	Low	C
		38-60+	fs	SP-SM	A-3, A-2	Low	
Pg	Pompano fine sand	0-42+	fs	SP, SP-SM	A-3	Low	A/D
Ph	Pompano fine sand, shallow	0-33	fs	SP, SP-SM	A-3, A-2	Low	A/D
		33-48+	fscl	SC	A-2, A-6	Moderate	
Pk	Portsmouth fine sand	0-24	fs, mfs	SP-SM, SM	A-2	Low	D
Pl	Portsmouth mucky fine sand	24-42+	scl	SC-SM, SC	A-2, A-4	Moderate	
Ra	Rains fine sand	0-18	fs	SP, SP-SM	A-3, A-2	Low	B/D
		18-48+	fscl	SC, SM-SC	A-2, A-4	Moderate	
Rb	Ruskin fine sand	0-24	fs	Sm, SM-SP	A-2	Low	A/D
		24-36	fscl	SC	A-2, A-4	Moderate	
		36-42	marl	marl	--	---	
Rc	Rutledge fine sand	0-20	fs, mfs	SP-SM, SM	A-2	Low	A/D
Re	Rutledge mucky fine sand	20-42+	fs	SP, SP-SM	A-3	Low	
Rd	Rutledge fine sand, shallow	0-14	fs	SP-SM	A-2	Low	A/D
		14-36	fs	SP	A-3	Low	
		36-42+	scl	SM-SC, SC	A-6	Moderate	
Sd	St. Lucie fine sand	0-42+	fs	SP	A-3	Low	A

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2.
Page - 6

Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Pg	Pompano fine sand	V. frequent Long	V. shallow Long	45	0-42+	6.3	.05
Ph	Pompano fine sand,	V. frequent Long	V. shallow Long	45	0-33 33-48+	6.3 .20-.63	.05 .10-.15
Pk	Portsmouth fine sand	V. frequent	V. shallow	45-75	0-24	6.3	.15-.20
Pl	Portsmouth mucky fine sand	V. long	V. long		24-42+	.20-.63	.10-.15
Ra	Rains fine sand	V. frequent V. long	V. shallow V. long	45-75	0-18 18-48+	6.3 .20-.63	.05-.10 .10-.15
Rb	Ruskin fine sand	Infrequent Brief	V. shallow Brief	45	0-24 24-36 36-42	6.3 2.0-6.3 -	.05 .10-.15 -
Rc	Rutledge fine sand	V. frequent	V. shallow	45	0-20	6.3	.15-.20
Re	Rutledge mucky fine sand	V. long	V. long		2-42+	6.3	.05
Rd	Rutledge fine sand, shallow	V. frequent	V. shallow	45	0-14 14-36 36-42+	6.3 6.3 .63-2.0	.15-.20 .05 .10-.15
Sd	St. Lucie fine sand	None	Deep Continuous	45	0-42+	6.3	.05
Sa	Sandy local alluvium	Infrequent Brief	Mod shallow Brief	45	0-42+	6.3	.05
Sb	Scranton fine sand	Frequent Brief	V. shallow Long	45	0-14 14-42+	6.3 6.3	.10-.15 .05-.10

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2B
Page - 6

Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHTO		
Sa	Sandy local alluvium	0-42+	fs	SP	A-3	Low	
Sb	Scranton fine sand	0-14	fs	SP-SM	A-2	Low	D
		14-42+	fs	SP	A-3	Low	
Sc	Shallow ponds with grass	0-60	Variable	Variable	Variable	Variable	Variable
Se	Sunniland fine sand, mod. shallow over marl	0-20	fs	SP	A-3	Low	
		20-30	fscl	SC	A-2-6	Moderate	
		30-40+	marl	--	--	--	
Ta	Terra Ceia peaty muck	0-20	muck	Pt, OL	Organic	High	A/D
		20-48+	fscl	SC	A-2-6	Moderate	
24 Tb	Tidal marsh (Unclassified soils)	0-60	Variable	Variable	Variable	Variable	Variable
Tc	Tidal swamp (Unclassified soils)						

Abbreviations:

c - clay
 fs - fine sand
 fsc - fine sandy clay
 fscl - fine sandy clay loam
 fsl - fine sandy loam
 lfs - loamy fine sand
 mfs - mucky fine sand
 V. - Very
 Mod. - Moderately

ESTIMATED SOIL PROPER FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2.
Page - 7

Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Sc	Shallow ponds with grass	V. frequent V. long	V. shallow V. long	Variable	0-60	Variable	Variable
Se	Sunniland fine sand, mod. shallow over marl	Infrequent Brief	V. shallow Brief	45	0-20 20-30 30-40+	6.3 2.0-6.3 -	.05 .10-.15 -
Ta	Terra Ceia peaty muck	V. frequent V. long	V. shallow V. long	45	0-20 20-48+	6.3 2.0-6.3	.20 .10-.15
Tb	Tidal Marsh (Unclassified soils)	V. frequent V. long	V. shallow V. long	Variable	0-60	Variable	Variable
Tc	Tidal Swamp (Unclassified soils)						

1/ Flood Hazard: Water from stream overflow, runoff, or seepage, standing or flowing above the soil surface.

FREQUENCY		DURATION	
None	Less often than once in 50 years	Extremely brief	Shorter than 2 days
Very infrequent	Once in 20 to 50 years	Very brief	2 to 7 days
Infrequent	Once in 5 to 20 years	Brief	7 days to 1 month
Frequent	Once in 1 to 5 years	Long	1 month to 6 months
Very frequent	More often than once every year	Very long	Longer than 6 months

2/ Water Table: The upper surface of free water in a soil or underlying material. In some places an upper or perched water table is separated from a lower one by a dry zone. If water is above the surface, it is called flooding.

DEPTH		DURATION	
Deep	Deeper than 120 inches	Very brief	Shorter than 1 month per year
Moderately deep	Deeper than 60 to 120 inches	Brief	1 to 2 months per year
Moderately shallow	Deeper than 30 to 60 inches	Long	2 to 6 months per year
Shallow	Deeper than 15 to 30 inches	Very long	6 to 12 months per year
Very shallow	Deeper than 0 to 15 inches	Continuous	More than 12 months

Appendix 10-3
Test Lab, Inc. Report

Report
of
PRELIMINARY GEOTECHNICAL STUDY
RESOURCE RECOVERY FACILITY
FAULKENBURG ROAD SITE
HILLSBOROUGH COUNTY, FLORIDA
for
Hillsborough County - Department of Solid Waste

TEST LAB
INC.



April 20, 1984

Hillsborough County
Department of Solid Waste
P.O. Box 1110
Tampa, Florida 33601

Attention: Mr. Marc J. Rogoff
Resource Recovery Program Administrator

Subject: Preliminary Geotechnical Study
Resource Recovery Facility
Falkenburg Road Site
Hillsborough County, Florida
Project No. 84-1479

Gentlemen:

The purpose of this preliminary geotechnical study was to determine the general nature of the subsurface conditions at the plant site and generally ascertain the types of foundation systems which might be used to support the facilities. An earlier study had been made, but the facility was relocated to the northern portion of the tract. Although it was thought that similar subsurface conditions would exist at the new plant site, a field exploration program was necessary to verify this. Ultimately, this proved to be the case. The following report briefly describes the field and laboratory procedures used in this study and presents a general engineering evaluation of the subsurface and foundation conditions.

FIELD PROCEDURES

Twelve exploratory borings were made at the site at the locations shown on the accompanying plan. These borings were made at locations we recommended, but which were staked in the field by county personnel who also determined the ground surface elevation.

The exploratory borings were made with a truck-mounted CME-55 drilling rig. Conventional rotary drilling procedures were utilized along with a bentonite drilling fluid to stabilize the bore holes. Standard penetration tests were made and split-barrel soil samples obtained at 2.5 foot intervals to a depth of 10 feet and 5 foot intervals thereafter. The following is a brief description of this field test procedure.

The exploratory borings were made in accordance with ASTM's method of standard field penetration tests (D 1586). Standard penetration tests are made with a 2 inch O.D. split-barrel sampler. After drilling to the required depth and cleaning the bore hole, the sampler is driven 18 inches into the undisturbed soil by a 140 pound drop-hammer falling 30 inches. The number of blows required to affect the last foot of penetration is recorded as the penetration resistance (N). The numerals in parenthesis below the 'N' values are the blow count for each of the 6 inch increments which the split-barrel sampler was driven. The soil samples thus obtained were visually classified, and some used for qualitative laboratory tests. Upon completion of the drilling, the bore holes were sealed and grouted in accordance with Southwest Florida Water Management District regulations.

The subsurface data obtained from the field exploration program are presented on the accompanying logs. Also attached is a legend explaining the classification terms and symbols used on these logs.

LABORATORY PROCEDURES

A laboratory test program, limited to determining soil index properties, was undertaken to better ascertain the physical characteristics of the various soil strata found at the site. Grain-size analyses and atterberg limit determinations were conducted on selected disturbed soil samples. The following are brief descriptions of these test procedures.

Grain Size Analyses

Particle size analyses were made in accordance with ASTM procedure 422. The distribution of particle sizes larger than a No. 200 sieve is determined by mechanical sieving; whereas, the distribution of particle sizes smaller than a No. 200 sieve is determined by a sedimentation process. Either or both procedures may be used to more fully evaluate the physical characteristics of the soil. In this study, only the former procedure was used, but the soil samples were mechanically washed over a No. 200 sieve (ASTM D 1140) to more accurately determine the percentage of silt and clay sized particles.

Plasticity Tests (Atterberg Limits)

The liquid limit (LL) and plastic limit (PL) of the soils were determined in accordance with ASTM procedures D 423 and D 424, respectively. The soil plasticity index (PI) is the numerical difference between the liquid limit and plastic limit. The atterberg limits of a soil are particularly useful when identifying and classifying cohesive soils; and also as indexes to other significant properties such as compressibility, plasticity, permeability, and swell-shrink potential.

The data obtained from the laboratory tests are presented on the accompanying grain size distribution sheets.

SUBSURFACE CONDITIONS

The field exploration program revealed generally similar subsurface conditions existing in the various areas investigated. These conditions were similar to those found in

the southern portion of the tract by the earlier Williams study. Basically, four relatively distinct soil/rock strata were revealed by the borings. The following is a generalized description of these strata in the sequence encountered.

Stratum No. 1

This is a moderately thick cohesionless surface stratum which consists of very loose to loose gray and brown medium fine sand and slightly clayey sand containing numerous dark brownish black slightly clayey organic stained zones. This surface stratum varies from 5' to 22' in thickness, but is typically 10' thick.

Stratum No. 2

This a moderately thin semi-cohesive stratum which consists of generally firm brown, grayish brown and light tannish gray clayey medium-fine sand with some slightly clayey lenses. This stratum varies in thickness from 0 to 15 feet, but is typically 5' thick; and extends to depths ranging from 12 to 27 feet.

Stratum No. 3

This is a thick complex stratum of interbedded semi-cohesive and cohesive soils. Typically the upper part of this stratum is a firm light green clay which transgresses with depth to more granular semi-cohesive soils - that is, greenish gray and tan fine sandy clay and clayey fine sand which contain some zones with cemented sand fragments. This stratum is typically about 20' thick, although occasionally much thinner, and extends to depths varying from 24' to 47'.

Stratum No. 4

This stratum, which is the Tampa Formation, is the limestone bedrock. The nature of this stratum is quite variable, typically being more like soil than rock - that is, a hard light tannish white calcareous sandy clay containing rock fragments, hard limestone lenses, some softer weathered zones and occasional green and gray sandy clay lenses. Generally, the upper part of this stratum is poorly indurated and softer, probably the result of weathering; whereas below this, this stratum tends to be somewhat harder and more competent, but frequently contains softer zones. This stratum was encountered at depths of 24 to 47 feet.

Although the stratigraphy in the areas investigated is quite similar, the depth and thickness of the various strata are quite varied. Therefore, the attached soil test boring logs should be reviewed for a detailed description of the materials and conditions encountered at each boring location. The depth to ground water table measured in the borings at the time of the study is shown on the logs. However it should be noted that after heavy rains during the study, standing water existed throughout much of the site.

PRELIMINARY EVALUATION

The object of this preliminary study was to determine the general nature of the subsurface conditions and to generally evaluate these conditions from a foundation standpoint with respect to supporting the type facilities proposed. While this general data and information is to be provided to prospective bidders so that they will be more knowledgeable of the site, subsurface and foundation conditions; it should be noted that this preliminary data is not sufficient to develop final foundation recommendations and design criteria. A more comprehensive final geotechnical study must be undertaken for such purposes.

At the present time, only conceptual plans have been developed, and thus specific structural data and foundation loads are not available. However the proposed facilities will generally be of the size, configuration and located as shown on the accompanying plan. The main building will be a very large heavy steel-frame structure which will house the refuse pit, refuse storage bins, furnace and furnace charging equipment, boilers, air pollution control equipment, and administrative offices. Although the refuse pit will extend approximately 10' below grade, the ground floor level

elsewhere will be at approximately existing grade. Adjacent to the main building will be a 250' high stack. Other more lightly loaded associated facilities are the cooling towers, electric switchyard, and scales & scale houses. An extensive roadway system and associated parking areas are planned. Most of the roadways and parking areas will be constructed at approximately the existing grade. However, high earthen ramps approximately 25' in height will be required for truck access and unloading into the refuse pit. Some large shallow retention ponds are also proposed to store storm water drainage.

The preliminary evaluation of the foundation conditions is based upon analyzing the soil/rock characteristics obtained from this study by comparison with previously made correlations of such data and foundation stabilities that have been developed for subsurface conditions similar to those found at this site. In addition, the data derived from the earlier Williams study, specifically the laboratory consolidation test data, were also used to evaluate the foundation conditions. The general engineering evaluation of the foundation conditions is based upon a site development plan and facilities of the type previously discussed.

The subsurface conditions at the site are considered typical of those generally found in this area. These conditions were quite similar to those revealed by the earlier Williams study. No unusual or significantly different conditions were found. Basically the same potentially poor subsurface conditions exist at the new plant site, that is:

1. The generally loose consistency of the cohesionless surface soils (stratum no. 1).
2. The weak and potentially compressible nature of the soft & loose zones within the deeper underlying semi-cohesive and cohesive soils (stratum no. 3).

3. The less competent, weak, poorly indurated, or highly weathered zones within the limestone bedrock (stratum no. 4).
4. The very shallow ground water table.

The first potentially poor condition poses a foundation problem because loose cohesionless soils may not provide adequate support for even lightly loaded shallow foundations. Shallow foundations supported on loose sands may settle as a result of consolidation due to imposed foundation loads, changes in loading conditions or vibrations. Thus, special site preparation will be necessary to densify the shallow loose sands, thereby providing adequate support for shallow foundations and minimizing potential settlement from this source. Although inexpensive routine proof-rolling techniques may adequately densify the shallow loose sands to a sufficient depth to provide satisfactory foundation support for very light structures, such as the scale facilities; this method may not be adequate for other moderately light structures because of the slightly clayey nature and depth of the loose sands and high ground water table. Therefore, other special in situ densification methods may be required.

The second potentially poor condition is of more serious concern. These potentially compressible cohesive soils cannot be readily improved, except by means of surcharging which does not appear practical. Heavy foundation and embankment loads will induce subsurface stresses of sufficient magnitude to cause appreciable consolidation compression of the weaker zones within this stratum. Thus significant total and differential settlement would occur which could detrimentally affect the structures. Therefore the main building and other associated heavily loaded structures should be supported on deep foundation systems which extend through the compressible soils to adequate bearing on or within the more competent

underlying weathered limestone stratum. Although obviously deep foundations must be used to support the heavy structures, it might also be more practical to similarly support even moderately light structures in view of the relatively shallow depth at which deep foundations will bear and the difficulty and cost of adequately densifying the loose cohesionless soils. Another potential effect caused by the consolidation of this stratum is that of negative friction or pile drag-down. This must be considered in the design of deep foundations in areas where they may be affected - such as adjacent to the roadway embankments.

The third potentially poor condition is only of significance in that the less competent weak weathered zones will limit the capacity of deep foundations. Furthermore, significant variations in the depth at which deep foundations will achieve adequate bearing are anticipated because of the somewhat erratic nature of the limestone bedrock.

The fourth potentially poor condition, i.e. very high ground water table, will necessitate proper dewatering for below grade construction, such as the refuse pit and scales. The dead weight of buried structures must also be sufficient to resist the uplift pressure caused by the ground water. Special consideration must also be given to the high ground water table in the design of pavements, as proper subgrade drainage is essential to achieve satisfactory pavement performance. It would appear that pavements should either be raised to avoid this problem or underdrains installed to alleviate the problem. Also a type of pavement or base should be used which is resistant to deterioration if wetted. The high ground water table will also severely limit the storage capacity of retention basins. This may necessitate raising of the general plant site to facilitate drainage and provide adequate storage capacity, or lowering outfalls may suffice.

It should be noted that during heavy rains and shortly thereafter, and possibly throughout the rainy season, standing water may exist in many portions of the site which can severely hamper construction operations. Thus, site drainage improvements should be one of the first construction activities.

This preliminary study indicates that after proper site preparation and densification of the shallow loose sands light structures may be supported on conventional shallow foundation systems, whereas moderate to heavy structures must be supported on deep foundation systems. Driven piles or drilled piers appear to be the most economical and practical types of deep foundation systems to use; whereas, auger-cast piles do not appear appropriate for the subsurface conditions. The preliminary subsurface data indicate that adequate bearing for deep foundations can be achieved at reasonably shallow depths. Driven piles will typically reach bearing at 35' to 45', although significant variations (30' to 60') are anticipated due to the variable nature of the weathered limestone bedrock. Drilled piers may have to penetrate at somewhat greater depths, depending upon their capacity.

The following page presents some very general deep foundation design parameters which may be used for preliminary planning and cost estimating purposes. However, a more comprehensive geotechnical study should be undertaken to finally select the most appropriate and economical types of deep foundation systems to use for the various structures.

Although various types of piling commonly used in the area have been shown, there are advantages to using certain types. Displacement type piling (timber, concrete, closed-end pipe, or shell) usually derive their support primarily from end-bearing on the underlying weathered limestone bedrock;

DRIVEN PILES

Timber Piling, conforming to ASTM specification D-25.

8 inch	20 tons
10 inch	30 tons

Prestress Concrete Piling, conforming to FDOT specifications (not commercial grade).

10 inch	35 tons
12 inch	50 tons
14 inch	70 tons

Closed-End Steel Pipe Piling (concrete filled), with minimum wall thickness of 0.25 inches, conforming to ASTM specification 252A grade 2.

10 inch	50 tons
12 inch	60 tons

Mandrel-Driven-Shell Piling, with adequate shell gauge to withstand both driving stresses and earth pressures without damage or collapse, minimum 14 gauge is suggested.

10 inch	50 tons
12 inch	60 tons

Open-End Steel Pipe Piling, conforming to ASTM A 252, with a minimum wall thickness of 3/8 inch (soil or concrete filled).

9 inch	60 tons
11 inch	75 tons

Steel H-Piling, conforming to ASTM specification A-36.

HP 8 x 36	40 tons
HP 10 x 42 or 12 x 53	50 tons
HP 10 x 57	70 tons

DRILLED PIERS

Should be installed by the wet-hole method or slurry displacement technique. Capacity is dependent upon diameter and length of rock socket. Load carrying capacity should be based solely upon rock socket side friction at 5 to 6 KSF in competent limestone.

whereas non-displacement type piling (open-end pipe, or H-piles) usually drive their support by a combination of friction and end-bearing in the underlying limestone bedrock. Consequently displacement piling usually takeup and reach adequate bearing at somewhat shallower depths than non-displacement piling which tend to penetrate somewhat deeper into the weathered limestone bedrock. A disadvantage of fixed-length type piling (timber or concrete) is the difficulty of predetermining the length to purchase where the depth to bearing is quite variable as at this site. Furthermore, these piles are usually difficult and costly to splice, particularly to sustain uplift loads. Thus, it is usually advisable to purchase sufficiently long piles to eliminate this problem, as it is frequently less costly to waste cutoffs than to splice. To avoid these difficulties, it is usually advantageous to use other types of piling which are more readily adaptable to significant variations in required length - such as pipe, shell, or H-piling which can be more easily cut off and spliced. These various factors and structural loadings and pile cap design requirements must be considered in the selection of the foundation system.

A more comprehensive final foundation study should be undertaken to obtain the additional data needed to establish specific site preparation procedures and foundation design criteria for the various facilities. These additional data are also needed to permit the detailed cost estimates necessary to select the most appropriate and economical types of deep foundation systems to use. Furthermore, additional data are required to establish specific design and construction recommendations for dewatering and foundation installation procedures, load testing, construction monitoring, etc.

LIMITATIONS

This preliminary study was undertaken for planning purposes only. Generally accepted soil mechanics and foundation engineering practices were utilized in the preparation of this report; and no other warranty, either expressed or implied, is made as to the professional advice provided. This report has been prepared solely for the use of our client and may not contain sufficient information for other uses or for the purposes of other parties. We are not responsible for any conclusions or recommendations based upon this data which are made by others, unless we have been given an opportunity to review and concur with them. The following are other applicable limitations.

The lines on the logs designating the interface between the various strata may only be approximate boundaries when the transition is gradational or could not be detected by the drilling operations.

The depth to the ground water table measured in the borings during the investigation is only indicative of the water level at that time. The ground water table may fluctuate significantly due to seasonal changes, variations in rainfall, and other factors not evident at the time of the investigation.

The general engineering evaluation of the subsurface conditions and the preliminary opinions and conclusions presented in this report are based solely upon the data obtained from the exploratory borings made at the locations indicated on the attached plan; and are only valid so long as the site and subsurface conditions remain unchanged. This report does not reflect any variations which may occur between these borings, except as may be discussed in the report.

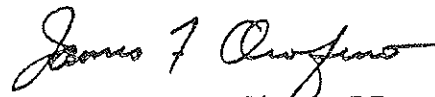
Because of the preliminary nature and limited scope of this study, this report is by necessity rather brief and quite general. However, we would be pleased to answer any specific questions you may have or evaluate these preliminary findings with respect to any other specific development concept you

April 20, 1984

might consider. It should be noted that the exploratory borings were very widely spaced, thus significantly different or more varied conditions are possible at other locations. When the final planning of this facility is complete and more definitive data regarding foundation loads available, a more comprehensive study should be undertaken to establish specific site preparation and foundation criteria for the planned facilities.

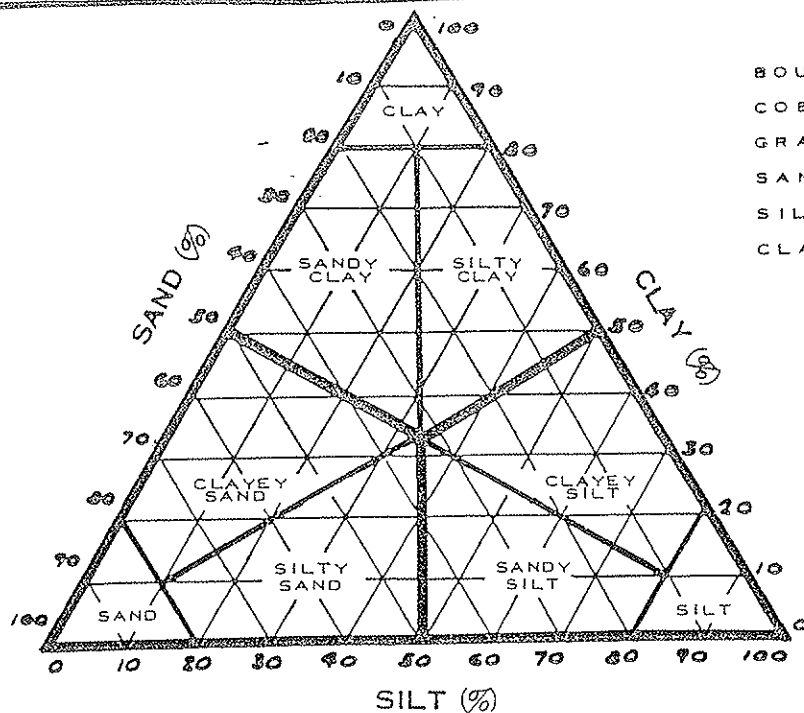
If you have any questions concerning this study, or if we may be of further assistance, please do not hesitate to call.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "James F. Orofino".

James F. Orofino, PE

President



BOULDERS	LARGER THAN 6 INCHES
COBBLES	2 TO 6 INCHES
GRAVEL	2 MM TO 2 INCHES
SAND	0.074 TO 2 MM
SILT	0.002 TO 0.074 MM
CLAY	SMALLER THAN 0.002 MM

SOIL CLASSIFICATION CHART

SOIL SYMBOLS



SAND



WEATHERED
LIMESTONE



CLAYEY SAND
SILTY SAND



LIMESTONE



SANDY CLAY
SANDY SILT



PEAT, MUCK,
ORGANIC SOILS



CLAY, SILT
SILTY CLAY
CLAYEY SILT



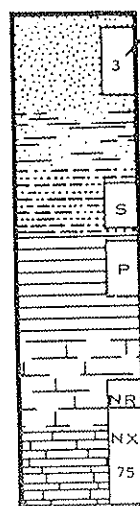
GRAVEL, COBBLES,
BOULDERS



VOID/CAVITY



MISCELLANEOUS
FILL, TOPSOIL,
ETC.



SAMPLE NUMBER
STANDARD
PENETRATION
TEST

▽ GROUND WATER

S SHELBY SAMPLE

P PISTON SAMPLE

LOSS OF DRILLING
FLUID (PERCENT)

NR NO RECOVERY

NX CORE SIZE

75 CORE RECOVERY
(PERCENT)

CONSISTENCY

COHESIONLESS SOIL

VERY LOOSE	0 - 4 BLOWS/FT.
LOOSE	4 - 10 BLOWS/FT.
FIRM	10 - 30 BLOWS/FT.
DENSE	30 - 50 BLOWS/FT.
VERY DENSE	50 - UP BLOWS/FT.

COHESIVE SOIL

VERY SOFT	0 - 2 BLOWS/FT.
SOFT	2 - 4 BLOWS/FT.
FIRM	4 - 8 BLOWS/FT.
STIFF	8 - 15 BLOWS/FT.
VERY STIFF	15 - 30 BLOWS/FT.
HARD	30 - UP BLOWS/FT.

LEGEND

MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
	dark grayish brown medium-fine SAND (topsoil)		4
	loose light grayish tan medium-fine SAND		1 ∇ (2,2,2)
5	loose dark brown medium-fine SAND (slightly organic stained)		2 7 (3,4,3)
	loose light brown medium-fine SAND		3 5 (2,2,3)
10	loose dark brown medium-fine SAND (slightly organic stained)		4 8 (2,3,5)
15	dense dark brown slightly clayey medium-fine SAND		5 52 (17,24,28)
20	dense light brown CLAYEY medium-fine SAND w/sand lenses		6 42 (10,16,26)
25	firm grayish brown CLAYEY medium-fine SAND		7 29 (14,14,15)
30	loose light greenish gray CLAYEY fine SAND w/cemented sand fragments		8 4 (3,2,2)
35	very stiff tan calcareous sandy clay w/some rock fragments & greenish zones (WEATHERED LIMESTONE)		9 16 (4,6,10)

Remarks: ground surface elevation 36.5 feet
complete loss of drilling fluid at 37 feet
bore hole cased (BX) to depth of 40 feet
bore hole grouted - 1/4 hour and 1/2 bag cement

BORING: 8-1

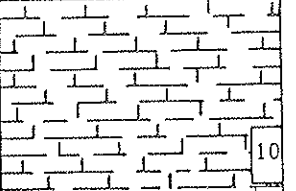
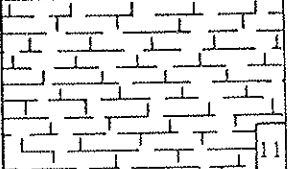
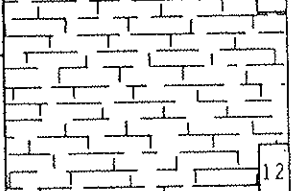
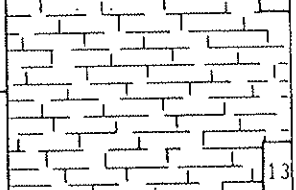
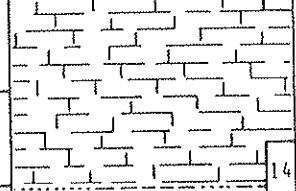
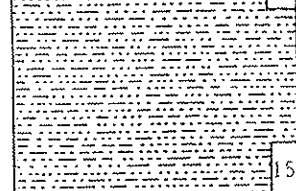
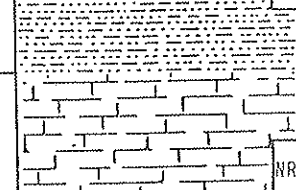
Page 1 of 3

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard light tannish white calcareous sandy clay w/some rock fragments & softer zones (WEATHERED LIMESTONE)		63 (12,30,33)
45			50 = 5"
50	firm grayish tan calcareous clayey sand (WEATHERED LIMESTONE)		24 (13,11,13)
55	hard light tannish white calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)		34 (11,12,22)
60	dense tan calcareous clayey sand (WEATHERED LIMESTONE)		75 = 10" (15,25,50/4)
65	hard gray & green fine SANDY CLAY w/rock fragments & weathered limestone lenses		100 = 10" (17,50,50/4)
70	hard tan calcareous sandy clay w/rock fragments & limestone lenses (WEATHERED LIMESTONE)		NR 50 = 1"

Remarks:

BORING: B-1

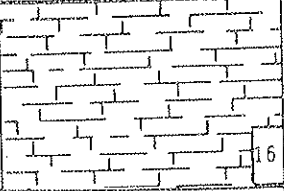
Page 2 of 3

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
75	hard tan calcareous sandy clay w/rock fragments & greenish gray & brown sandy clay lenses (WEATHERED LIMESTONE)		53 (16,20,33)
	boring terminated		

Remarks:

BORING: 8-1

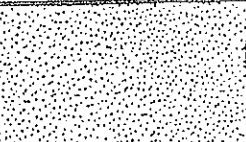
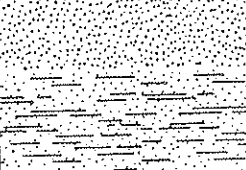
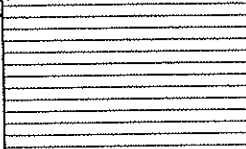
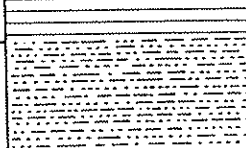
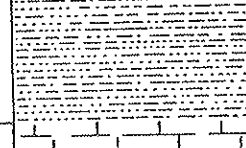
Page 3 of 3

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft
5	* light brown medium-fine SAND		6 1 ∇ (2,3,3)
	loose dark brown slightly clayey medium-fine SAND		4 2 (1,2,2)
	loose brown slightly clayey medium-fine SAND		12 3 (4,6,6)
10	firm light grayish brown CLAYEY medium-fine SAND		18 4 (7,9,9)
15	firm light green CLAY w/some harder zones		23 5 (1,3,20)
20	stiff light tan fine very SANDY CLAY		9 6 (3,4,5)
25	soft light greenish tan fine SANDY CLAY		3 7 (1,1,2)
30	very stiff light tannish white calcareous sandy clay w/some rock fragments & occasional limestone lenses (WEATHERED LIMESTONE)		27 8 (31,13,14)
35			31 9 (17,14,17)

Remarks: * dark brown & gray medium-fine SAND

ground surface elevation 38.0 feet
partial loss of drilling fluid at 27 & 45 feet
bore hole cased (BX) to depth of 30 feet
bore hole grouted - 1/4 hour and 1/2 bag cement

BORING: 8-2

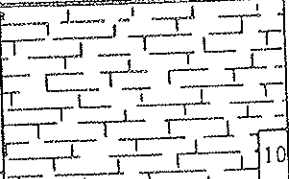
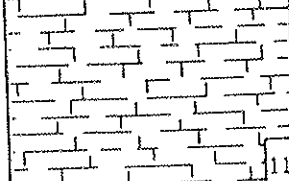
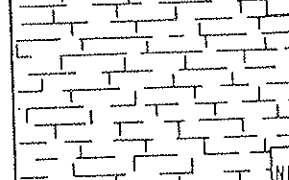
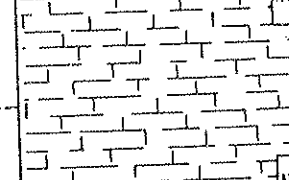
Page 1 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
40	very stiff light tannish white calcareous sandy clay w/some rock fragments & occasional limestone lenses (WEATHERED LIMESTONE)		50 = 1½" (17,50/1½)
45	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses, some greenish zones & occasional softer zones (WEATHERED LIMESTONE)		85 (36,40,45)
50			50 = 2"
55	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses & occasional softer zones (WEATHERED LIMESTONE)		50 = 1½"
	boring terminated		

Remarks:

BORING: B-2

Page 2 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
5	very loose dark brownish black slightly clayey medium-fine SAND (organic stained)	1	3 (1,1,2)
	very loose brown medium-fine SAND	2	3 (2,1,2)
	very loose dark brownish black slightly clayey medium-fine SAND (organic stained)	4	2 (1,1,1)
		5	15 (4,5,10)
10	firm light tannish gray CLAYEY medium-fine SAND		
15	firm light green CLAY	6	4 (1,2,2)
20	firm light greenish gray fine SANDY CLAY w/some cemented sand fragments	7	6 (7,3,3)
25	very loose green CLAYEY fine SAND	8	1 = 18"
30	very soft light tannish white calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)	9	2 (1,1,1)
35	hard light tan calcareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)	10	50 = 5"

Remarks: * dark grayish peaty medium-fine SAND (topsoil)

ground surface elevation 33.8 feet
partial loss of drilling fluid at 22 feet
complete loss of drilling fluid at 27 feet
bore hole cased (BX) to depth of 35 feet
bore hole grouted - 1/4 hour and 1/2 bag cement

BORING: B-3

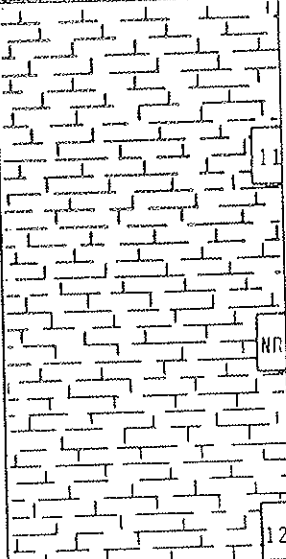
Page 1 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard light tan calareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)		50 = 4" (17,50/4)
45			NR 50 = 3"
50			73. (32,36,37)
	boring terminated --		

Remarks:

BORING: B-3

Page 2 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
	* **		▽ 2 (1,1,1)
5	very loose to firm dark brownish black slightly clayey medium-fine SAND (organic stained)	1 2 3 4	13 (3,7,6) 6 (2,2,4) 5 (2,2,3)
10			
15	firm light green CLAY	5	7 (2,3,4)
20	firm bluish green CLAY	6	7 (2,2,5)
25	stiff light bluish green fine very SANDY CLAY w/trace of small gravel	7	9 (2,4,5)
30	very loose greenish gray, gray & light brown CLAYEY fine SAND w/some slightly clayey zones	8 9	2 (2,1,1)
35	very soft tan calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)	10	2 (1,1,1)

Remarks: * dark grayish brown medium-fine SAND (topsoil)
 ** light brownish gray medium-fine SAND
 ground surface elevation 35.1 feet
 partial loss of drilling fluid at 35 feet
 bore hole grouted - 1/4 hour and 1/2 bag cement

BORING: B-4

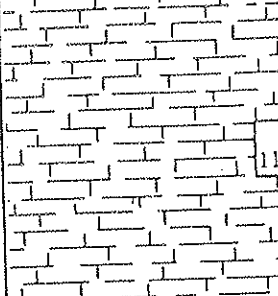
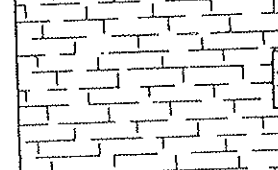
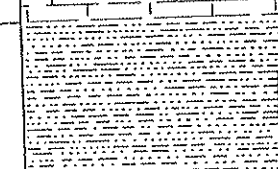
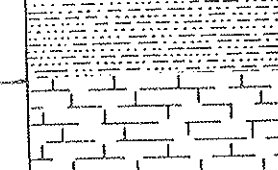
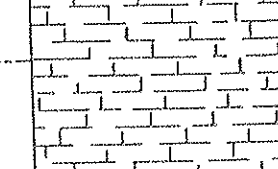
Page 1 of 3

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard tan calcareous sandy clay w/rock fragments, limestone lenses & occasional softer zones (WEATHERED LIMESTONE)		50 = 4" (32,50/4)
45			42 (29,20,22)
50	firm green CLAYEY fine SAND		50 = 4" (13,30,50/4)
55	hard tan calcareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)		50 = 4" (46,50,50/4)
60	firm dark greenish gray fine SANDY CLAY w/tan calcareous lenses		8 (7,4,4)
65	very stiff tannish gray calcareous sandy clay w/rock fragments & some greenish zones (WEATHERED LIMESTONE)		18 (2,5,13)
70	hard tan calcareous sandy clay w/rock fragments & limestone lenses (WEATHERED LIMESTONE)		50 = 4" (16,46,50/4)

Remarks:

BORING: B-4

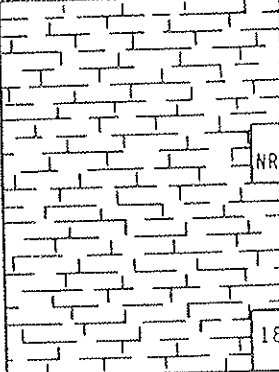
Page 2 of 3

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 64-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
75	hard tan calcareous sandy clay w/rock fragments & limestone lenses (WEATHERED LIMESTONE)		50 = 3"
80	boring terminated		50 = 4" (22, 46, 50/4)

Remarks:

BORING: 8-4

Page 3 of 3

TEST NAME

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
5	loose light grayish tan medium-fine SAND	1	8 ∇ (3,3,5)
		2	16 (4,6,10)
	firm dark brownish black slightly clayey medium-fine SAND (organic stained)	3	12 (7,6,6)
10	loose grown medium-fine SAND	4	8 (2,3,5)
		5	9 (2,3,6)
15	loose brown CLAYEY medium-fine SAND w/some slightly clayey zones & dark brownish black organic stained zones	6	
		7	4 (2,2,2)
20	firm light green CLAY		
		8	2 (2,1,1)
25	very loose light brownish gray, tan & greenish gray CLAYEY fine SAND w/cemented sand fragments, limestone fragments, & some sandy clay lenses		
		9	3 (2,2,1)
30			
		10	3 (1,1,2)
35	very loose yellowish tan & gray CLAYEY fine SAND		

Remarks: * gray medium-fine SAND

ground surface elevation 37.8 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: 8-5

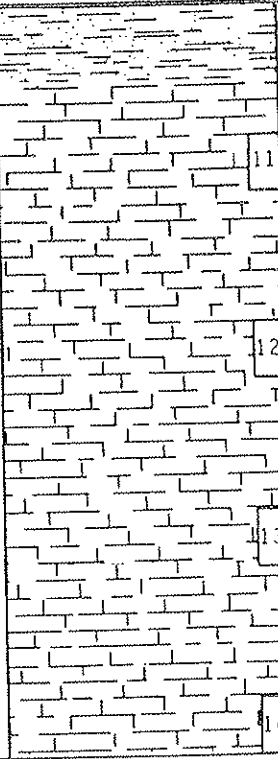
Page 1 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses, some softer zones & occasional greenish zones (WEATHERED LIMESTONE)		50 = 5½"
45			50 = 4"
50			50 = 2½"
55			50 = 3½" (38,50/3)
	boring terminated		

Remarks:

BORING: B-5

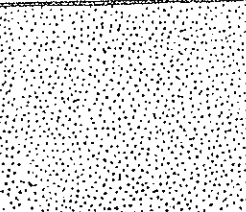
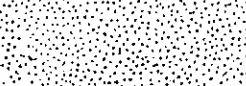
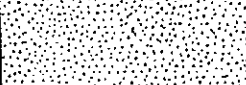
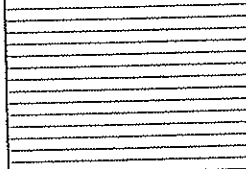
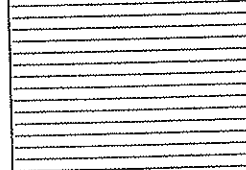
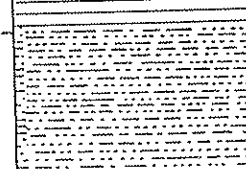
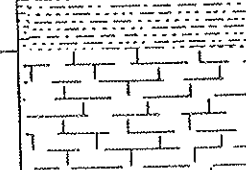
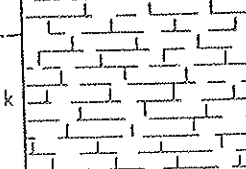
Page 2 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
	* loose light grayish tan medium-fine SAND		1 ▽ 7 (2,3,4)
5	loose brown slightly clayey medium-fine SAND		2 6 (2,2,4)
	very loose dark brownish black slight clayey medium-fine SAND (organic stained)		3 2 (2,1,1)
10	loose light grayish brown CLAYEY medium-fine SAND		4 9 (3,4,5)
15	firm light green CLAY		5 4 (2,2,2)
20	firm greenish gray fine very SANDY CLAY w/cemented sand lenses & fragments		6 5 (1,2,3)
25	firm greenish gray fine very SANDY CLAY w/cemented sand lenses & fragments		7 10 (2,4,6)
30	stiff light tannish white calcareous sandy clay w/rock fragments & greenish zones (WEATHERED LIMESTONE)		8 29 (3,7,22)
35	hard light tannish white calcareous sandy clay w/rock fragments & limestone lenses (WEATHERED LIMESTONE)		9 50 = 3"

Remarks: * gray medium-fine SAND

ground surface elevation 36.8 feet
bore hole grouted - 1/4 hour and 1/2 bag cement

BORING: 8-6

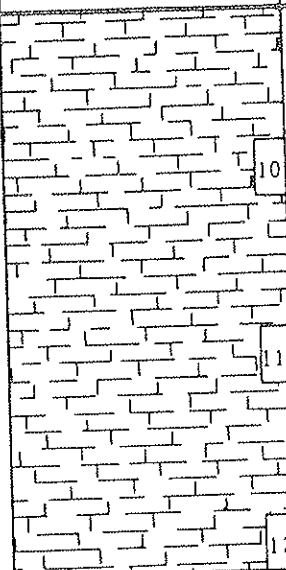
Page 1 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses, some softer zones & occasional greenish gray zones (WEATHERED LIMESTONE)		50 = 4" (25,47,50/4)
45			50 = 3"
50			63 (16,27,36)
	boring terminated		

Remarks:

BORING: B-6

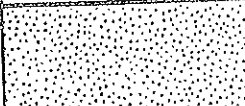
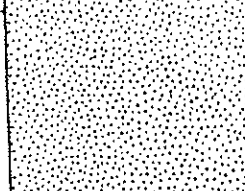
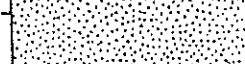
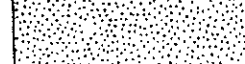
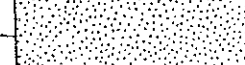
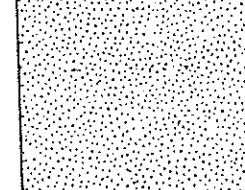
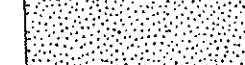
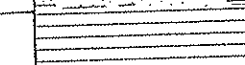
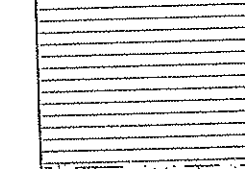
Page 2 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
	loose light gray medium-fine SAND		1 ∇ 7 (2,3,4)
5	loose to firm dark brownish black very slightly clayey medium-fine SAND (organic stained)		2 9 (2,3,6)
			3 15 (4,6,9)
10	loose brown medium-fine SAND		4 8 (3,4,4)
			
15	firm dark brownish black very slightly clayey medium-fine SAND (organic stained)		5 19 (7,10,9)
			
20			6 13 (5,6,7)
			
25	firm light brown CLAYEY medium-fine SAND		7 15 (5,6,9)
			
30	firm dark greenish brown CLAY		8 6 (2,3,3)
			
35	very loose light brown CLAYEY fine SAND w/cemented sand & shell fragments		9 2 (3,1,1)

Remarks: * gray medium-fine SAND
ground surface elevation 38.4 feet
partial loss of drilling fluid at 60 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: B-7

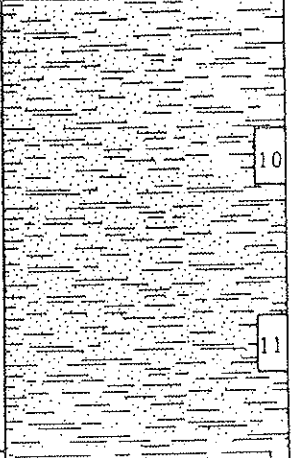
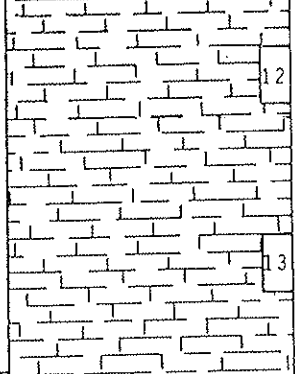
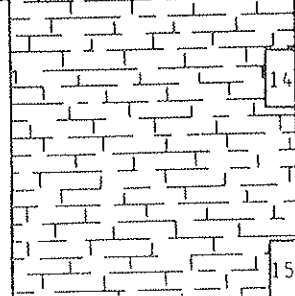
Page 1 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	very loose greenish gray CLAYEY fine SAND		1 = 18"
45			1 = 18"
50	hard light tan calcareous sandy clay w/some rock fragments, occasional limestone lenses, greenish zones & softer zones (WEATHERED LIMESTONE)		50 = 2" (38,50/2)
55			71 = 10" (11,21,50/4)
60	hard light grayish tan calcareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)		50 = 3" (32,50/3)
65			88 (40,40,48)
	boring terminated		

Remarks:

BORING: B-7

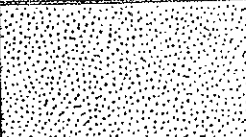
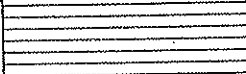
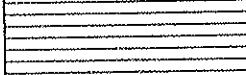
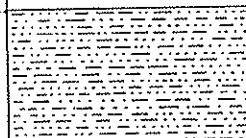
Page 2 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
5	loose brown medium-fine SAND		1 ▽ 6 (2,3,3)
	loose dark brownish black slightly clayey medium-fine SAND (organic stained)		2 4 (3,2,2)
10	firm green CLAY w/brown clayey sand & sandy clay lenses		3 6 (2,3,3)
			4 5 (2,2,3)
15	stiff light green fine SANDY CLAY		5 9 (3,4,5)
20	soft light greenish gray & tan fine SANDY CLAY		6 3 (2,1,2)
25	firm light tannish white calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)		7 7 (2,3,4)
30	very stiff to hard light tannish white calcareous sandy clay w/occasional rock fragments & greenish zones (WEATHERED LIMESTONE)		8 33 (10,20,13)
35			9 22 (6,7,15)

Remarks: * dark grayish brown slightly peaty medium-fine SAND (topsoil)

ground surface elevation 30.4 feet
bore hole grouted - 1/4 hour and 1/2 bag cement

BORING: B-8

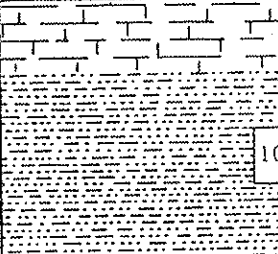
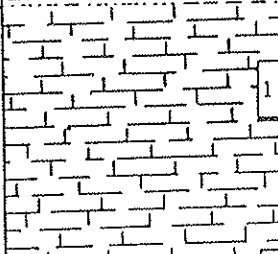
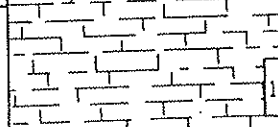
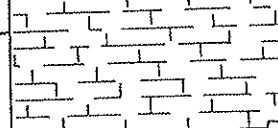
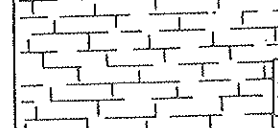
Page 1 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard green fine very SANDY CLAY		31 (8,13,18)
45	hard light tannish white calcareous sandy clay w/some rock fragments, limestone lenses, greenish zones & occasional softer zones (WEATHERED LIMESTONE)		50 = 4" (30,50/4)
50	—		80 (14,30,50)
55	hard light tan calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)		40 (9,20,20)
60	hard grayish tan calcareous sandy clay w/rock fragments, limestone lenses, occasional greenish zones & softer zones (WEATHERED LIMESTONE)		83 = 4" (25,33,50/4)
65			50 = 5"
70	boring terminated		50 = 2"

Remarks:

BORING: B-8

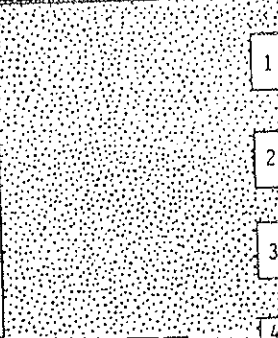
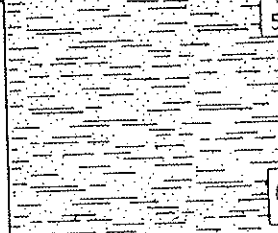
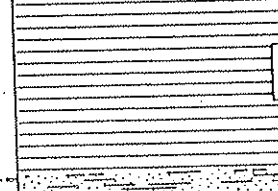
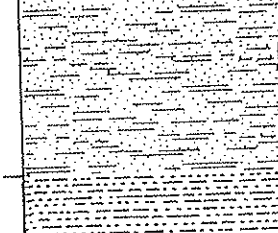
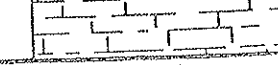
Page 2 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
5	loose light gray medium-fine SAND		1 8 ∇ (2,3,5)
	loose brown medium-fine SAND		2 6 (2,2,4)
	very loose dark brownish black very slightly clayey medium-fine SAND (organic stained)		3 3 (1,2,1)
10	firm light grayish tan CLAYEY medium-fine SAND		4 14 5 (3,6,8)
			6 18 (6,9,9)
20	soft light green CLAY		7 3 (2,1,2)
25	loose light greenish tan CLAYEY fine SAND		8 8 (2,3,5)
30	very soft light greenish gray fine very SANDY CLAY w/clayey sand lenses, tan calcareous clay lenses & rock fragments		9 2 (1,1,1)
35	very soft light tannish white calcareous sandy clay w/green sandy clay lenses (WEATHERED LIMESTONE)		10 1 = 18" 11

Remarks: * grayish brown medium-fine SAND (topsoil)
ground surface elevation 37.2 feet
partial loss of drilling fluid at 35 feet
bore hole cased (BX) to depth of 40 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: B-9

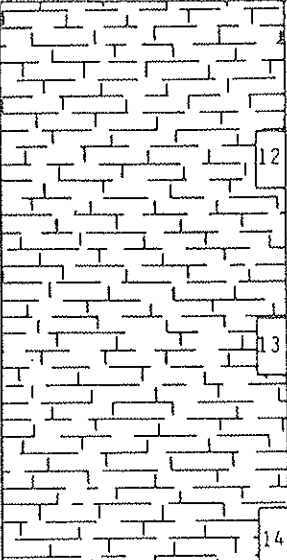
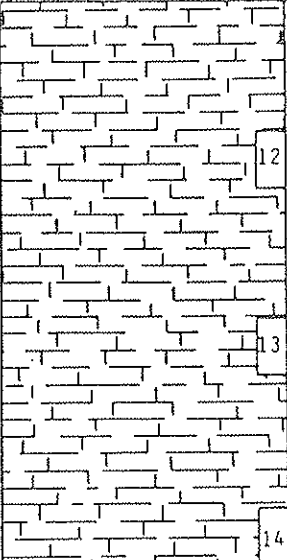
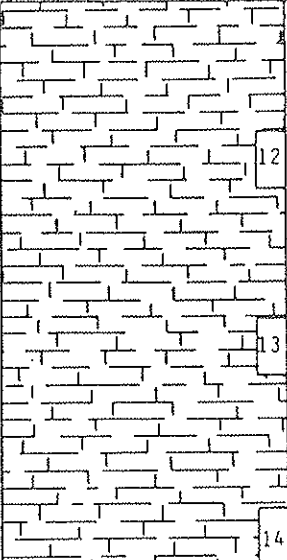
Page 1 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
40	stiff light tan & white calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)		12 (2,7,5)
45	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)		50 = 3" (50,50/3)
50	boring terminated		50 = 3"

Remarks:

BORING: B-9

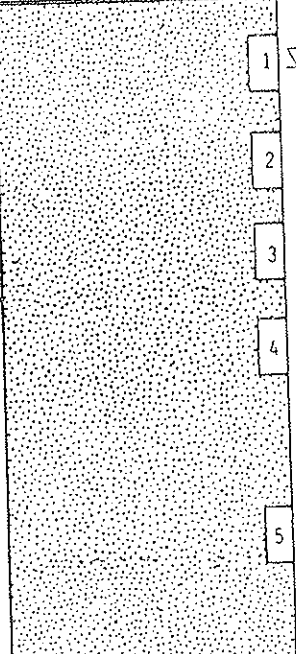
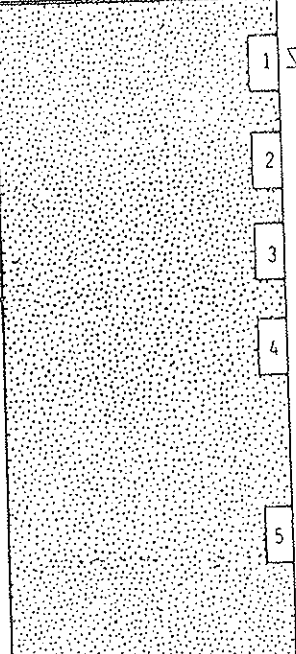
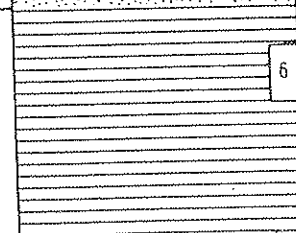
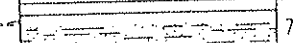
Page 2 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
5	dark grayish brown medium-fine SAND (topsoil)		1 ▽ 6 (2,2,4)
	loose light grayish tan medium-fine SAND		2 17 (4,7,10)
	firm brown medium-fine SAND		3 15 (4,8,7)
10	firm dark brownish black very slightly clayey medium-fine SAND (organic stained)		4 6 (2,2,4)
	loose to firm gray & brown medium-fine SAND		5 28 (5,11,17)
20	firm gray CLAY		6 4 (3,2,2)
25	firm light grayish tan very CLAYEY fine SAND		7 11 (3,4,7)
	boring terminated		

Remarks: ground surface elevation 32.2 feet

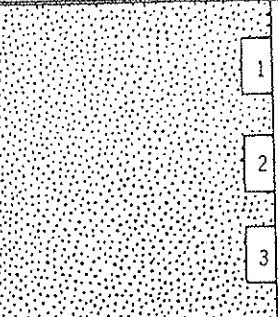
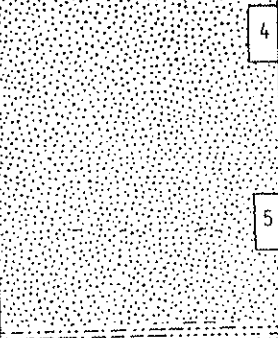
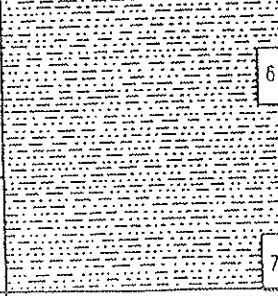
BORING: 8-10

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
5	loose light gray & tan medium-fine SAND		1 ▽ 7 (2,3,4)
	loose dark brown medium-fine SAND		2 8 (2,3,5)
	firm dark brownish black medium-fine SAND (organic stained)		3 13 (4,5,8)
10	firm to dense brown & gray medium-fine SAND		4 19 (5,8,11)
15			5 36 (9,14,22)
20	stiff gray fine very SANDY CLAY w/some tan sand lenses		6 11 (2,4,7)
25	stiff light bluish gray fine SANDY CLAY w/some tan sand lenses		7 14 (3,6,8)
	boring terminated		

Remarks: * grayish brown medium-fine SAND (topsoil)

ground surface elevation 32.8 feet

BORING: B-11

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

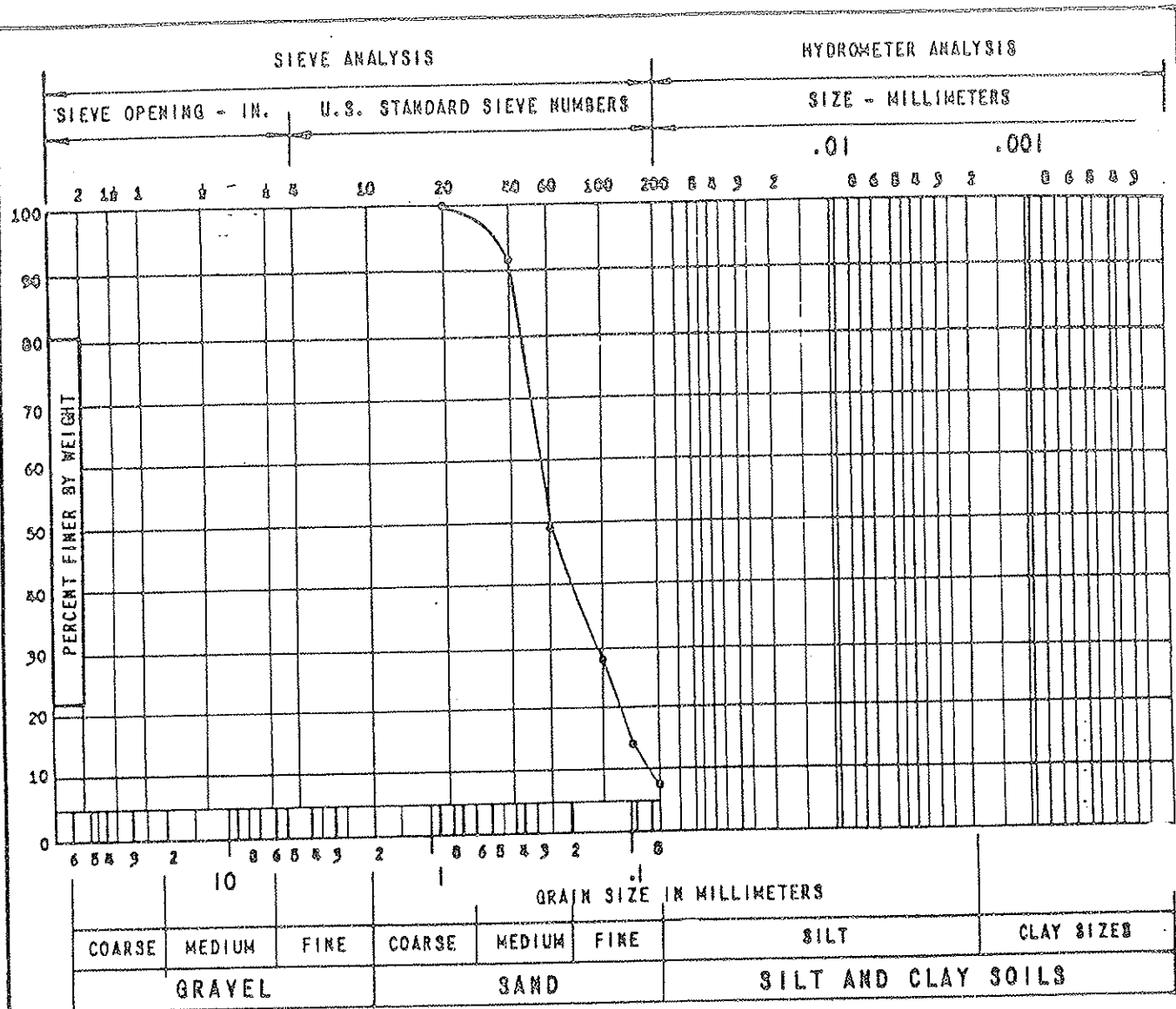
Depth	Soil Description	Soil Log	Sampler Blows/Ft.
	*		▽
		1	2 (1,1,1)
5	very loose dark brownish black slightly clayey medium-fine SAND (organic stained)	2	3 (1,1,2)
		3	9 (5,5,4)
	loose brown slightly clayey medium-fine SAND	4	3 (1,2,1)
10			
	very loose to loose dark brown, medium-fine SAND w/some dark brownish black organic stained zones	5	5 (1,2,3)
15			
	firm light gray CLAYEY fine SAND	6	14 (10,8,6)
20		7	
	stiff light green CLAY		
25		8	8 (3,3,5)
	boring terminated		

Remarks: * dark brownish black slightly peaty medium-fine SAND
(topsoil)

ground surface elevation 33.0 feet

BORING: 8-12

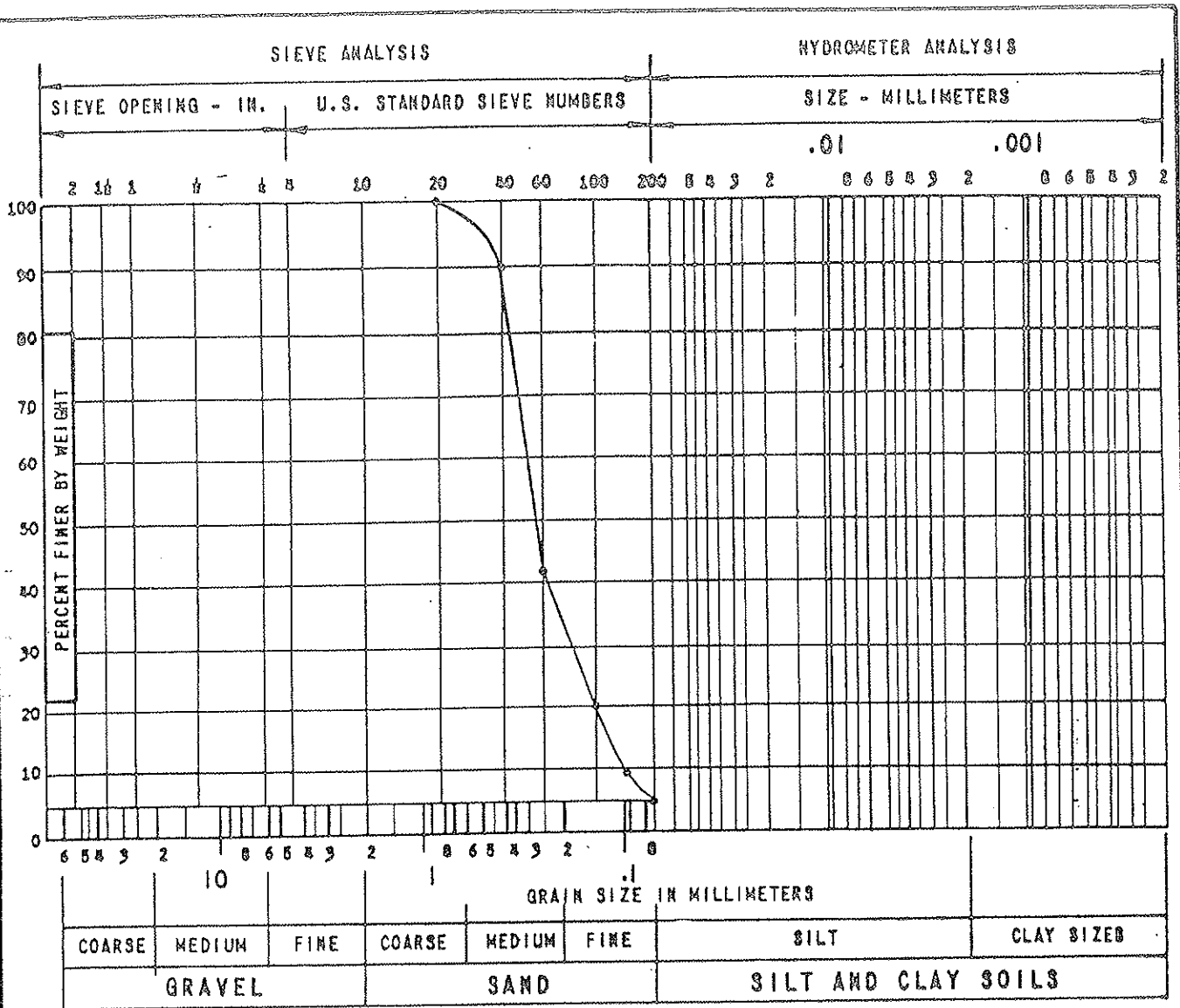
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 2	3 1/2' to 5'				loose dark brown medium-fine sand (slightly organic stained)

GRAIN SIZE DISTRIBUTION

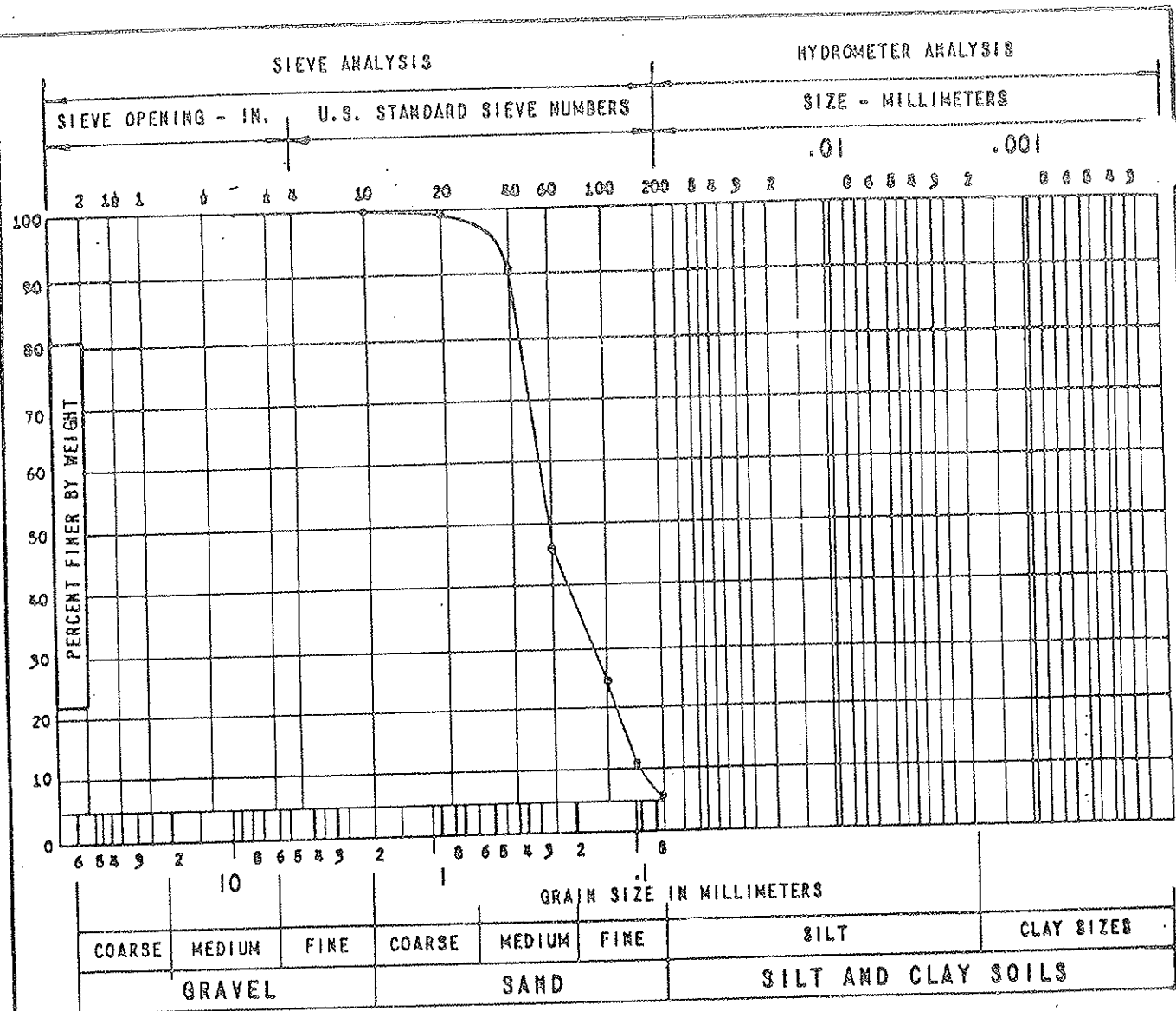
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 3	6' to 7½'				light brown medium-fine sand

GRAIN SIZE DISTRIBUTION

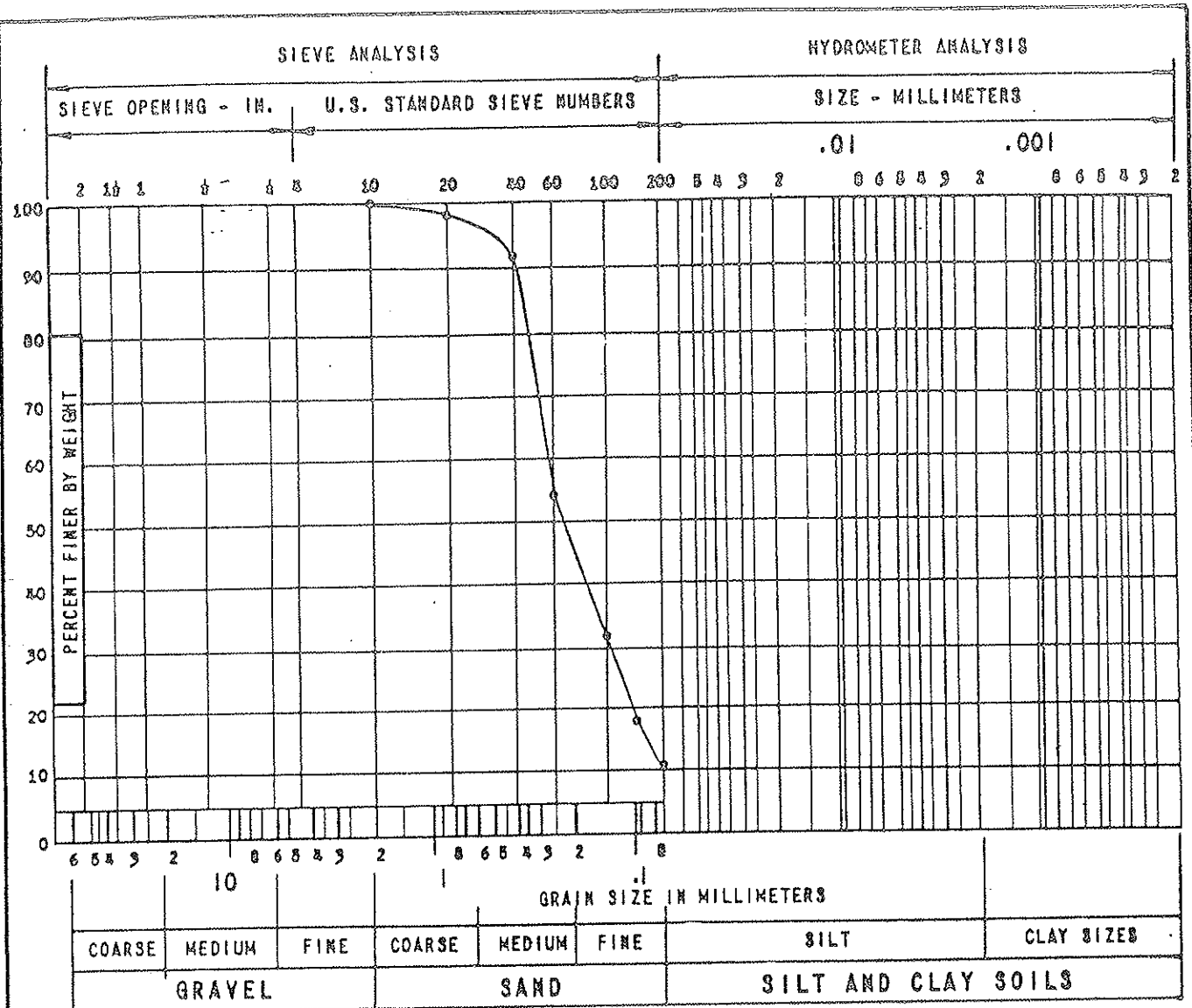
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 4	8½' to 10'				dark brown medium-fine sand (slightly organic stained)

GRAIN SIZE DISTRIBUTION

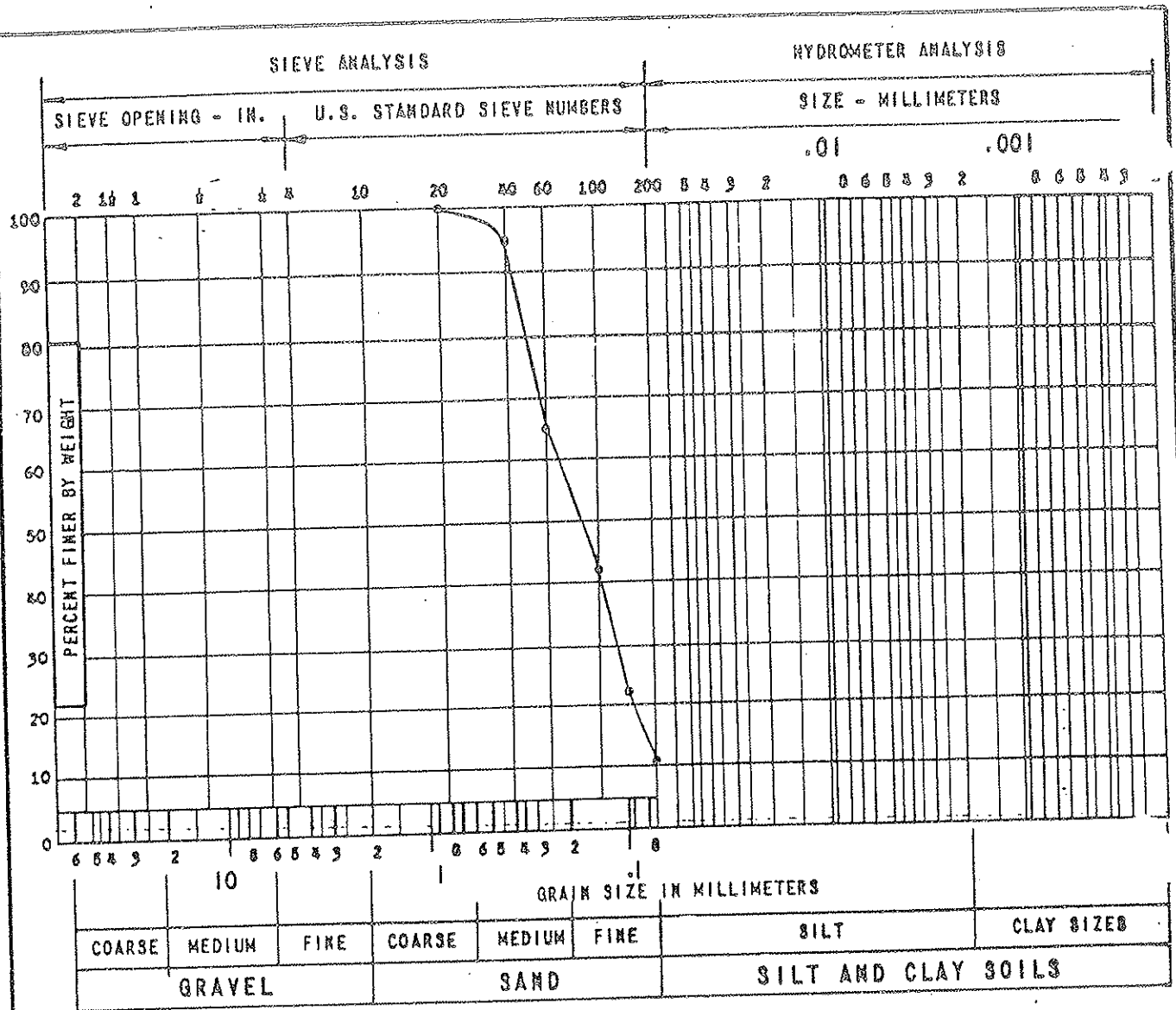
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 5	13½' to 15'				dark brown slightly clayey medium-fine sand

GRAIN SIZE DISTRIBUTION

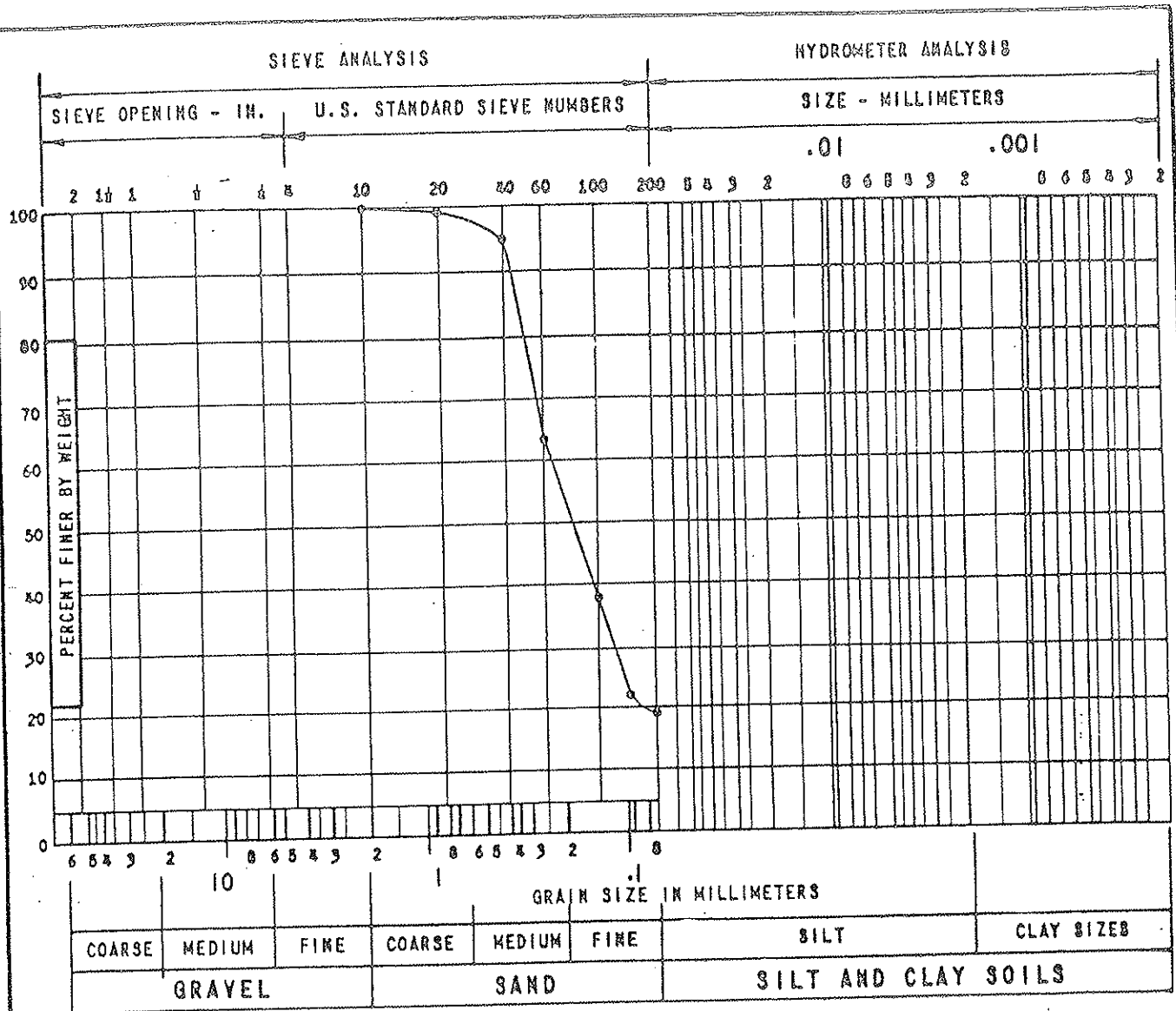
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 6	18½' to 20'				light brown clayey medium-fine sand w/sand lenses

GRAIN SIZE DISTRIBUTION

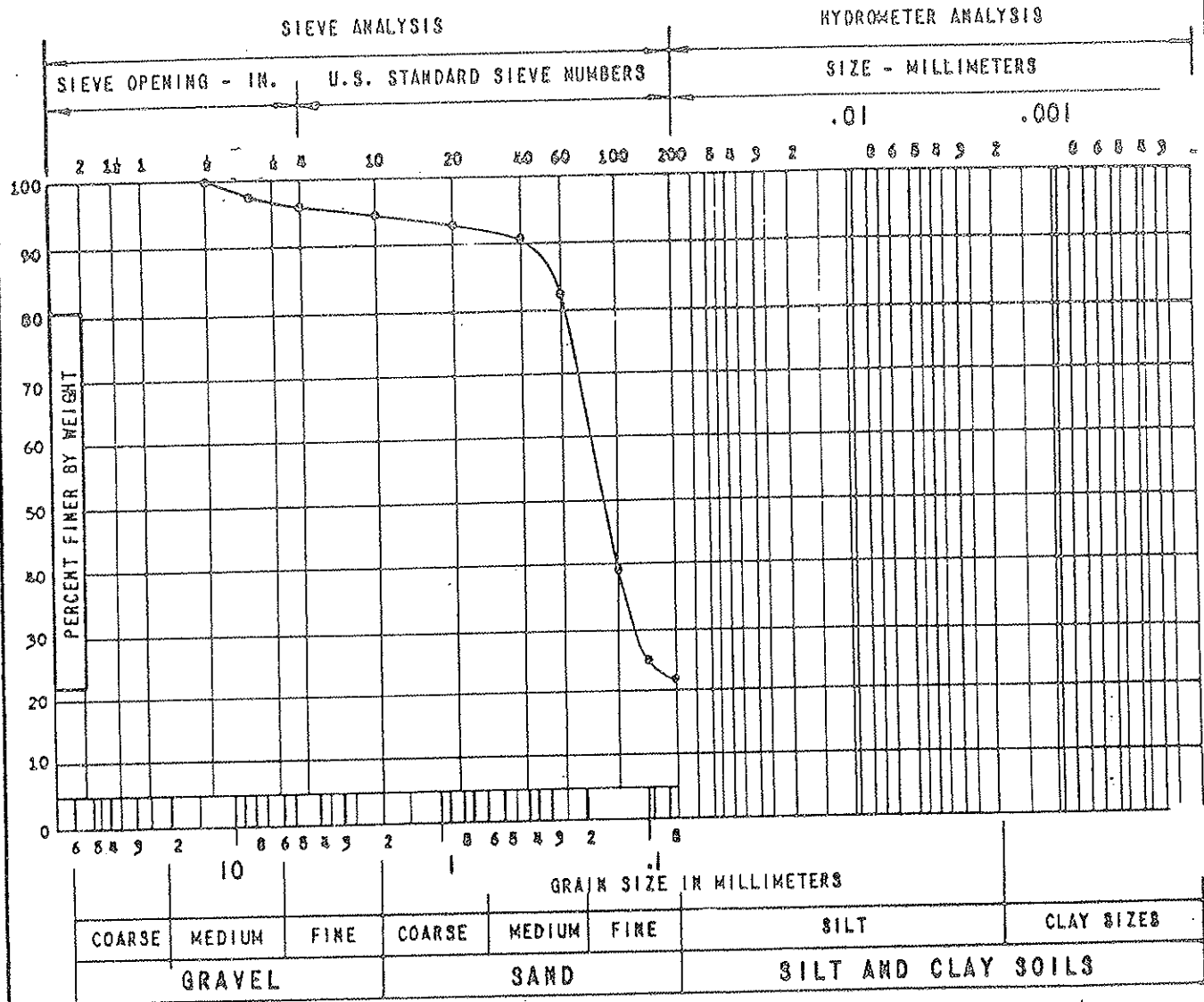
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 7	23½' to 25'		20	7	grayish brown clayey medium-fine sand

GRAIN SIZE DISTRIBUTION

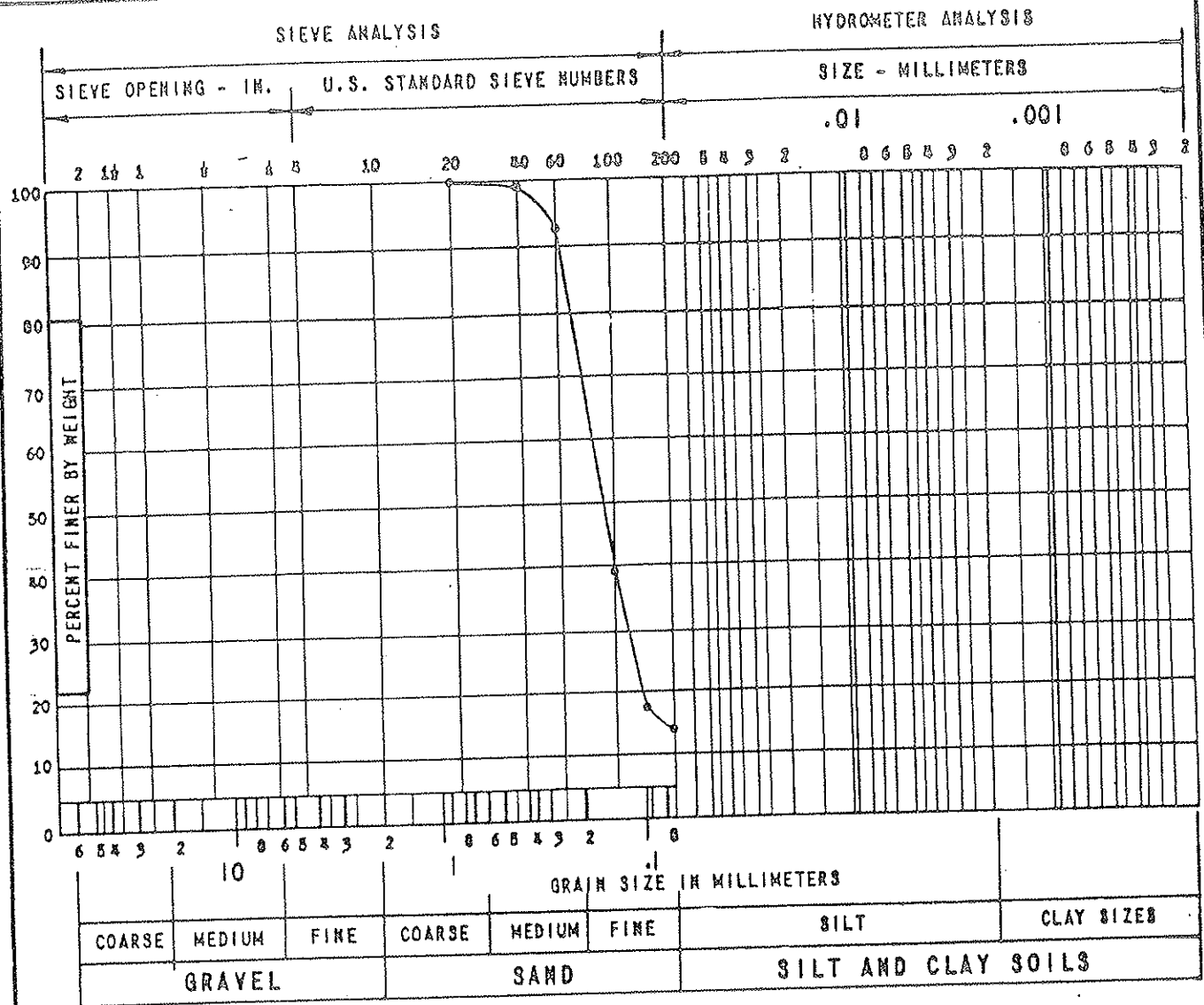
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 8	28½' to 30'		28	13	light greenish gray clayey fine sand w/cemented sand fragments

GRAIN SIZE DISTRIBUTION

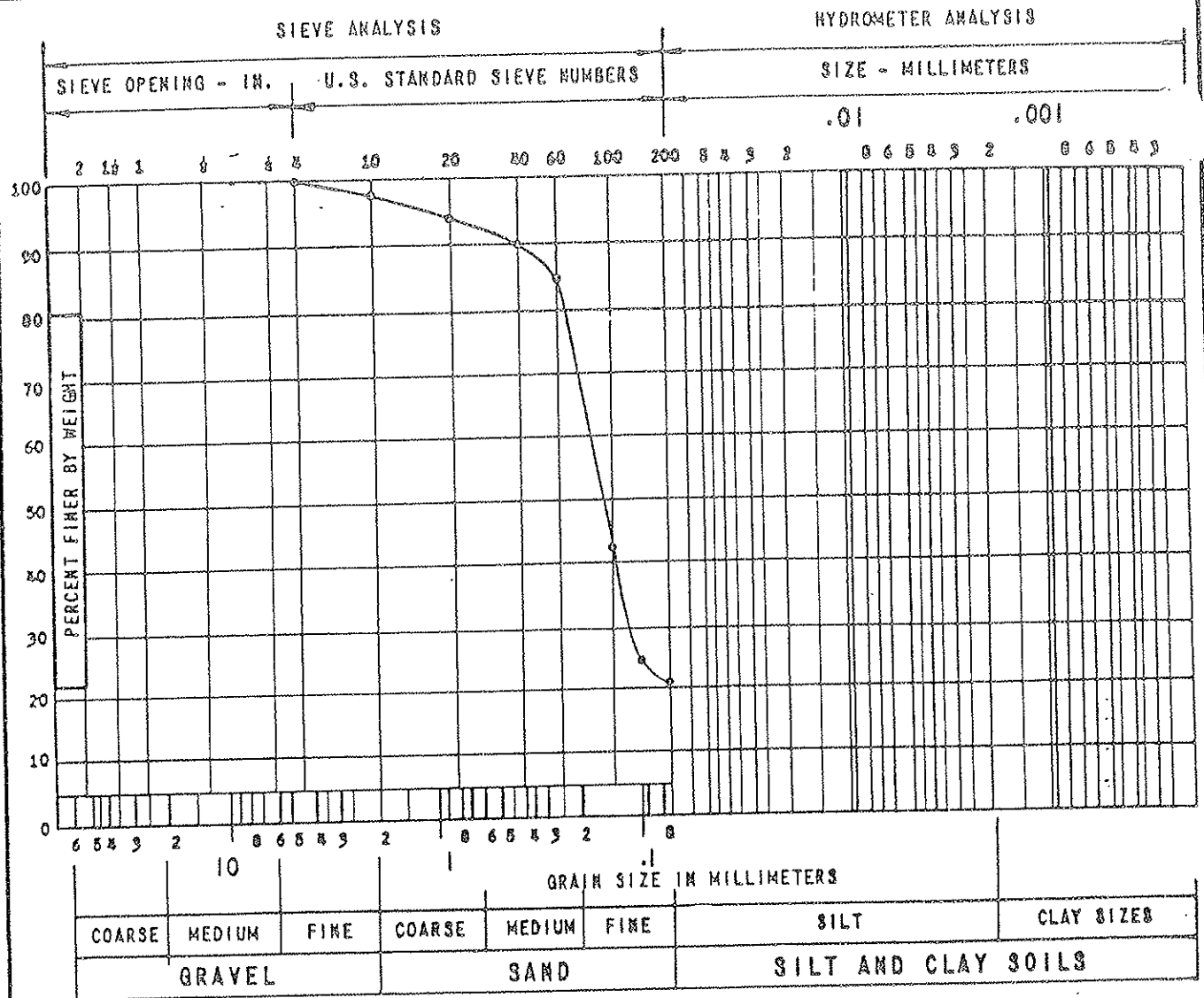
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		8-3 Sample No. 8	23½' to 25'		22	NP	green clayey fine sand

GRAIN SIZE DISTRIBUTION

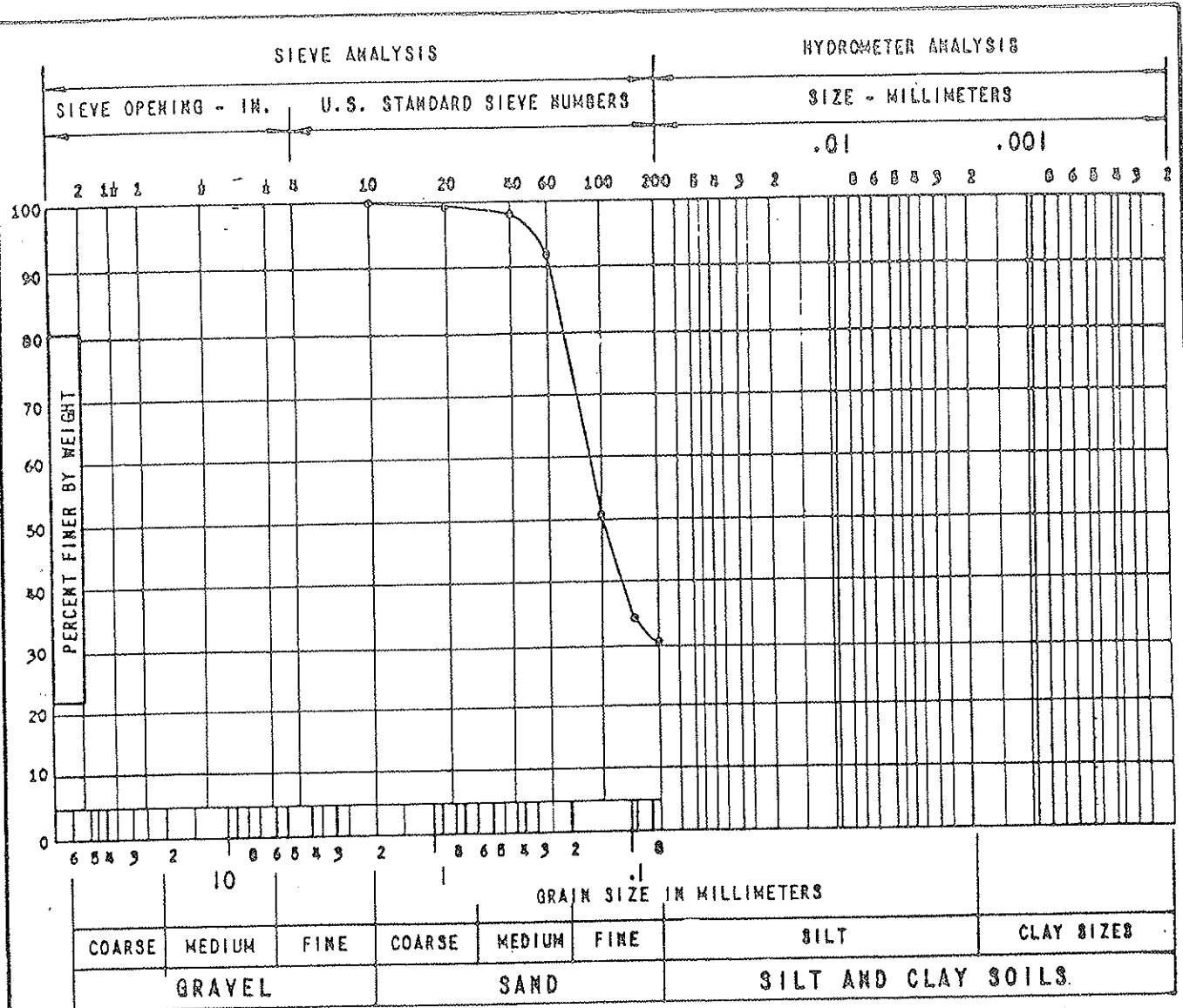
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-5 Sample No. 8	23½' to 25'		35	10	light brownish gray clayey fine sand w/some cemented fragments

GRAIN SIZE DISTRIBUTION

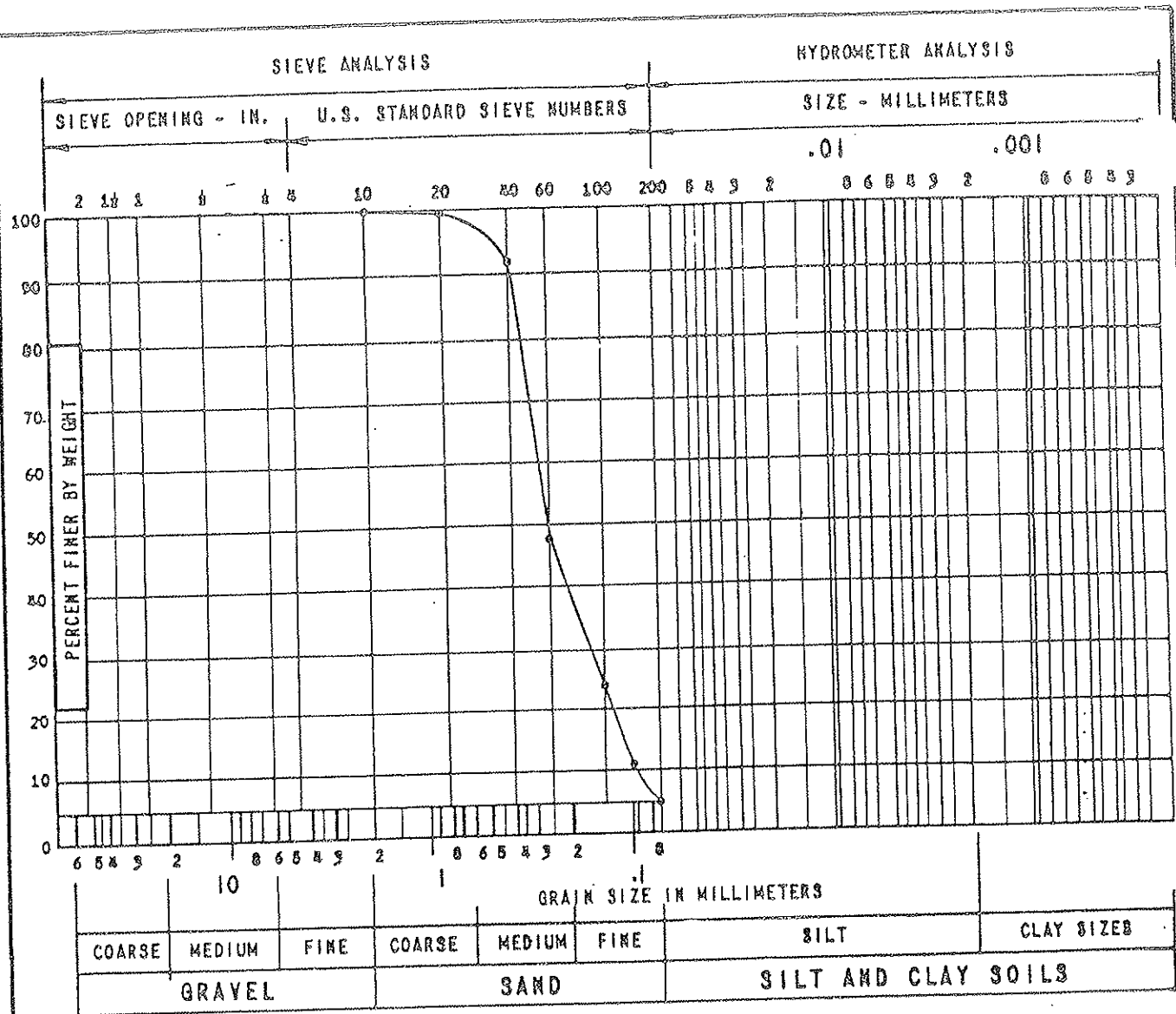
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB

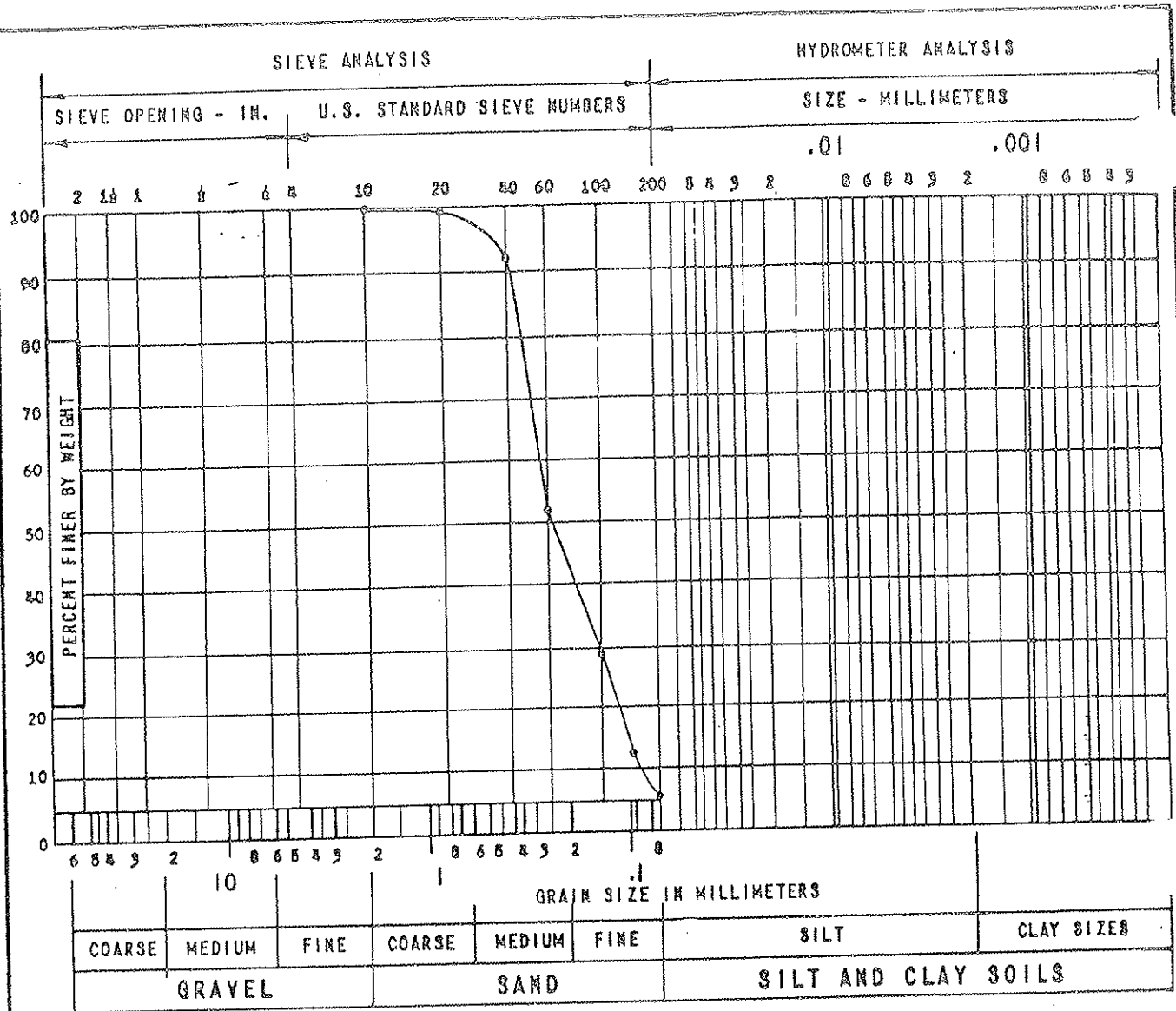


CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-5 Sample No. 10	33½' to 35'		61	22	yellowish tan & gray clayey fine sand

GRAIN SIZE DISTRIBUTION

MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB

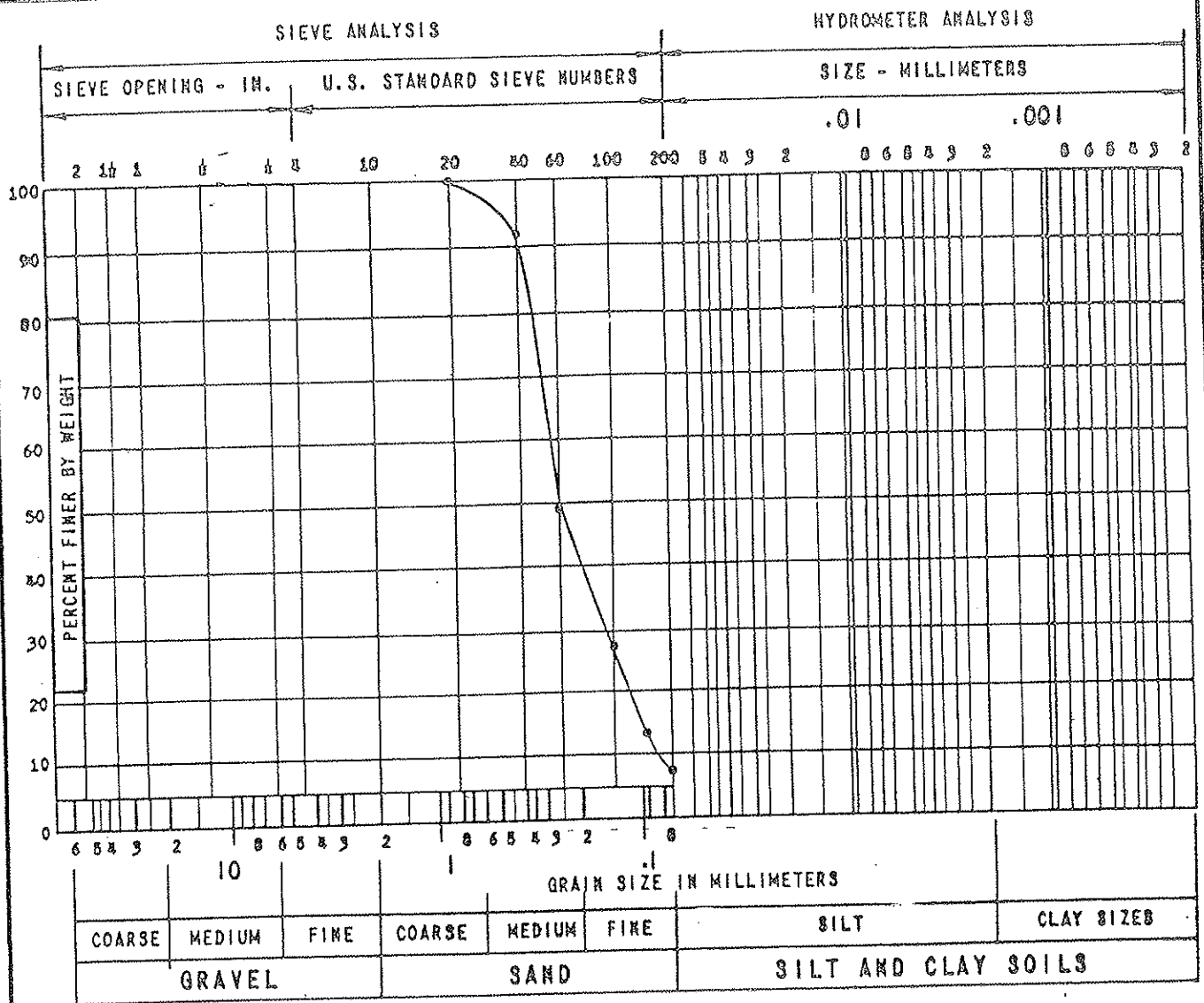




CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 4	8½' to 10'				brown medium-fine sand

GRAIN SIZE DISTRIBUTION

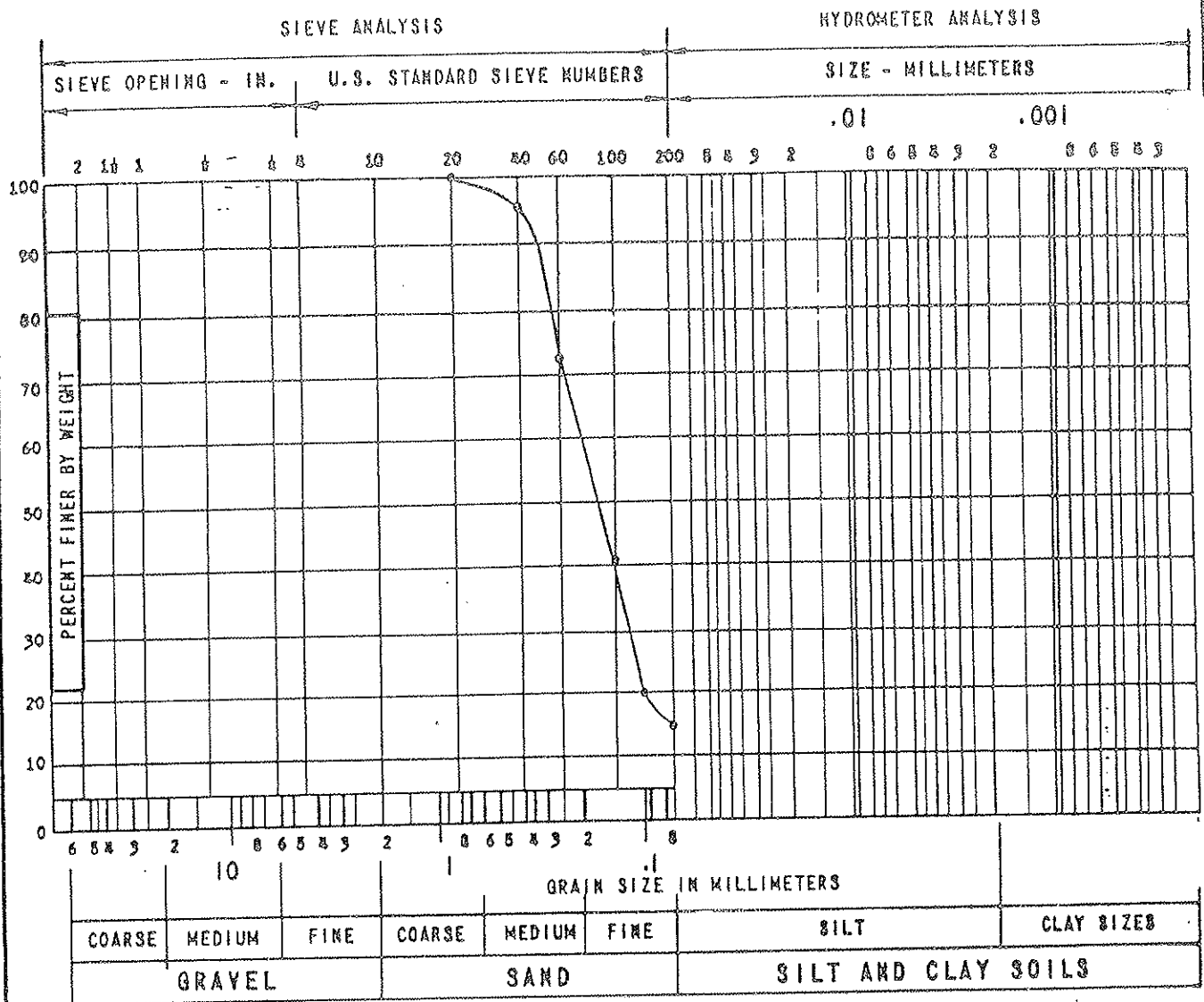
INTERVALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 5	13½' to 15'				dark brownish black very slightly clayey medium-fine sand (organic stained)

GRAIN SIZE DISTRIBUTION

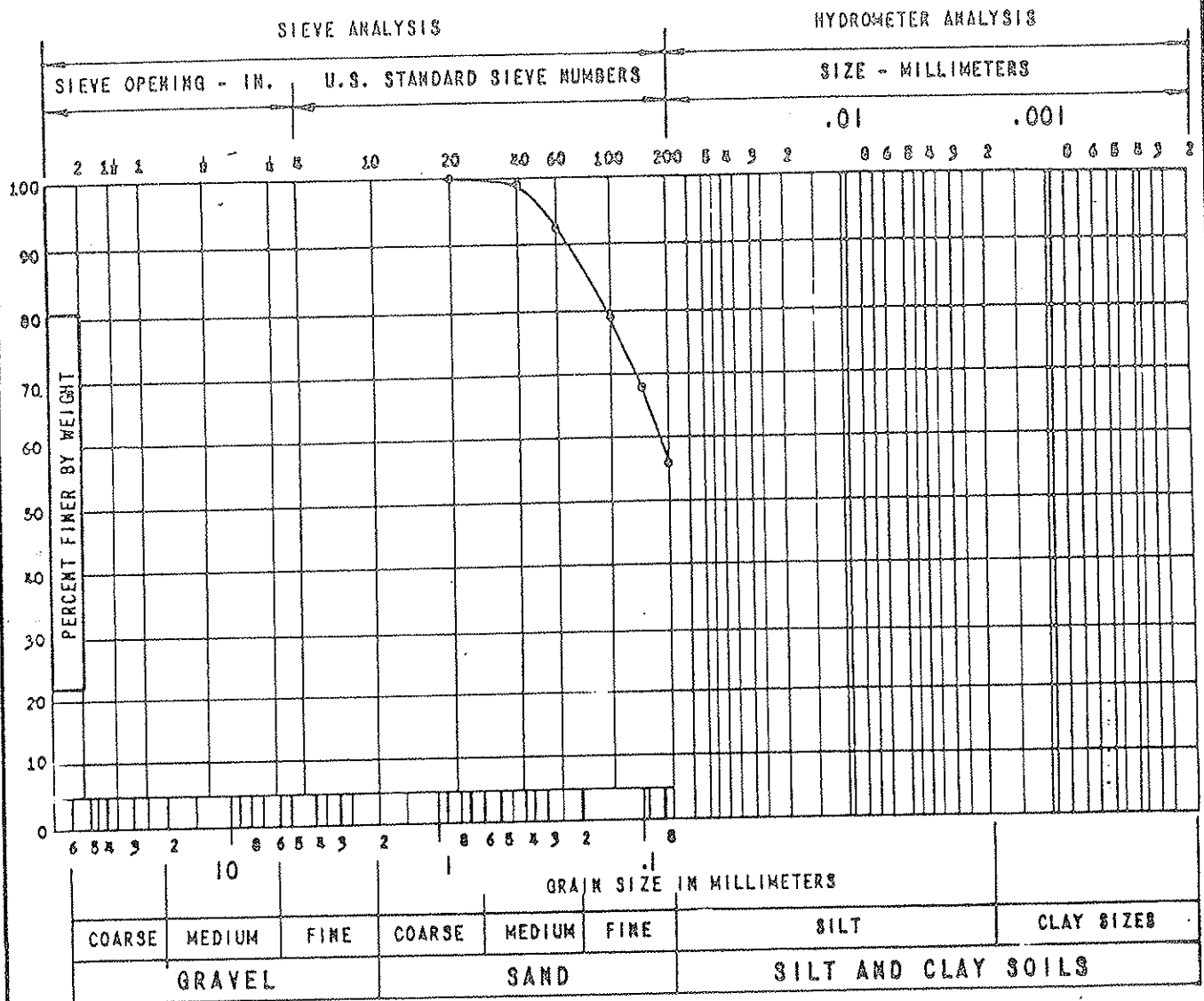
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 7	23½' to 25'		20	NP	light brown clayey medium-fine sand

GRAIN SIZE DISTRIBUTION

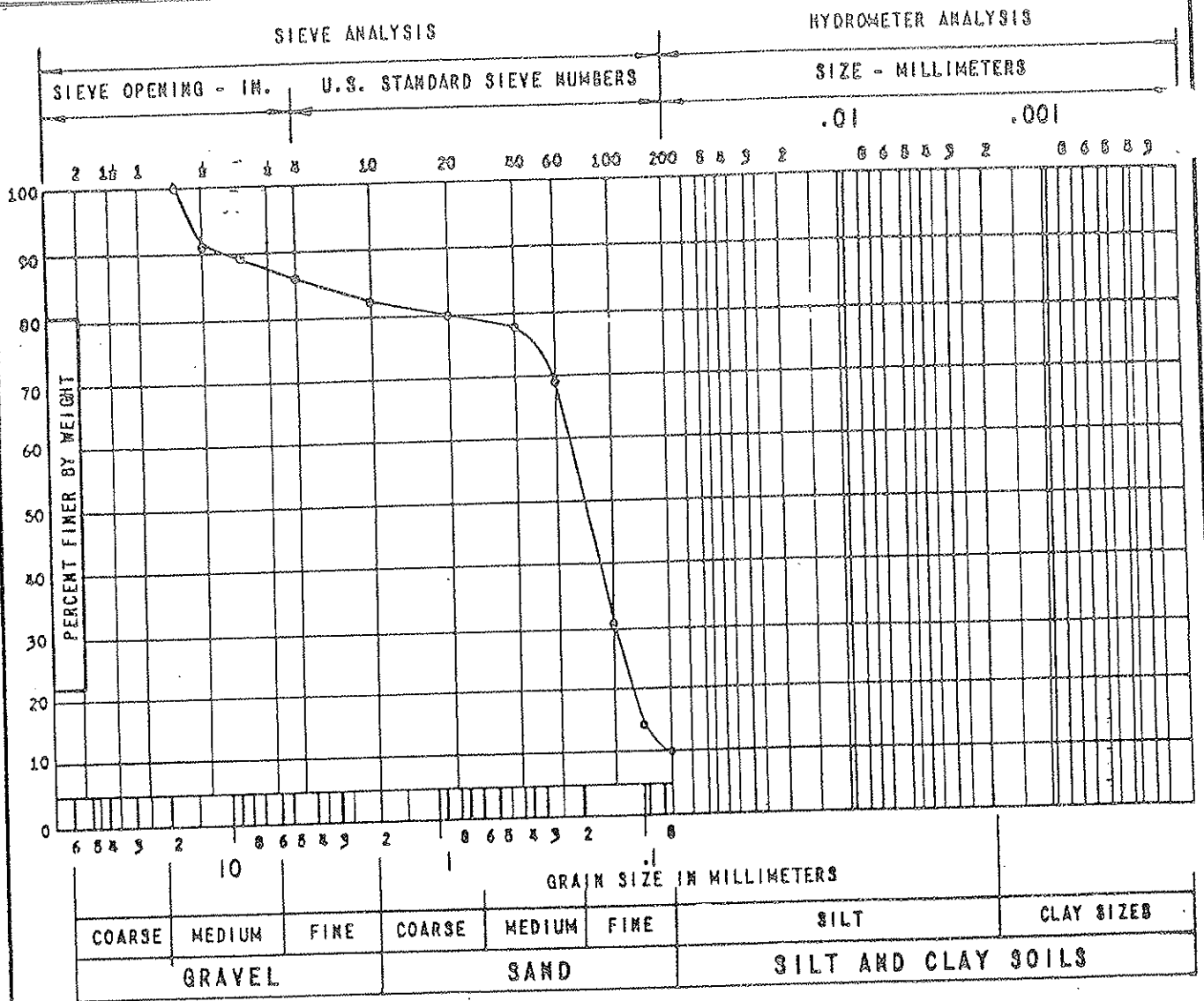
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		8-7 Sample No. 8	28½' to 30'		55	20	dark greenish brown fine sandy clay

GRAIN SIZE DISTRIBUTION

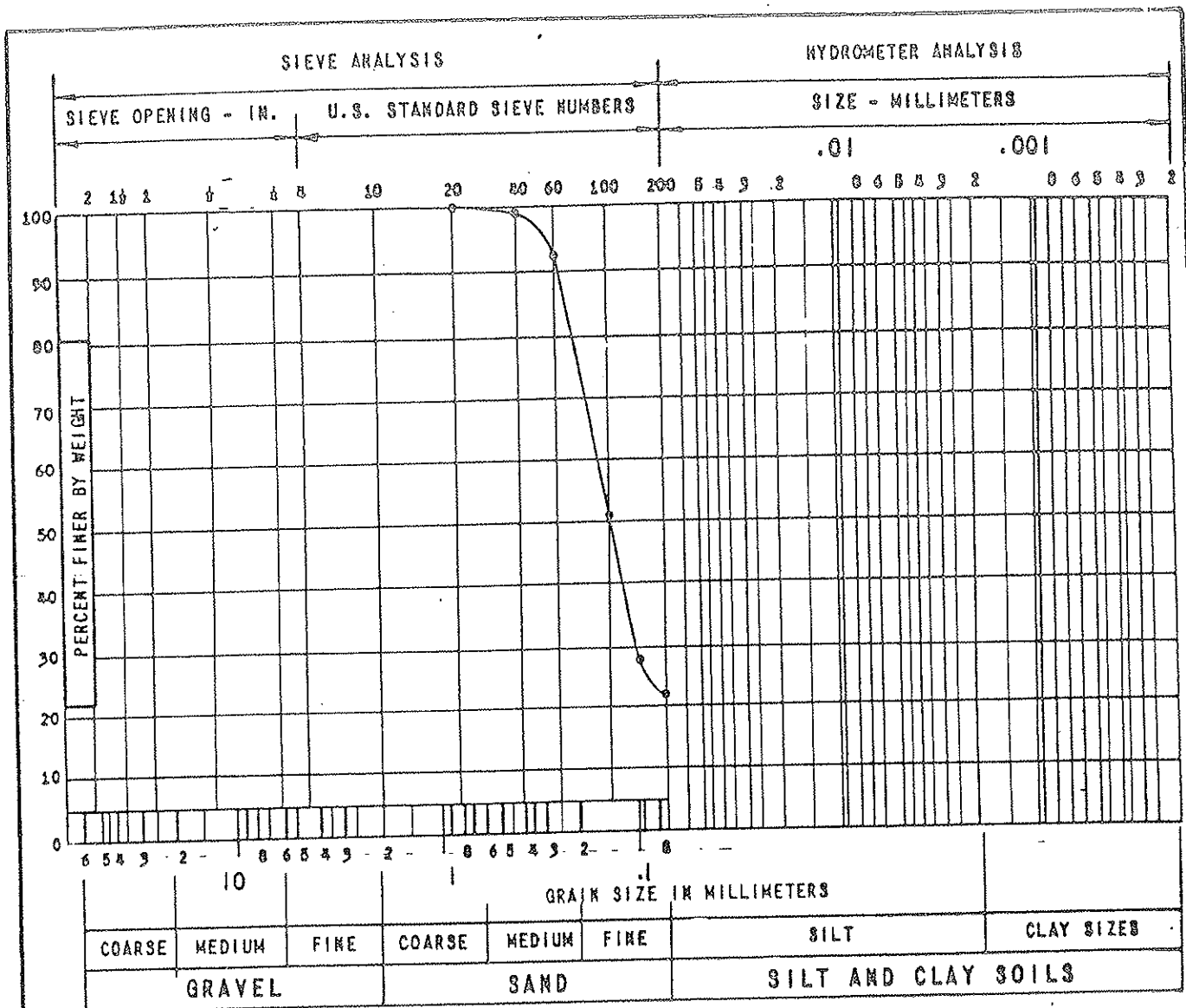
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 9	33½' to 35'		24	NP	light brown clayey fine sand w/cemented sand & shell fragments

GRAIN SIZE DISTRIBUTION

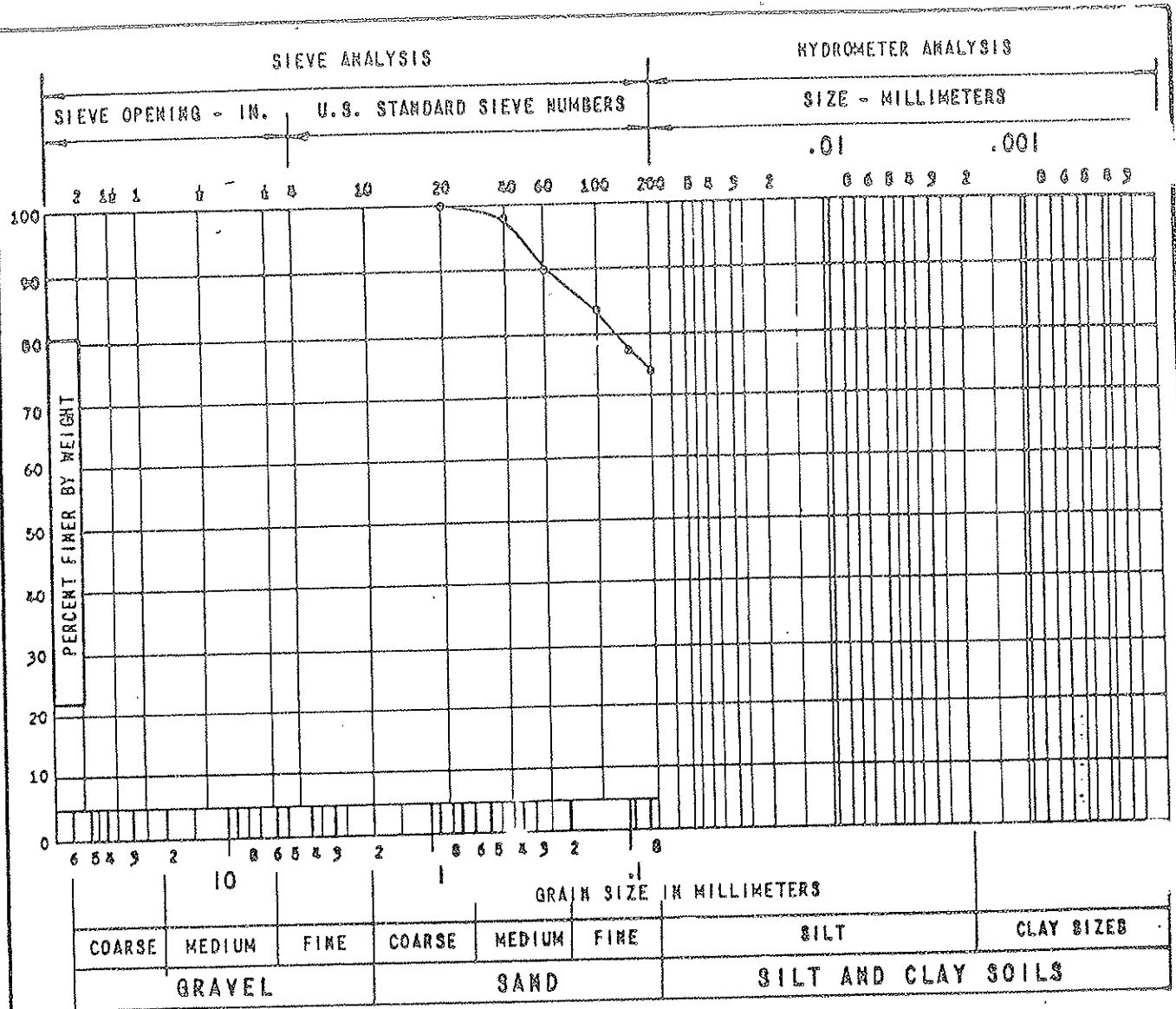
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 10	38½' to 40'		43	22	greenish gray clayey fine sand

GRAIN SIZE DISTRIBUTION

MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB

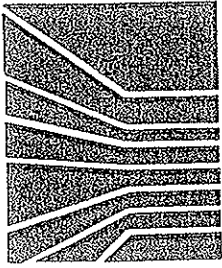


CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-8 Sample No. 3	6' to 7½'		93	64	firm green clay w/brown clayey fine sand & fine sandy clay lenses

GRAIN SIZE DISTRIBUTION

MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB

Appendix 10-4
Williams and Associates Inc.,
Report



WILLIAMS & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING & MATERIALS TESTING
12290 US HIGHWAY 19 SOUTH, CLEARWATER, FLORIDA 33516
TELEPHONE: CLEARWATER (813) 536-4789 TAMPA (813) 228-7020

29 March 1983

County of Hillsborough
Department of Solid Waste
Post Office Box 1110
Tampa, FL 33601

Attention: Mr. Warren N. Smith

Subject: Report of a Preliminary Subsurface Exploration
Proposed Solid Waste Energy Recovery Facility
Faulkenburg Road Site, Hillsborough County, Florida
Our File Number D820117P

Gentlemen:

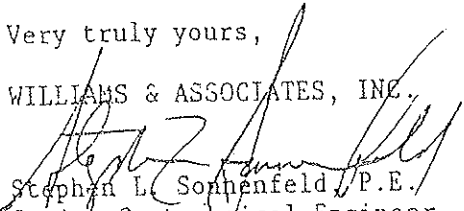
Williams & Associates, Inc., has performed a subsurface exploration for the subject project. The intent of this study was to develop preliminary or conceptual soil-related criteria for foundation design. It is our understanding that these recommendations are to be utilized in the development of preliminary cost estimates. Previous investigative work we have performed at this and other potential recovery facility sites was reported to you on 1 November 1982.

Our engineering and testing services were authorized by your acceptance of our proposal dated 24 January 1983. The scope of data collection indicated in that proposal was altered due to difficult access caused by the high ground-water levels. One change was to perform additional soil test borings rather than electric cone penetrometer soundings. Also, no data could be obtained from several test locations due to the high water. Because of the relatively uniform conditions encountered, it is not anticipated that additional borings will be performed for this preliminary study.

Williams & Associates, Inc., appreciates the opportunity to provide these engineering and testing services. If you have any questions, please contact our office.

Very truly yours,

WILLIAMS & ASSOCIATES, INC.


Stephen L. Sonnenfeld, P.E.
Senior Geotechnical Engineer
Florida Registration Number 19398

SLS/cb/460/H

SUBMITTALS: Addressee (1)
Camp, Dresser & McKee, Inc. (3)

Revised 12 December 1983

TABLE OF CONTENTS

<u>Item</u>	<u>Page No.</u>
I. INVESTIGATIVE PROCEDURES	1
A. Field Testing	1
1. Soil Borings	1
2. Undisturbed Samples	1
3. NX Coring	1
B. Laboratory Testing	2
1. Classification Tests	2
2. Determination of Unit Weight and Moisture Content	2
3. Consolidation Testing	2
II. SITE AND SUBSURFACE CONDITIONS	3
III. SUPPLIED INFORMATION	5
IV. EVALUATIONS	6
V. PRELIMINARY RECOMMENDATIONS	9
A. Heavily-Loaded Components	9
1. Driven Piles	9
2. Drilled Shafts	9
B. Lightly-Loaded Components	10
1. Design Criteria	10
2. Roadway and Parking Areas	10

APPENDIX:

Drawings:	No. 820117P-1	Site Location
	No. 820117P-2	Test Locations
	No. 820117P-3	Soil Profiles
	No. 820117P-4	Soil Profiles

Field Testing

Laboratory Testing

I. INVESTIGATIVE PROCEDURES

A. FIELD TESTING

1. Soil Test Borings

On a supplied site plan, we selected the locations for ten soil test borings. These borings were located in the field by our engineering technician using a 100-foot tape and estimated right angles. The approximate boring locations are shown on our Drawing 820117P-2, which we prepared from the furnished site plan.

Soil test borings provide soil samples and Standard Penetration Resistance Values from selected depth intervals. Based on previously developed empirical correlations, various engineering properties of the soils can be inferred from these data. Records of the test borings are attached.

2. Undisturbed Samples

Soft cohesive soils which could adversely affect foundation support were encountered in the test borings. To better quantify these soils' engineering properties, relatively undisturbed samples were obtained for quantitative laboratory testing. These samples were obtained in conjunction with the soil test borings and are shown on the appropriate boring record.

3. NX Coring

NX-size corings were performed in general accordance with ASTM D 2113. The borings were advanced using a double-tube core barrel. Water was pumped through the core barrel to the tip to aid in cutting and flushing the bore hole. Once the desired length of core had been cut, the barrel was returned to the surface and the sample removed.

Coring provides a continuous sample of the more competent material encountered. These samples aid in better stratification of the subsurface conditions and provide samples for laboratory testing. This type procedure is not applicable in the softer material. A record of all coring is presented on the soil test boring logs.

B. LABORATORY TESTING

1. Classification Tests

Grain-size and Atterberg limit tests were performed on selected samples to assist in soils classification and to provide a general indication of the soils' engineering properties. The grain-size tests were performed in general accordance with ASTM D 442-63.

The soils' liquid limit was determined in general accordance with ASTM 423-67. The plastic limit and plasticity index were determined in general accordance with ASTM D 424-59. The test results are shown in the Summary of Laboratory Test Data.

2. Determination of Unit Weight and Moisture Content

In-place unit weights and moisture contents are necessary in evaluating the soils' settlement potential. The test data are presented in the Summary of Laboratory Test Data.

3. Consolidation Tests

In order to determine the soils' settlement characteristics, consolidation tests were performed on selected undisturbed samples. Consolidation tests provide quantitative data for estimating the soils' settlement potential under planned loading conditions. The tests were performed in general accordance with the procedures outlined in ASTM D 2435-78. The test results are presented as plots of void ratio versus the log of the applied vertical pressure.

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GEOTECHNICAL ENGINEERS

II. SITE AND SUBSURFACE CONDITIONS

The location of the proposed Faulkenburg Road solid waste treatment facility is shown on our Drawing 820117P-1. At the present time, the site is being utilized for pasture land. Due to heavy rains which have occurred recently, standing water has been observed over portions of the site. This very wet condition has made access to the site extremely difficult for truck-mounted equipment.

The soil test borings drilled during this study indicated overburden soils consisting primarily of fine sands to sandy clays (see Drawings 820117P-3 and 4). The clean, fine sands were typically encountered from the ground surface to depths of 5 to 13 feet. The consistency of this upper layer of sands ranged from very loose to medium dense, as indicated by Standard Penetration Resistance Values ranging from 3 to 19 blows per foot. An exception to this occurred at Boring 105, where dense conditions in the upper sands were indicated by Standard Penetration Resistance Values as high as 60 blows per foot.

Underlying the fine sands, clayey fine sands to sandy clays were encountered. Borings 108 and 109 were terminated in this cohesive stratum at a depth of 21.5 feet. The consistency of these clays varied markedly, as indicated by Standard Penetration Resistance Values ranging from 2 to 20 blows per foot. This wide range in penetration resistance values of the cohesive stratum indicates a significant variation in its settlement potential. This potential was further defined by laboratory consolidation tests.

The soils overlying the limestone formation were encountered to depths ranging from approximately 27 to 38 feet below existing ground surface. The test borings penetrated through these soils into the calcareous clays and silts of the limestone formation. Standard Penetration Resistance Values in the upper portion of the formation varied significantly from 8 to in excess of 100 blows per foot. However, the penetration resistance values within the

formation typically increased in depth, ranging from approximately 26 to in excess of 100 blows per foot. The borings were terminated in the formation at a maximum depth of 60 feet.

The relatively porous nature of the limestone formation was indicated by the loss of drilling fluid. However, no voids or near-void conditions were observed.

Relatively stabilized groundwater was observed in hand auger borings drilled adjacent to the test borings. At the time of our study, groundwater was encountered at ground surface to depths of approximately 1 foot. However, it is known the groundwater levels will fluctuate with rainfall and seasonal conditions.

III. SUPPLIED INFORMATION

At the present time, we have not been provided with specific structural information pertaining to the proposed solid waste facility. The following structural concepts are based on our experience with similar type facilities. We have assumed that the most critical components will be the refuse pit, boilers, steam generators, smoke stack, and heavy steel-frame structures.

The refuse pit will likely have an area load of approximately 3000 pounds per square foot. For traffic to access this pit, a ramp, a minimum of 20 to 30 feet in height, will likely be required. Both the fill and the proposed pit will cover large lateral areas.

Other heavier loading conditions will exist in the boiler, steam generator, and smoke stack areas. We have estimated that column loads could range from as high as 1000 to 1500 kips. At the present time, we have not considered the affects of equipment vibrations on the proposed foundations.

Typically a development of this nature will have a series of relatively small on-site improvements. These improvements could consist of office space, cooling towers and electrical substations, for example. For our preliminary purposes, we have defined lightly loaded structures as those which would have column loads less than 200 kips.

IV. EVALUATIONS

The following evaluations and recommendations are based on the subsurface data collected at this site and the preliminary structural conditions discussed herein. While in our opinion sufficient data have been obtained to evaluate the site in a preliminary fashion, additional subsurface data will be necessary in order to develop final recommendations. Also, it is cautioned that these evaluations are based on assumed structural conditions which could vary markedly. If there are significant variations from these structural conditions, we should be informed so as to review these evaluations for possible changes to our recommendations.

The subsurface data collected at this site indicate two limiting conditions for using conventional shallow foundations under the planned heavy loads. These are the very loose surficial sands and the potential for consolidation-type settlement in the underlying clayey stratum. The upper sands could be improved so as to significantly reduce the potential for post-construction settlement. However, the potential for consolidation-type settlement in the underlying clays would be somewhat more difficult to reduce. One procedure would be to surcharge the area. However, from a preliminary or conceptual point of view, this approach does not appear to be favored due to the required fill and possible construction delays.

For the relatively light loads, column loads less than 200 kips, post-construction settlement due to consolidation will likely be less than 1 inch. Therefore, shallow foundation support for lightly loaded components is quite feasible. It is cautioned that care would have to be taken between shallow-supported and pile-supported elements so as to reduce the potential for detrimental affects of differential types of settlement.

The proposed structures could be supported on a driven pile foundation. Additional information pertaining to the compressive strength of the limestone formation was obtained from both soil test borings and NX core samples. Based on this additional data, it is our opinion that pile compressive capa-

cities at this site should be limited to 60 tons. We estimate typical pile tip depths will range from 30 to 40 feet below existing ground surface for the 12-x 12-inch precast, prestressed concrete pile; or a pipe pile with a minimum diameter of 10 inches, driven to the 60-ton compressive capacity. However, based on a literal interpretation of the boring data, pile tip depths as great as 55 feet could occur at this site. Therefore, cutting and splicing of piles will likely be required. If the concrete section were selected rather than the steel section, then some means of splicing should be agreed upon prior to beginning production pile installation.

Another deep foundation support system would be to utilize a drilled shaft. Due to the relatively high groundwater levels, the drilled shaft would likely be installed using the "wet-hole" technique. Therefore, we recommend for preliminary planning that you consider drilled shafts developing their load-carrying capacity solely by side friction in the limestone formation. The top of the limestone formation was encountered at the test locations varying from approximately 27 to 40 feet below existing ground surface. Based on the additional data obtained during this study, we still recommend a design allowable friction capacity of 6 kips per square foot.

The relatively high groundwater level was observed throughout the entire site. Lowering of the groundwater level will likely be required during foundation construction. Also, depending on final site grading, high groundwater levels could be a factor in the design of pavement sections. We strongly recommend that for proposed paved areas, which will exist near or below existing ground surface, you consider a base course which is resistant to early deterioration due to water intrusion. Such base courses as soil-cement and cement-treated limerock would appear to be appropriate.

Aerial photographs of this site indicate numerous circular depressions in this general area. One of the test borings drilled during our previous study was located in a depression. The porous nature of the formation was indicated by the loss of drilling fluid in some of the test borings. However, this is not considered to be a unique condition. No evidence of advanced solution activity

such as voids and near-void conditions, was observed within either the overburden or limestone formation. Therefore, it is our opinion that this site does not appear to have a higher potential for solution and sink development than that which exists in this general locale.

V. PRELIMINARY RECOMMENDATIONS

We recommend that for your conceptual planning you consider supporting the heavily loaded components by means of a deep foundation system. Preliminary criteria for alternate deep foundation systems are discussed below. For the more lightly loaded components, less than 200-kip column loads, shallow foundation support would seem to be feasible. Preliminary recommendations for these footings are also recommended. However, it is again cautioned that care should be taken to reduce the potential of detrimental affects between the shallow and deep supported elements.

A. Heavily-Loaded Components

1. Driven Piles

Individual pile compressive capacities of up to 60 tons are available for preliminary design. The recommended minimum pile sections are a 12- x 12-inch precast, prestressed concrete pile and a closed-end, concrete-filled pipe pile with a minimum diameter of 10 inches. These piles should be installed with a driving hammer which has a rated energy of at least 19,500 foot-pounds. Estimates of pile lengths are presented in the Evaluation section. It is cautioned that the boring data does not fully bracket the variations in tip depths that production piles might encounter. Also, some cutting and splicing of these piles are likely. Therefore, if the concrete section is selected, appropriate splicing techniques should be agreed upon prior to beginning pile installation. After the final subsurface exploration is performed, criteria for test pile driving and load testing should be developed.

2. Drilled Shafts

We recommend that you consider drilled shafts for support of the heavier-loaded components. The drilled shafts should develop their load-carrying capacity solely by side friction in the underlying limestone formation. Side friction values up to 8 kips per square foot can be used for design.

Estimates of the top of the limestone formation were presented in the Evaluations section. Again, additional field and laboratory test data should be obtained prior to developing specific criteria for testing and observation of production drilled shafts.

B. Lightly-Loaded Components

1. Design Criteria

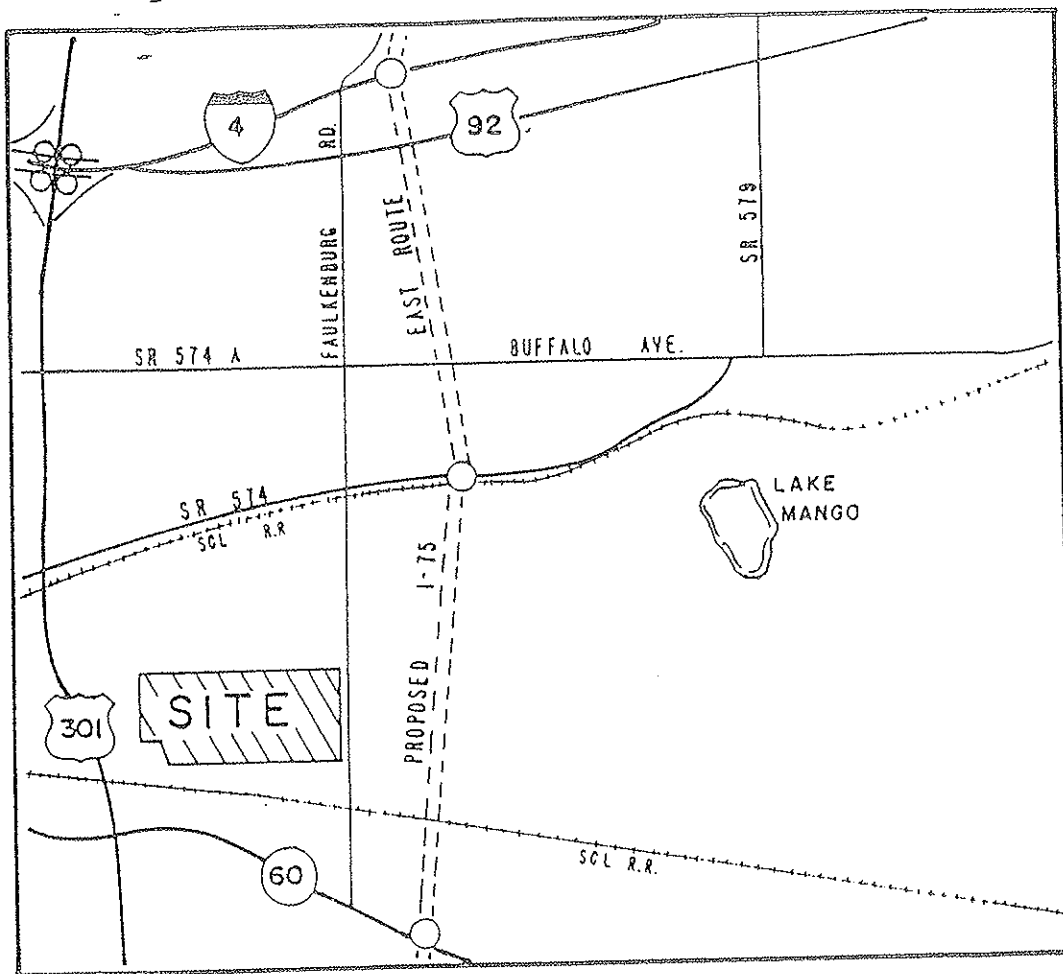
Soil bearing pressures of up to 3000 pounds per square foot (total load) are available for design of the more lightly-loaded components. Minimum footing widths of not less than 18 inches for continuous footings and 24 inches for isolated column footings should be specified even though maximum allowable bearing pressures may not be developed. The minimum dimensions are considered necessary to provide confinement which cohesionless bearing soils require to develop adequate shear strength. All footings should bear a minimum of 18 inches below final adjacent grade.

Specific criteria for installation of these footings should be based on data obtained during a final subsurface exploration and specific structural information. Also, lowering of the groundwater levels during footing construction will likely be required. A system of perimeter ditches may be effective. Pumping directly from footing excavations should be strictly prohibited.

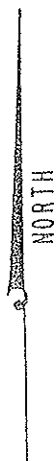
2. Roadways and Parking Areas

The development of specific design criteria for a wearing surface, base, or sub-base is considered beyond the scope of this preliminary study. Due to the relatively high groundwater levels, the need for underdrains, and/or cement-treated base courses may be necessary. The determination of whether to use one or both of these should be based on actual site grading and the anticipated high groundwater conditions.

* * *

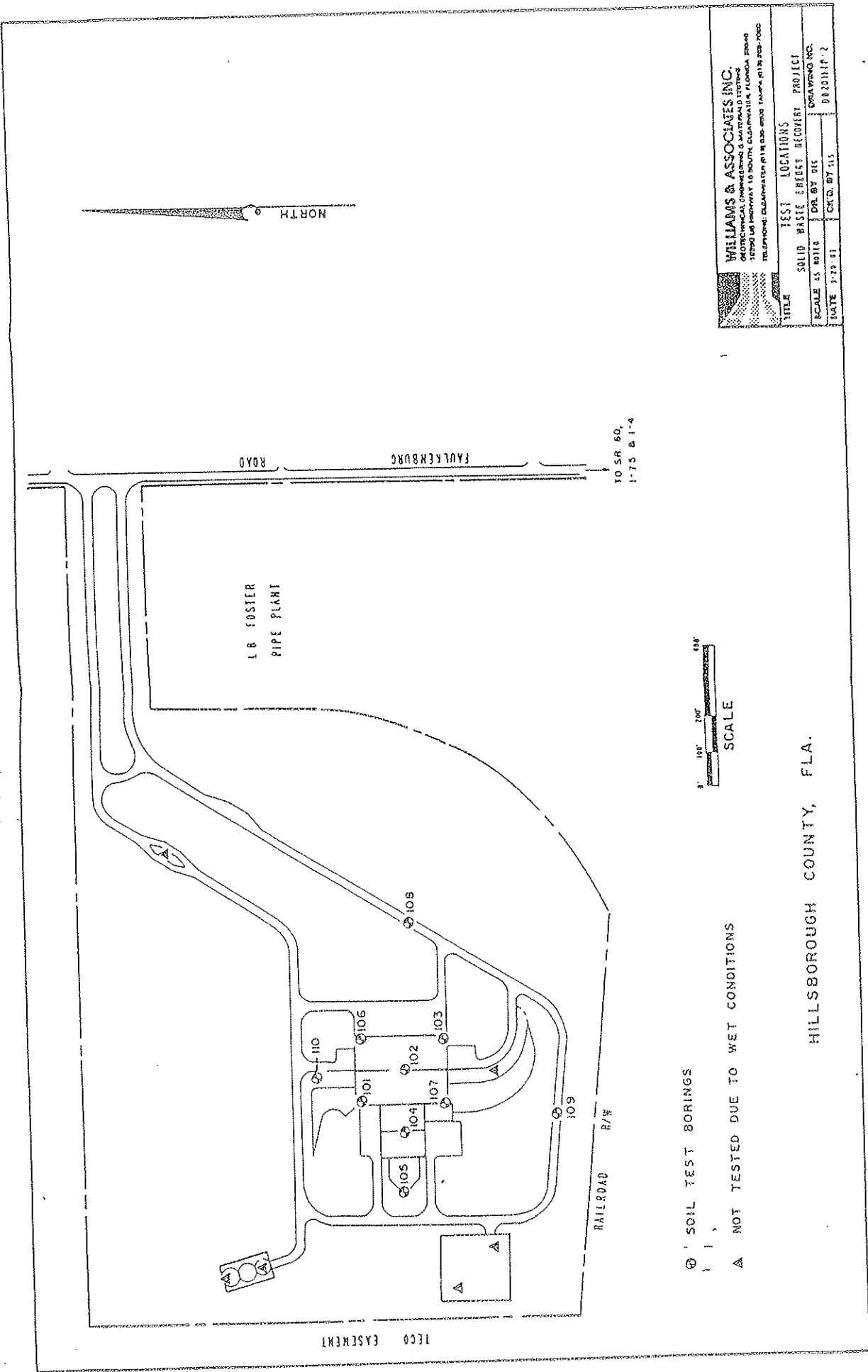


HILLSBOROUGH COUNTY, FLA.



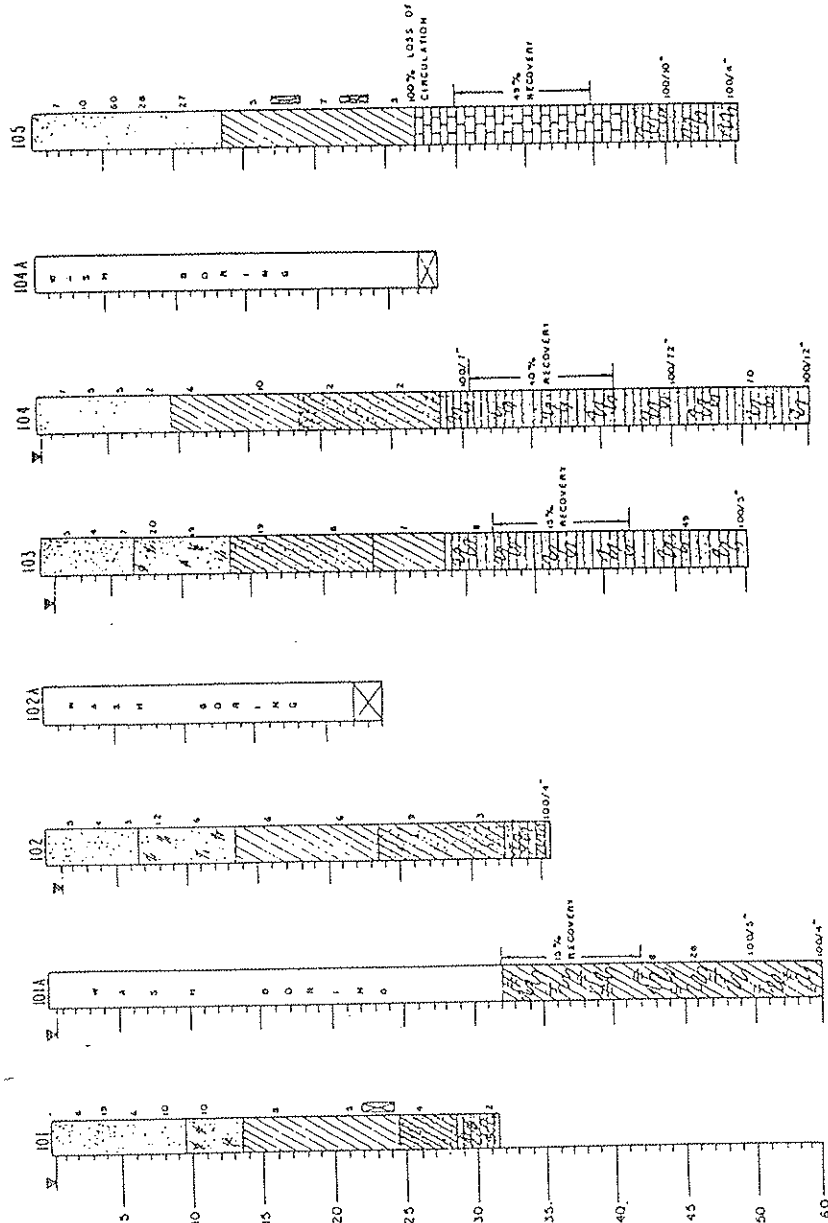
1 MILE
SCALE

WILLIAMS & ASSOCIATES INC. GEOTECHNICAL ENGINEERING & MATERIALS TESTING 18260 US HIGHWAY 18 SOUTH, CLEARWATER, FLORIDA 34625 TELEPHONE: CLEARWATER (813) 622-6502 TAMPA (813) 622-7020		
TITLE SITE LOCATION SOLID WASTE ENERGY RECOVERY PROJECT		
SCALE AS NOTED	DR. BY DES	DRAWING NO.
DATE 3-29-83	CHK'D. BY SLS	082011TP-1



Revised 12 December 1983

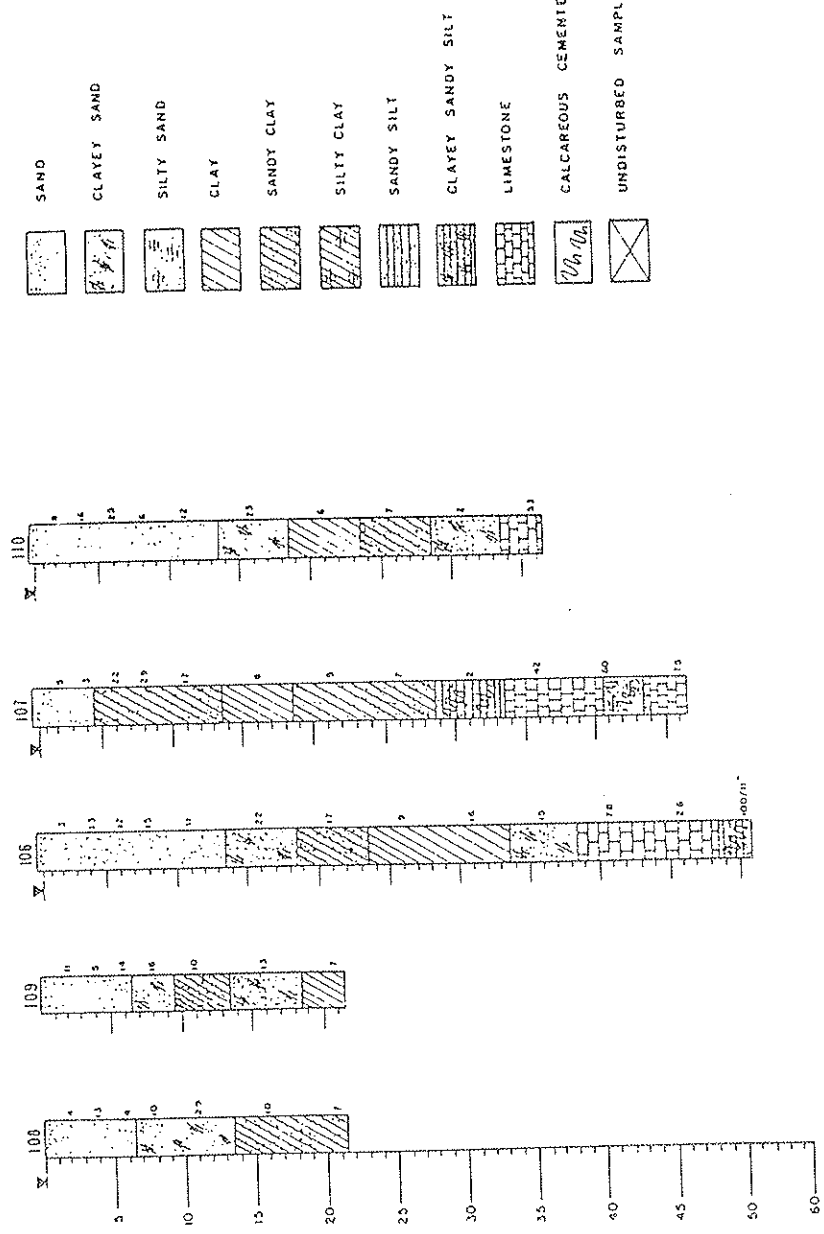
SEE DRAWING NO D2011P-4 FOR
SOIL CLASSIFICATION LEGEND



WILLIAMS & ASSOCIATES INC.	
GEOTECHNICAL ENGINEERING & SURVEYING	
1000 W. HAWTHORNE BLVD. SUITE 100, AUSTIN, TEXAS 78704	
TEL: (512) 476-1111 FAX: (512) 476-1112	
TITLE: SOIL PROFILES	
SHEET: 15 OF 18	DATE: 1-29-81
SCALE: AS SHOWN	DES. BY: SLS
DATE: 1-29-81	CHECKED BY: SLS
PROJECT: DRAINAGE IMP.	
DRAWING NO.: D2011P-3	

WATER TABLE

NUMBERS TO THE RIGHT OF
COLUMNS REFER TO BLOWCOUNTS

[illegible]

TEST BORINGS

A) Soil Test Borings

Drilling and Standard Penetration Testing were performed in accordance with ASTM D1586-67, and as modified by the job specifications. These test borings were advanced to the desired testing depths by a rotary drilling process. This process utilizes a viscous drilling fluid to flush cuttings and stabilize the bore hole. To drill these nominal 4-inch diameter holes, an upward baffled side discharge drill bit was utilized. The drill bit was then withdrawn and a penetration test performed with a standard 1.4-inch I.D., 2-inch O.D., split-barrel sampler.

In penetration testing, the sample was driven with a 140-pound hammer falling 30 inches until either:

- 1) 18 inches of penetration was achieved, or
- 2) 50 blows were applied with less than 6 inches of penetration.

The number of hammer blows required to drive this hammer each 6 inches was recorded. The first 6-inch increment was considered to be the seating drive. The number of blows required to drive the sampler the final foot is designated "penetration resistance". Where the sampler was advanced less than 12 inches for 50 blows, the number of hammer blows applied and the penetrations achieved were recorded. The actual energy being transmitted from the hammer to the sampler was calibrated by Dr. John H. Schmertmann. A copy of his report is included.

Soil test borings provide soil samples and standard penetration resistance from selected depth intervals. Based on previously developed empirical correlations, various engineering properties of the soils can be inferred from these data. A record of the test borings is attached.

EXPLORATION LOGS

BORING LOG

NO. 101

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P
Client Hillsborough County Engineering Dept.
Boring Date 2/28/83 Casing 20.0' Drill # 250
Location See Drawing 820117P-2
Ground Water 0.0 Date 2/28 Ground Elevation unknown

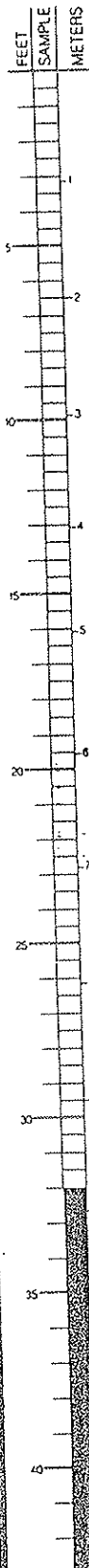
FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 5'
		10	30	50	70	90	
1	LOOSE TO MEDIUM DENSE gray fine SAND	2	2				2/2/4
2			4				4/6/13
3	LOOSE dark brown fine SAND with minor finely divided organic matter	3	3				2/3/3
4			4				3/4/6
5	LOOSE brown very clayey fine SAND	3	5				3/5/5
6							
7	FIRM green plastic CLAY with minor indurated zones	3	3	5			3/3/5
8							
9	Shelby Tube sample: light gray sandy CLAY with random horizontal seams of clay	4	3	2			4/3/2
10							
11	SOFT green sandy CLAY	2	2	2			2/2/2
12							
13	VERY SOFT tan calcareous slightly sandy clayey SILT (Limestone formation)	1	1	1			1/1/1
14	Bottom of Boring						
15	Grouted borehole						

BORING LOG

No. **101A**

Sheet **1** of **2**

Project **Solid Waste Energy Recovery Project**
Hillsborough County, Florida Job Number **D820117P**
 Client **Hillsborough County Engineering Dept.**
 Boring Date **3/2/83** Casing **none** Drill # **250**
 Location **See Drawing 820117P-2**
 Ground Water **0.5'** Date **3/2** Ground Elevation **unknown**



CLASSIFICATION

STANDARD PENETRATION TEST
 Blows per foot on 2" O.D. Sampler
 with 140 lb. hammer falling 30"

BLOWS ON
 SAMPLER
 per 6"

Wash Boring from 0.0' to 32.0'

NX Core: gray calcareous partially-indurated
 sandy very silty CLAY (Limestone formation)
 Interval Recovery % Recovery
 32.0' - 42.0' 1.5' 15

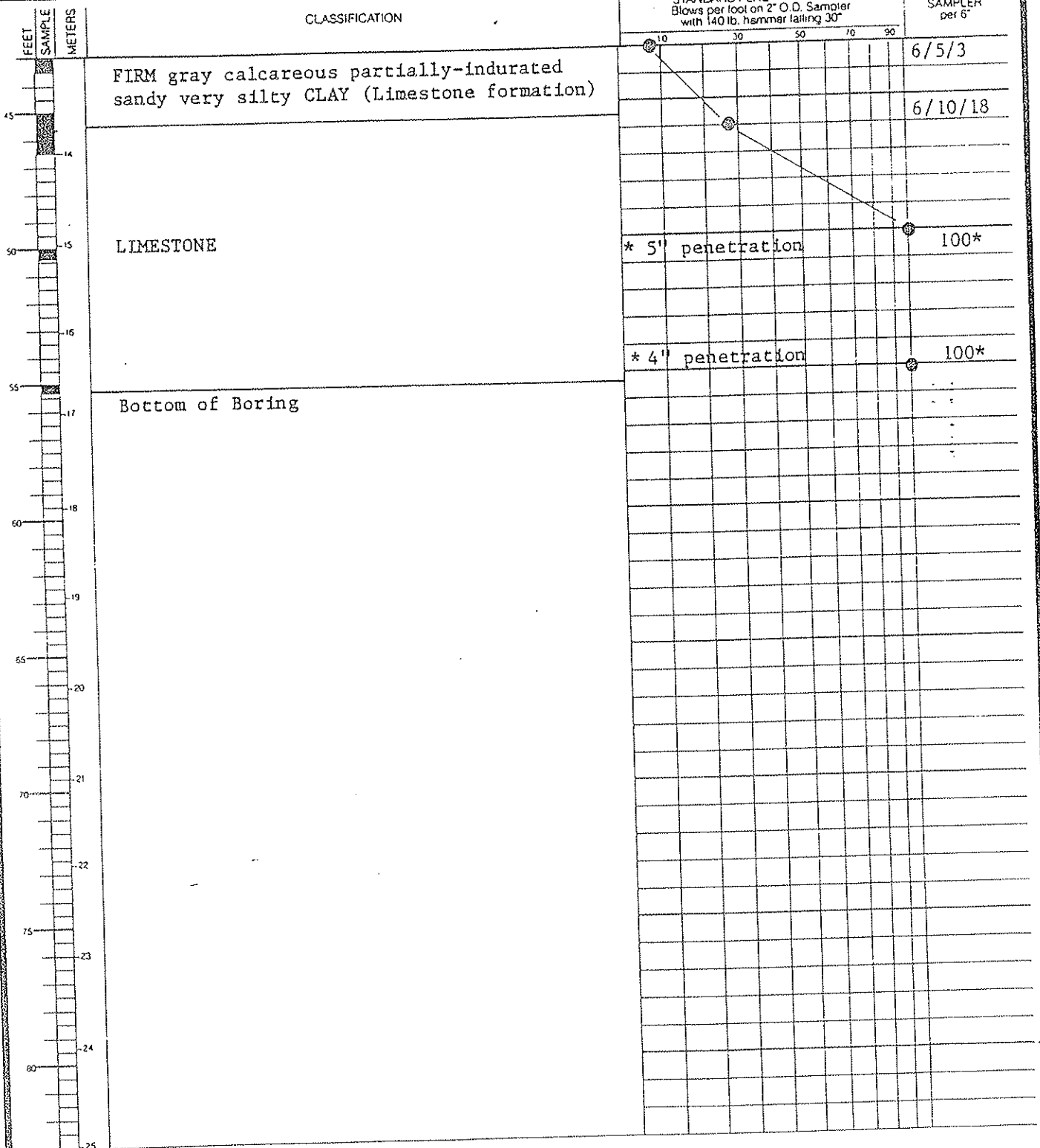
FIRM gray calcareous partially-indurated
 sandy very silty CLAY (Limestone formation)

BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P

No. 101A

Sheet 2 of 2



Revised
12 December 1983

WAGE - G005.83

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BORING LOG

No. 102

Sheet 1 of 1

Project Solid Waste Energy Recovery Project

Hillsborough County, Florida Job Number D820117P

Client Hillsborough County Engineering Dept.

Boring Date 2/22/83 Casing 35.0' Drill # 250

Location See Drawing 820117P-2

Ground Water 1.1' Date 2/22 Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
0-1	LOOSE gray fine SAND	2					2/2/3
1-2	VERY LOOSE dark brown fine SAND	1					1/2/2
2-3		2					2/1/2
3-4		3					3/5/7
4-5	MEDIUM DENSE TO LOOSE brown very clayey fine SAND	2					2/3/3
5-6		3					2/3/3
6-7	STIFF green plastic CLAY	3					2/3/3
7-8		3					2/3/3
8-9	STIFF TO SOFT gray slightly calcareous very sandy CLAY	4					3/4/5
9-10		2					2/1/2
10-11		* 2" penetration					39/100*
11-12	HARD white calcareous very sandy SILT with chert pebbles (Limestone formation)						
12-13	Bottom of Boring Grouted borehole						

BORING LOG

No. 102A

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 2/23/83 Casing none Drill # 250
 Location See Drawing 820117P-2
 Ground Water Date Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 5"
		10	30	50	70	90	
1							
5							
2							
10							
3							
4							
15							
5							
20							
6							
7	Shelby Tube Sample: light gray sandy CLAY						
25	Bottom of Boring						
8							
30							
9							
35							
11							
40							
12							
45							
13							

BORING LOG

NO. 103

Sheet 1 of 2

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 2/22/83 Casing 32.0' Drill #1500
 Location See Drawing 820117P-2
 Ground Water 1.0' Date 2/22 Ground Elevation unknown

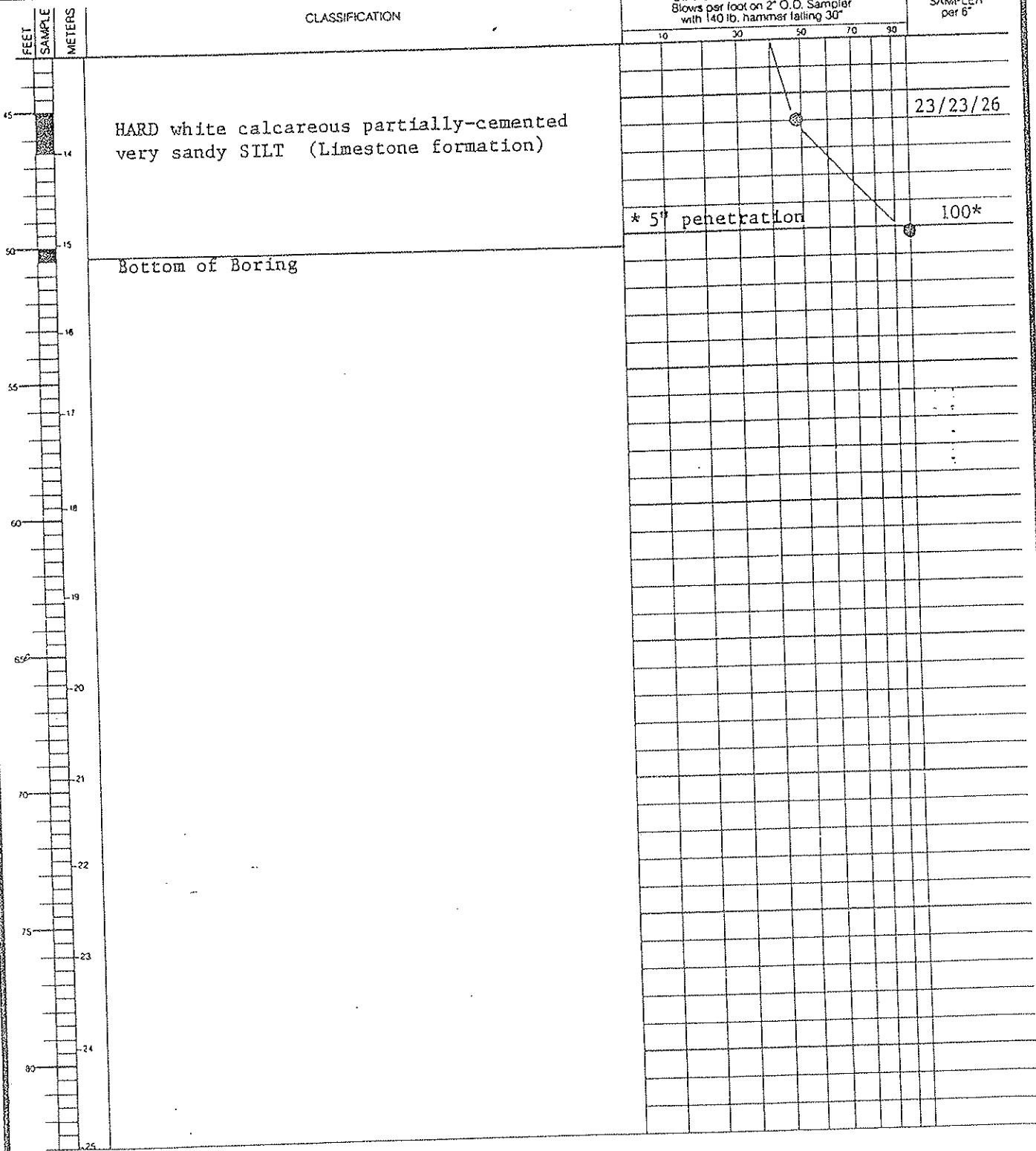
FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
0-1	LOOSE dark brown fine SAND with minor roots	●					2/2/3
1-2	VERY LOOSE TO LOOSE brown fine SAND	●					2/2/2
2-3		●					4/3/4
3-4	MEDIUM DENSE brown very clayey fine SAND	●					9/10/10
4-5		●					7/9/10
5-6	VERY STIFF green very sandy CLAY	●					8/9/10
6-7		●					2/4/4
7-8	interpocketed FIRM green very sandy CLAY and FIRM white sandy CLAY	●					2/3/4
8-9		●					3/1/7
9-10	FIRM green plastic CLAY	●					
10-11		●					
11-12	FIRM white calcareous partially-cemented very sandy SILT (Limestone formation)	●					
12-13		●					
13-14	NX Core: white calcareous partially-cemented very sandy SILT (Limestone formation)	●					
14-15		●					
15-16	Interval 32.0'-42.0'						
16-17	Recovery 1.5'						
17-18	% Recovery 15						
18-19	HARD white calcareous partially-cemented very sandy SILT (Limestone formation)	●					
19-20		●					

BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P

No. 103

Sheet 2 of 2



BORING LOG

NO. 104

Sheet 1 of 2

Project Solid Waste Energy Recovery Project

Hillsborough County, Florida Job Number D820117P

Client Hillsborough County Engineering Dept.

Boring Date 2/23/83 Casing 30.0' Drill # 250

Location See Drawing 820117P-2

Ground Water 0.3' Date 2/23 Ground Elevation unknown

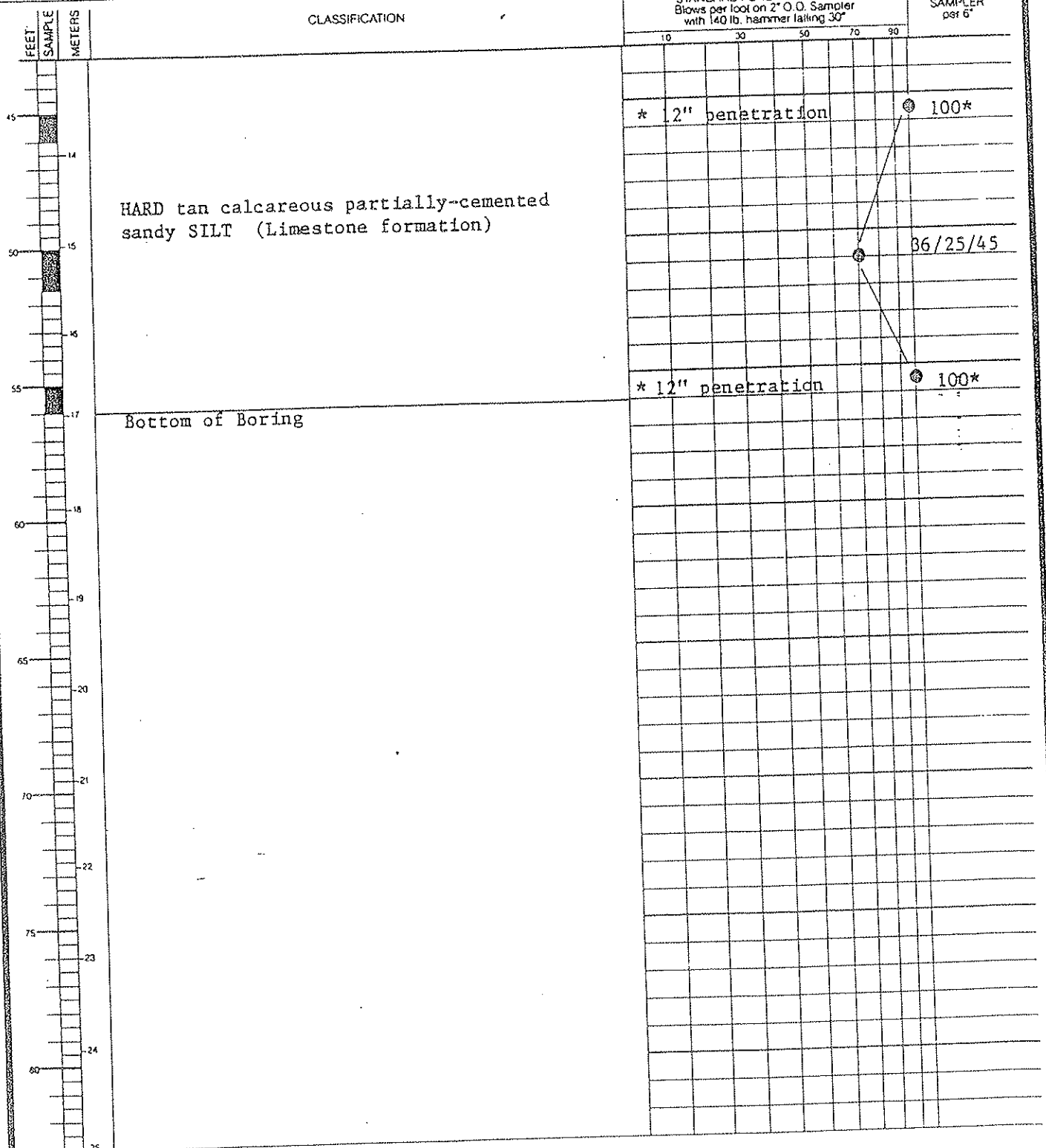
FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
0-1	LOOSE dark brown fine SAND with roots	●					3/4/3
1-2	LOOSE brown fine SAND	●					1/2/3
2-3	VERY LOOSE dark brown fine SAND with minor finely divided organic matter	●					2/2/3
3-4		●					2/1/1
4-5	FIRM TO STIFF green plastic CLAY	●					1/2/4
5-6		●					2/4/6
6-7	VERY SOFT gray slightly sandy plastic CLAY	●					2/1/1
7-8		●					1/1/1
8-9	HARD tan calcareous partially-cemented sandy SILT (Limestone formation)	●					* 8" penetration 100*
9-10							
10-11	NX Core: tan calcareous partially-cemented sandy SILT (Limestone formation)						
11-12	Interval Recovery % Recovery						
12-13	30.6'-41.0' 4.0' 38						
13-14	HARD tan calcareous partially-cemented sandy SILT (Limestone formation)						

BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P

No. 104

Sheet 2 of 2



BORING LOG

NO. 104A

Sheet 1 of 1

Project Solid Waste Energy Recovery Project

Hillsborough County, Florida Job Number D820117P

Client Hillsborough County Engineering Dept.

Boring Date 2/24/83 Casing none Drill # 250

Location See Drawing 820117P-2

Ground Water Date Ground Elevation unknown

FEET
SAMPLE
METERS

1
5
10
15
20
25
30
35
40

CLASSIFICATION

STANDARD PENETRATION TEST
Blows per foot on 2" O.D. Sampler
with 140 lb. hammer falling 30"

BLOWS ON
SAMPLER
per 6"

Wash Boring from 0.0' to 27.0'

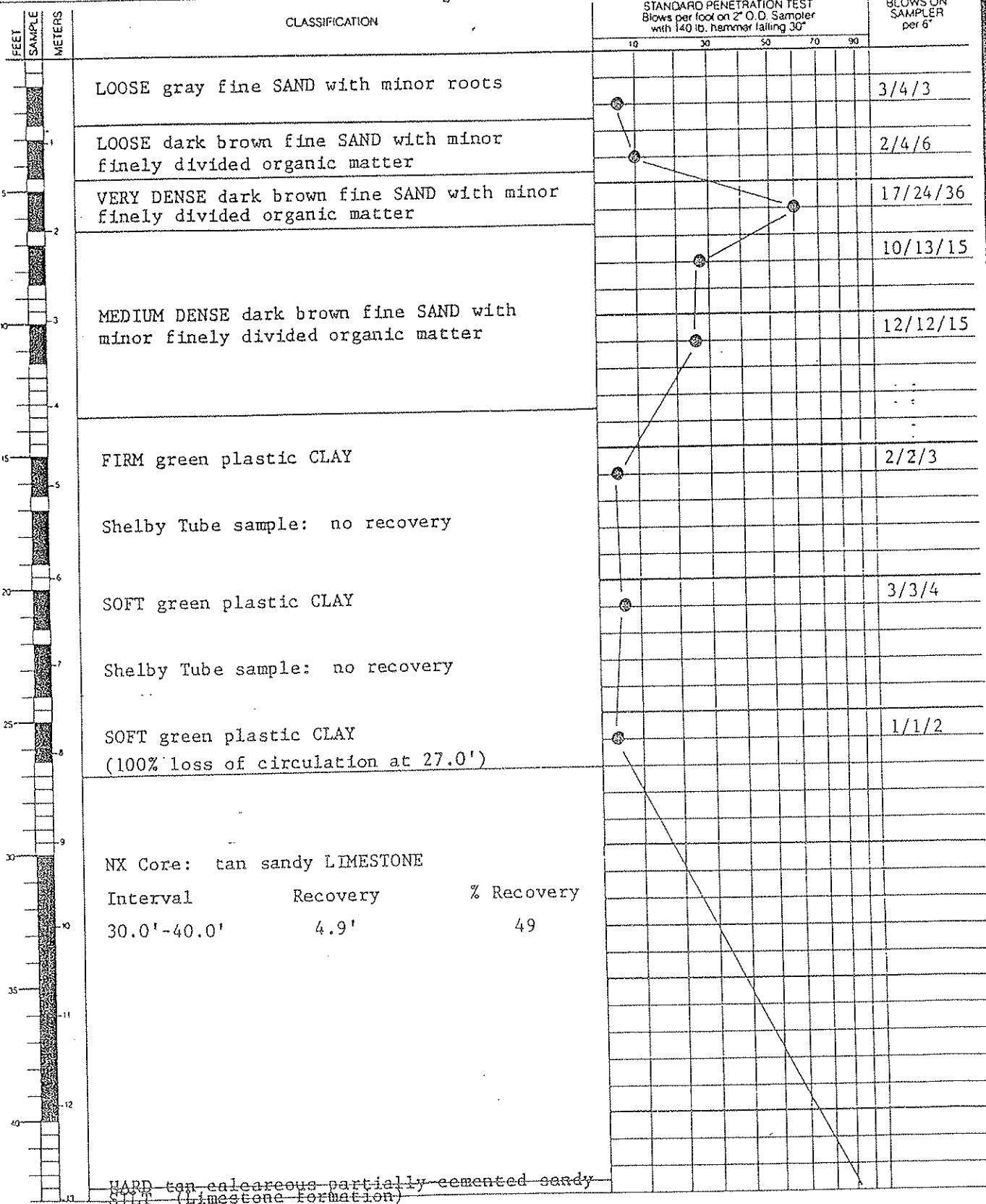
Shelby Tube sample: light gray sandy CLAY
Bottom of Boring

BORING LOG

NO. 105

Sheet 1 of 2

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 2/24/83 Casing 30.0' Drill # 250
 Location See Drawing 820117P-2
 Ground Water Date Ground Elevation unknown

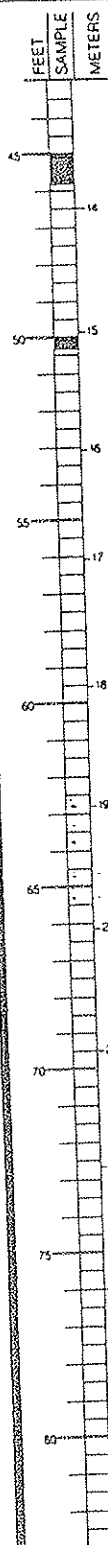


BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P

No. 105

Sheet 2 of 2



CLASSIFICATION

HARD tan calcareous partially-cemented
sandy SILT (Limestone formation)

Bottom of Boring

STANDARD PENETRATION TEST
Blows per foot on 2" O.D. Sampler
with 140 lb. hammer falling 30"

BLOWS ON
SAMPLER
per 6"

* 12" penetration

100*

* 4" penetration

100*

BORING LOG

No. 106

Sheet 1 of 2

Project Solid Waste Energy Recovery Project

Hillsborough County, Florida Job Number D820117P

Client Hillsborough County Engineering Dept.

Boring Date 3/1/83 Casing 20.0' Drill # 250

Location See Drawing 820117P-2

Ground Water 0.3' Date 3/1 Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
0-1	VERY LOOSE brown fine SAND with minor roots	●					1/1/2
1-2		●					3/5/8
2-3	MEDIUM DENSE dark brown fine SAND with minor finely divided organic matter	●					3/5/7
3-4		●					7/7/8
4-5							
5-6	MEDIUM DENSE brown fine SAND	●					2/3/8
6-7							
7-8							
8-9	MEDIUM DENSE dark brown slightly clayey fine SAND		●				12/10/12
9-10							
10-11							
11-12	VERY STIFF brown very sandy CLAY	●					9/8/9
12-13							
13-14		●					2/4/5
14-15	STIFF TO VERY STIFF green plastic CLAY						
15-16		●					5/7/9
16-17							
17-18							
18-19	MEDIUM DENSE gray very clayey fine SAND	●					4/7/8
19-20							
20-21	white clayey LIMESTONE					●	16/30/48

BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P

NO. 106

Sheet 2 of 2

CLASSIFICATION

STANDARD PENETRATION TEST
Blows per foot on 2" O.D. Sampler
with 140 lb. hammer falling 30"

BLOWS ON
SAMPLER
per 5"

10 30 50 70 90

8/12/14

white clayey LIMESTONE

HARD tan calcareous partially-cemented
sandy SILT (Limestone formation)
Bottom of Boring

* 1.1" penetration 100*



BORING LOG

NO. 107

Sheet 1 of 2

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 3/1/83 Casing 30.0' Drill # 250
 Location See Drawing 820117P-2
 Ground Water 0.3' Date 3/1 Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
0-1	LOOSE brown fine SAND with minor roots	1					1/2/3
1-2	VERY LOOSE tan fine SAND	2					2/2/1
2-3	VERY STIFF gray very sandy CLAY	5					5/9/13
3-4		7					7/13/16
4-5		6					6/8/9
5-6		4					4/4/4
6-7	FIRM green plastic CLAY	3					3/4/5
7-8		2					2/3/4
8-9		1					1/1/1
9-10	STIFF TO FIRM mottled gray and green partially-indurated sandy CLAY	1					1/1/1
10-11		1					1/1/1
11-12	VERY SOFT gray calcareous very sandy SILT with chert pebbles and shells (Limestone formation) (100% loss of circulation at 31.5')	1					1/1/1
12-13	white silty Limestone	9					9/14/28
13-14		12					12/24/36
14-15	VERY DENSE white calcareous very silty fine SAND (Limestone formation)	12					12/24/36

BORING LOG

NO. 108

Sheet 1 of 1

Project Solid Waste Energy Recovery Project

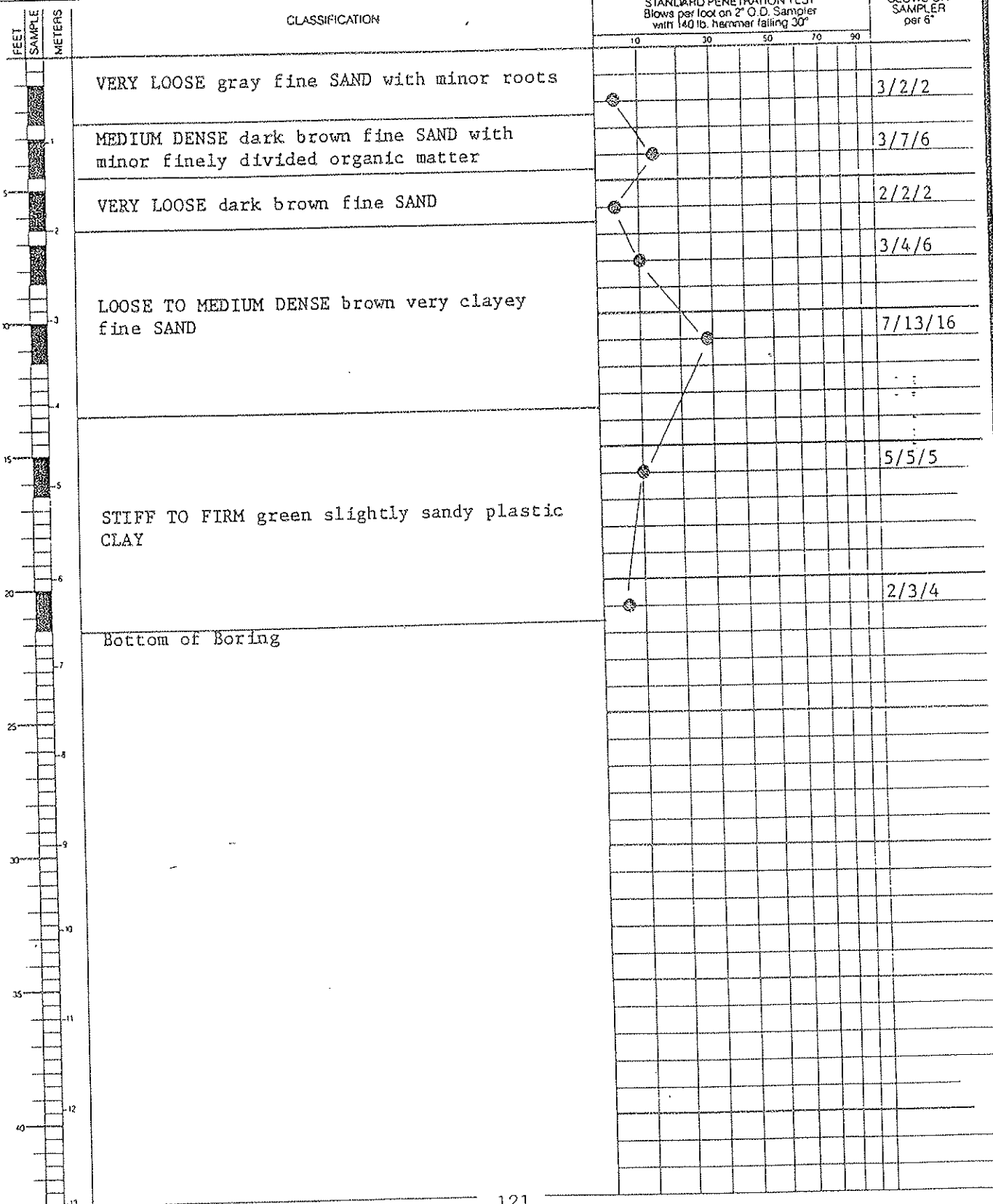
Hillsborough County, Florida Job Number D820117P

Client Hillsborough County Engineering Dept.

Boring Date 2/28/83 Casing none Drill # 250

Location See Drawing 820117P-2

Ground Water 0.0' Date 2/28 Ground Elevation unknown



BORING LOG

No. 109

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P
Client Hillsborough County Engineering Dept.
Boring Date 2/25/83 Casing none Drill #250
Location See Drawing 820117P-2
Ground Water Date Ground Elevation unknown

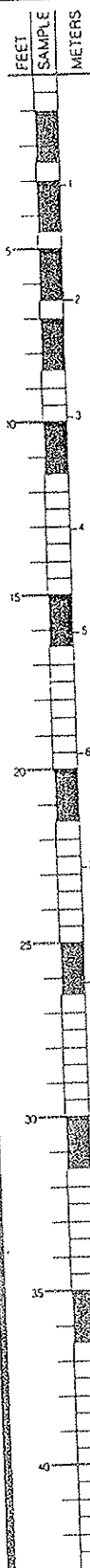
FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
1	MEDIUM DENSE dark brown fine SAND with minor finely divided organic matter	2					2/4/7
2	LOOSE brown fine SAND	2					2/2/3
3	MEDIUM DENSE dark brown fine SAND	3					2/3/11
4	MEDIUM DENSE brown slightly clayey fine SAND	4					8/9/7
5	STIFF green sandy CLAY with minor decaying roots	4					4/4/6
6	MEDIUM DENSE gray clayey fine SAND	3					3/6/7
7	FIRM green plastic CLAY	2					2/4/3
8	Bottom of Boring						
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BORING LOG

No. 110

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 3/2/83 Casing none Drill # 250
 Location See Drawing 820117P-2
 Ground Water 0.3' Date 3/2 Ground Elevation unknown



LOOSE gray fine SAND

LOOSE TO MEDIUM DENSE dark brown fine SAND

MEDIUM DENSE brown slightly clayey fine SAND

FIRM green plastic CLAY

FIRM green sandy CLAY

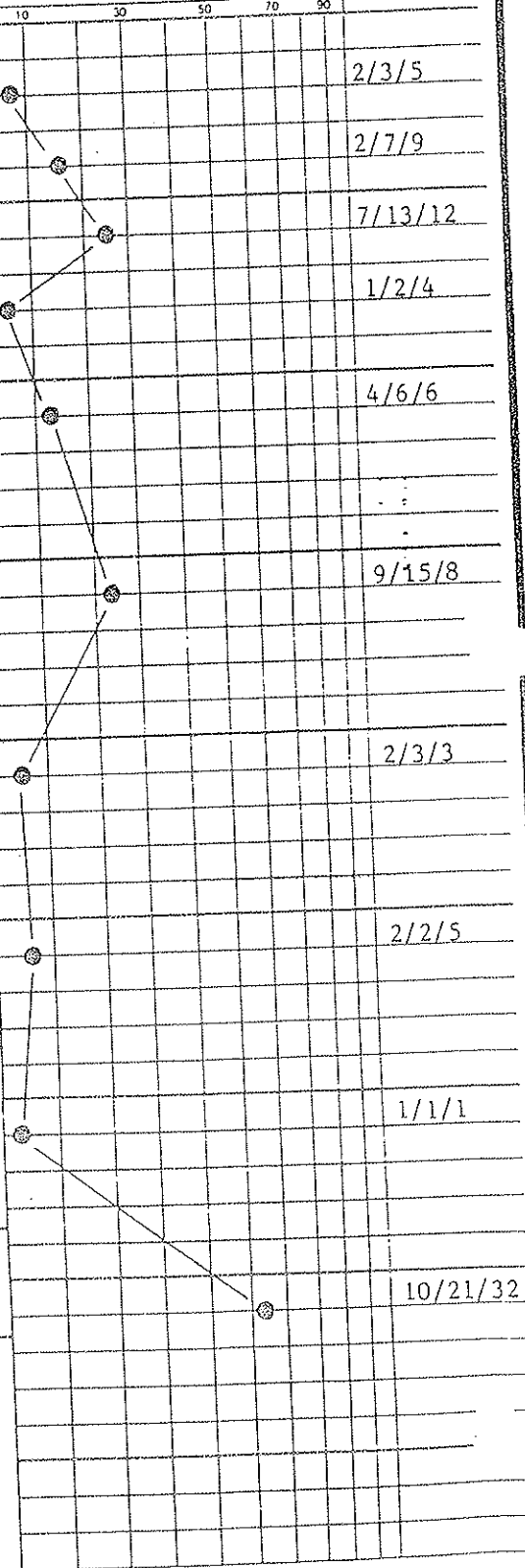
VERY LOOSE gray very clayey fine SAND

gray clayey LIMESTONE

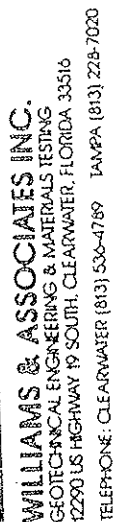
Bottom of Boring

STANDARD PENETRATION TEST
 Blows per foot on 2" O.D. Sampler
 with 140 lb. hammer falling 30"

BLOWS ON
 SAMPLER
 per 6"



SECONDARY LABORATORY TESTING



WILLIAMS & ASSOCIATES INC.

WILLIAMS & BROS.
GEOTECHNICAL ENGINEERING & MATERIALS TESTING
3300 U.S. HIGHWAY 90 SOUTH, CLIFTON PARK, FLORIDA 33516

TELEPHONE: CLEARWATER (813) 536-4789 TAMPA (813) 228-7020

JOB NO. D820117P

Hillsborough County, Department of Solid Waste

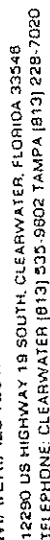
Solid Waste Energy Recovery Project

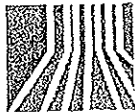
[illegible]

SOIL CLASSIFICATION

DEFIN

Summary of laboratory test results

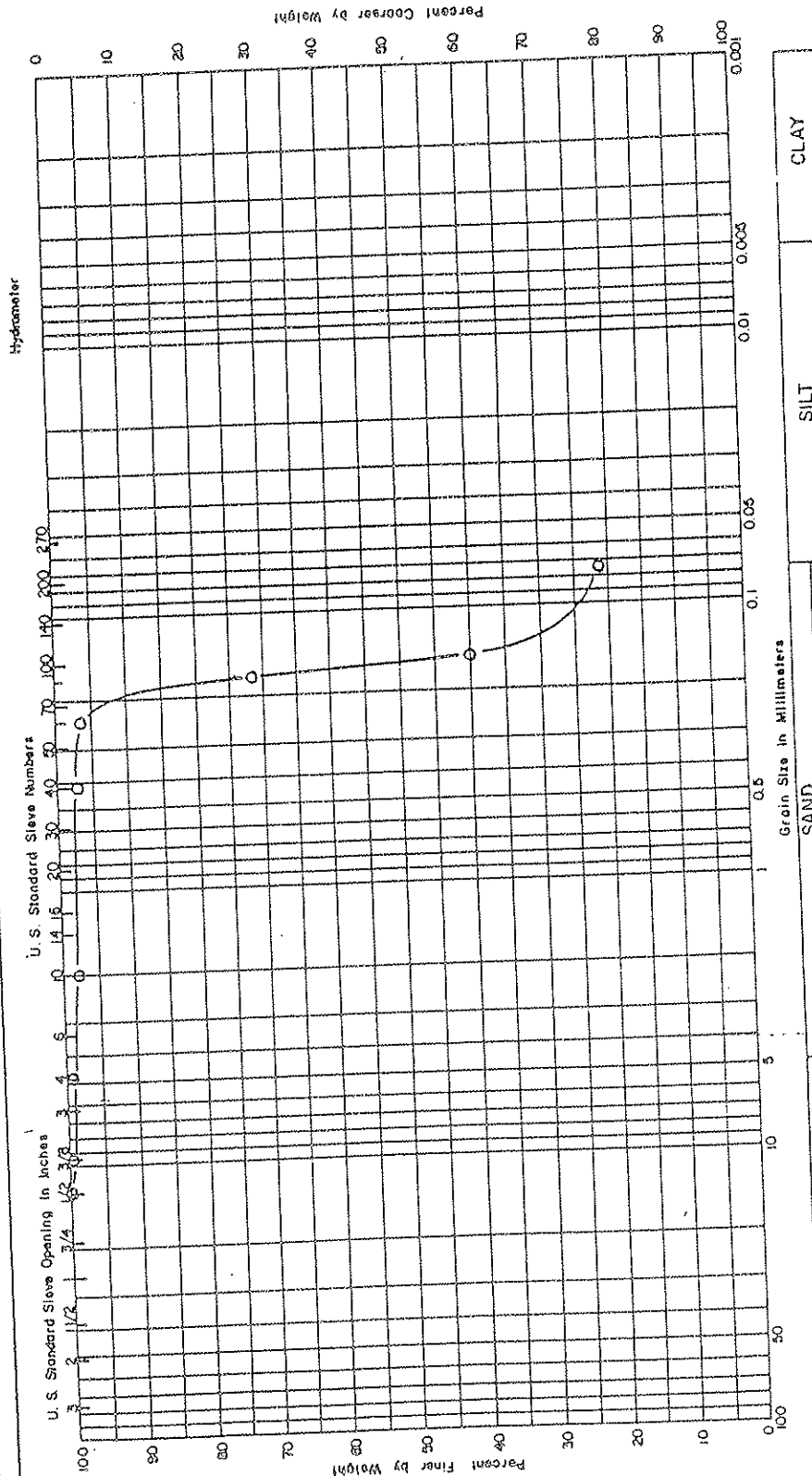




WILLIAMS & ASSOCIATES, INC.

MATERIALS TESTING ENGINEERS

12250 US HIGHWAY 19 SOUTH, CLEARWATER, FLORIDA 33546
TELEPHONE: CLEARWATER (813) 535-9802 TAMPA (813) 228-7020



SAMPLE DESCRIPTION; light gray sandy clay

LL = 48 PI = 27

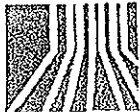
PROJECT: Solid Waste Energy Recovery Project

D820117P

CLIENT: Hillsborough County Engineering Dept.

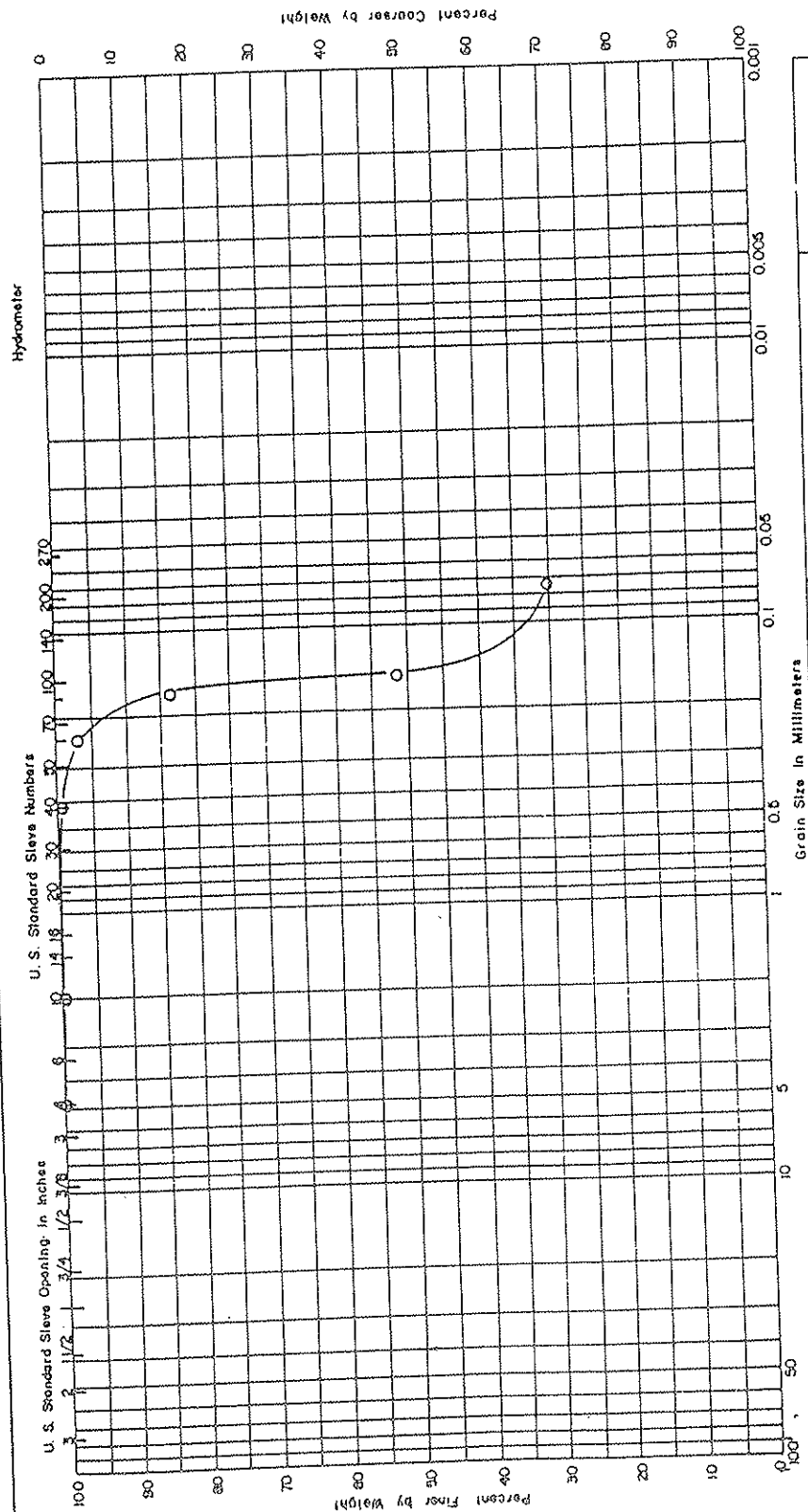
SAMPLE LOCATION: Boring 102A
22.0' - 24.0'

grain size analysis



WILLIAMS & ASSOCIATES, INC.
MATERIALS TESTING ENGINEERS

12290 US HIGHWAY 19 SOUTH, CLEARWATER, FLORIDA 33546
TELEPHONE: CLEARWATER (813) 535-9802 TAMPA (813) 228-7020



SAMPLE DESCRIPTION: light gray sandy clay

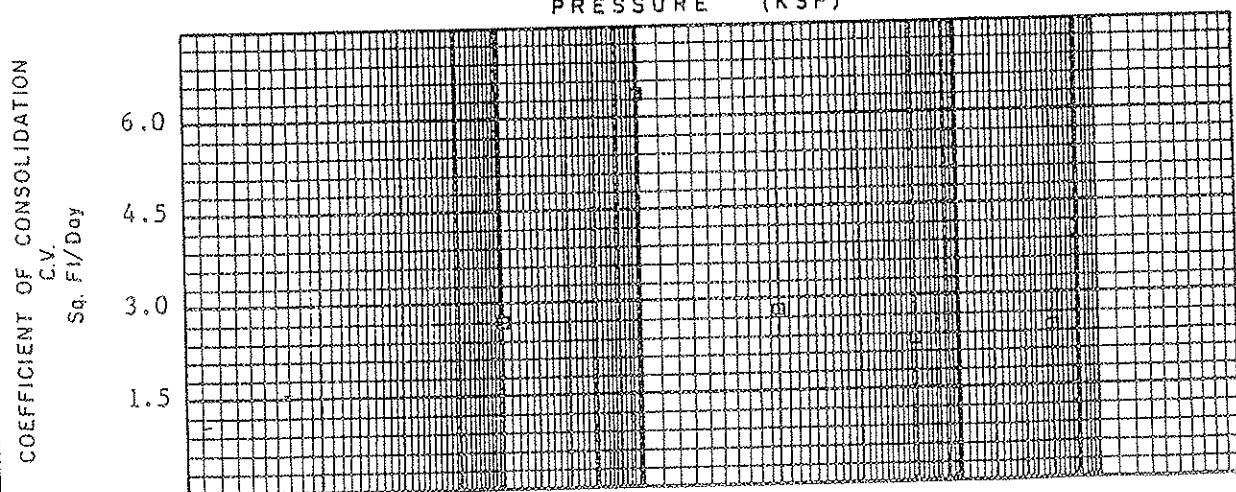
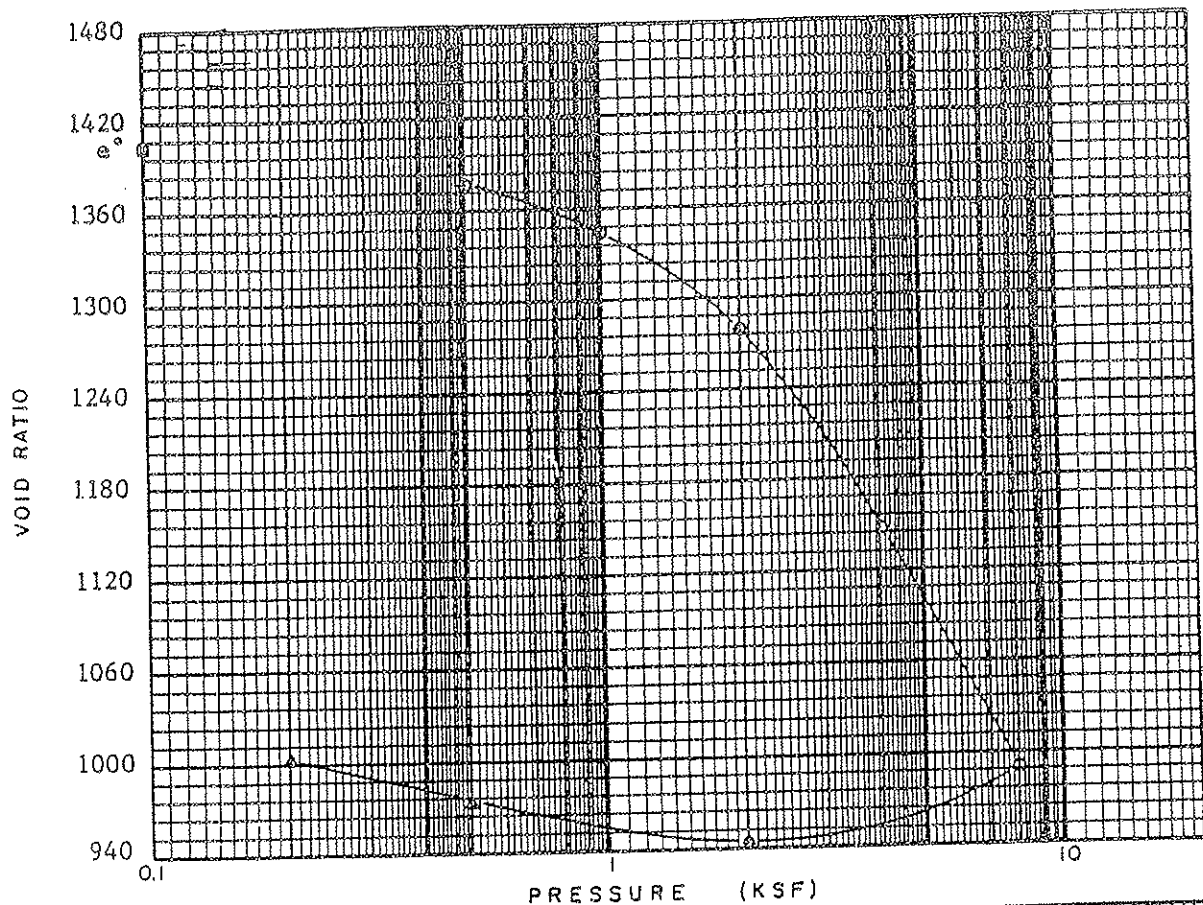
LL = 39 PI = 21

PROJECT: Solid Waste Energy Recovery Project
D820117P

CLIENT: Hillsborough County Engineering Dept.

SAMPLE LOCATION: Boring 104A
27.0' - 28.3'

grain size analysis



CONSOLIDATION TEST

CLIENT: Hillsborough County Engineering Dept.

LL = 48

PI = 21

PROJECT: Solid Waste Energy Recovery Project
D820117P

$G_s = 2.650$

INITIAL: $s = 100\%$

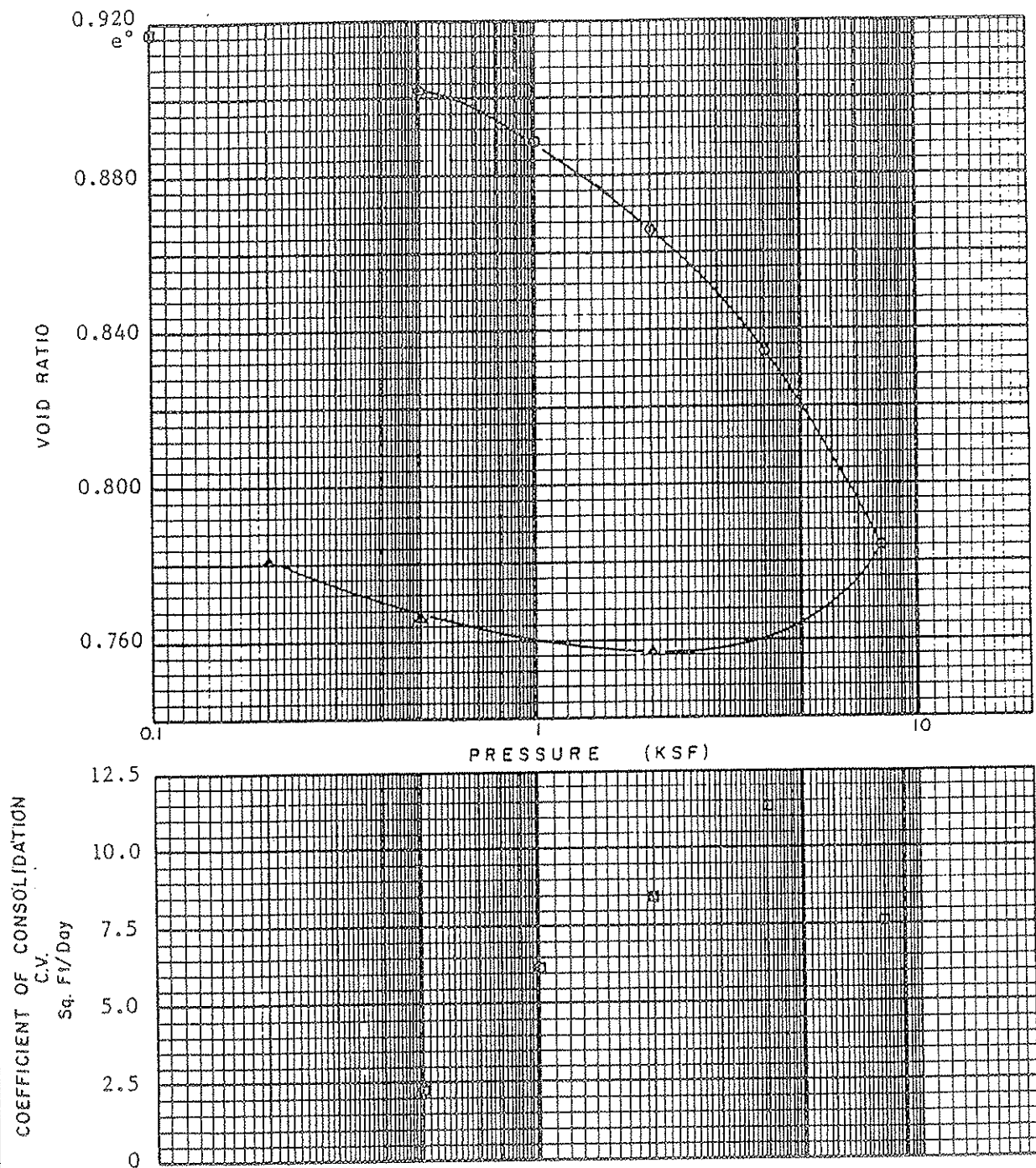
$\gamma_d = 69.8$

SAMPLE LOCATION: Boring 102A
22.0' - 24.0'

FINAL: $s = 100\%$

$\gamma_d = 81.5$

SOIL DESCRIPTION: Light gray sandy clay



CONSOLIDATION TEST

CLIENT: Hillsborough County Engineering Dept.

LL = 39 PI = 18

PROJECT: Solid Waste Energy Recovery Project
D820117P

$G_s = 2.645$

SAMPLE LOCATION: Boring 104A
27.0' - 28.3'

INITIAL: $s = 96.1\%$
 $\gamma_d = 87.4$

SOIL DESCRIPTION: Light gray sandy clay

FINAL: $s = 100\%$
 $\gamma_d = 94.1$

Revised 12 December 1983

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, thanks to the Association of Soil and Foundation Engineers (ASFE).

When ASFE was founded in 1969, subsurface problems were frequently being resolved through lawsuits. In fact, the situation had grown to such alarming proportions that consulting geotechnical engineers had the worst professional liability record of all design professionals. By 1980, ASFE-member consulting soil and foundation engineers had the best professional liability record. This dramatic turn-about can be attributed directly to client acceptance of problem-solving programs and materials developed by ASFE for its members' application. *This acceptance was gained because clients perceived the ASFE approach to be in their own best interests.* Disputes benefit only those who earn their living from others' disagreements.

The following suggestions and observations are offered to help you reduce the geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of his report may affect his recommendations.

Unless your consulting geotechnical engineer indicates otherwise, *your geotechnical engineering report should not be used:*

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

A geotechnical engineer cannot accept responsibility for problems which may develop if he is not consulted after factors considered in his report's development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by the geotechnical engineer who then renders an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those opined to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. For example, the actual interface between materials may be far more gradual or abrupt than the report indicates, and actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their geotechnical consultant through the construction stage, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.*

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.* Speak with the geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid these problems, the geotechnical engineer should be retained to work with other appropriate design professionals to explain relevant geotechnical findings and to review the adequacy

of their plans and specifications relative to geotechnical issues.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

Final boring logs are developed by the geotechnical engineer based upon his interpretation of field logs (assembled by site personnel) and laboratory evaluation of field samples. Only final boring logs customarily are included in geotechnical engineering reports. *These logs should not under any circumstances be redrawn* for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, *give contractors ready access to the complete geotechnical engineering report*. Those who do not provide such access may proceed under the *mistaken* impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgement and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical consultants. To help prevent this problem, geotechnical engineers have developed model clauses for use in written transmittals. These are *not* exculpatory clauses designed to foist the geotechnical engineer's liabilities onto someone else. Rather, they are definitive clauses which identify where the geotechnical engineer's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report, and you are encouraged to read them closely. Your geotechnical engineer will be pleased to give full and frank answers to your questions.

OTHER STEPS YOU CAN TAKE TO REDUCE RISK

Your consulting geotechnical engineer will be pleased to discuss other techniques which can be employed to mitigate risk. In addition, the Association of Soil and Foundation Engineers has developed a variety of materials which may be beneficial. Contact ASFE for a complimentary copy of its publications directory.

Published by

ASFE

ASSOCIATION OF SOIL AND FOUNDATION ENGINEERS

8811 Colesville Road/Suite 225
Silver Spring, Maryland 20910
301/565-2733

Appendix 11

Miscellaneous Reports

Appendix 11-1

Noise Technical Analysis

APPENDIX 10.12

NOISE TECHNICAL ANALYSIS

Existing Noise Environment

This section provides the background information necessary to evaluate, quantify, and locate potential increases of noise levels (above baseline or existing ambient noise levels) due to the proposed construction and operation of the Hillsborough County Resource Recovery Facility.

Noise is most often, and most simply defined as unwanted sound. The magnitude of air pressure fluctuations produced by sound is the sound level, and is measured in decibels (annotated as the abbreviation dB) (Kryter, 1970). Whereas the sound pressure disturbance that humans are capable of hearing is very small in relation to atmospheric pressure, the ranges of pressures within this range from the faintest to the loudest sound happen to be extensive. The decibel scale compresses this large range of pressures using a logarithmic function into a meaningful scale from 0 dB, representing the faintest possible audible sound, to in excess of 140 dB, which in turn produces pain in humans. Human hearing sensitivity, being frequency dependant, is represented by the “A-weighting” filter. This filter when applied to the decibel scale, simulates the frequency range upon which humans are dependent, and is used in measuring and reporting environmental noise levels. When applied to the decibel scale, the “A-weighting” filter is annotated dBA.

Since the decibel scale represents a compressed view of actual sound pressure variations, we find the relationship between the decibel scale and pressure variations to be somewhat complicated. For example, a 26 percent change in sound pressure would reflect on the decibel level as a miniscule “one dB”. The most sensitive human ear would not detect this change, except in the ideal conditions of an acoustical laboratory. A doubling of the sound pressure would result, again in a very small capacity, as 3 dB - therefore, barely perceptible to the human ear whilst in a natural environment. A tripling of the sound level would however result in a clearly noticeable change of 5 dB. And, a change of ten time the sound pressure, represented as a 10 dB increase or decrease, would be perceived by the human ear as a doubling or halving of the apparent loudness respectively.

The noise descriptors used in this analysis are equivalent sound level, annotated by L_{eq} and the exceedence levels L_{10} , L_{50} , and L_{90} . The equivalent sound level is a single value of sound level for any desired duration, subsequently including all of the time-varying sound energy within that measurement duration. The equivalent noise level correlates reasonably with the effects of noise upon humans for wide variations in environmental sound levels and time patterns, and is easily measured by available equipment. The exceedence levels represent those noise levels which are exceeded in a given percentage of a predetermined time period (the actual percentage is denoted by the subscript number following "L"). For example, L_{10} is the noise level exceeded 10 percent of the measured time, and is regarded as a measure of the more intrusive noise levels, whereas L_{90} is the noise level exceeded 90 percent of the allotted time measurement and is considered the ambient noise level (Peterson 1980).

The County of Hillsborough has set criteria for ambient noise levels using the L_{eq} . Table 1 (shown below) presents these criteria as categorized by land use at appropriate time periods of the day.

Table 1	HILLSBOROUGH COUNTY NOISE CRITERIA (Sound Levels by Receiving Land Use)	
Receiving Land Use Category	Time	Sound Level Limit dBA (L_{eq})
Residential and Public Space	7am thru 10pm	60
	10pm thru 7am	55
Commercial Areas	7am thru 10pm	65
	10pm thru 7am	60
Industrial Areas	At All Times	75

Source: Hillsborough County Environmental Protection Commission, 1976 (<http://www.epchc.org/Noise.htm>)

Since the operation of the facility (having been designed with noise control equipment) should not result in significantly increasing noise levels, the major noise sources would be the truck traffic approaching and departing. Because the terrain grade does not vary greatly, the noise

levels associated with the acceleration of these trucks from a stop should not be greater than those noise levels associated with normal roadway speeds. To aid in accessing potential increases over the current noise levels, a baseline noise monitoring program was implemented. This program was designed to represent the current traffic induced noise levels and facility operation levels in the area. Gross ambient sound level measurements were obtained in the vicinity of the site by Burcaw & Associates (B&A).

The baseline sound level survey was designed to provide a gross survey of ambient noise conditions during day and nighttime periods. The survey determined representative ambient noise levels at locations on and adjacent to the facility site. The locations for this noise inventory are the circled numbers 1 through 7 as shown via Figure 1 and the basis for their selection is described in Table 2.

Table 2	INFORMATION ON SELECTED NOISE MONITORING LOCATIONS
Monitoring Site Number	<u>Rationale for Selection</u>
1	This location was selected to collect existing ambient noise levels at the boundary of that portion of the site where development would occur (between the existing facility and the nearest sensitive receptors). This location is within zoning designated as PD-I.
2	This location was selected due to it being the closest residence to the proposed addition site and access road whilst remaining on site property. This area borders (to the North) the property currently abandoned by the light-industrial L.B. Foster Pipe Company, and the Hillsborough County Animal Services facility (to the South). This location is within zoning designated as PD-I.
3	This location was selected due to it being in the vicinity of the closest main residential area to the site and Falkenburg Road. This location is within zoning designated as ASC-1.
4	This location was selected due to it being the closest commercial manufacturing facility to the PI of the access road and Falkenburg Road. Note that this site directly borders the public right-of-way designated as Falkenburg Road. This location is within zoning designated as M.
5 - 7	These locations were selected to determine the impact, if any, on the southern bordering distribution (warehousing/light industrial) facilities located just South of the existing railway. These locations are within zoning designated as M.

Source: Burcaw & Associates Incorporated, Public Sector Department, 2004

Noise measurements were made using a hand-held meter, which measures dBA sound pressure levels. The meter is identified as a Brüel & Kjær, Precision Sound Level Meter, Type 2232, serial no. 865 786.

Spot noise measurements were made at each of the above indicated locations in order to determine a representative sound pressure level for the 2 daytime peak hour periods (8:00am-9:30am and 6:00pm-7:30pm) and a representative sound pressure level for the nighttime period (10:00pm-11:30pm). Measurements at each location were conducted every five seconds for sixty seconds total, with a full 360° sweep so that so that omni directional noise sources did not overly influence the ambient noise estimates for a particular location. The one-minute equivalent sound levels (L_{eq}) for two representative daytime peak hours and one nighttime hour are presented in Table 3.1. Measurements were taken by B&A at seven monitoring locations (1 through 7) during the approximate time periods noted below:

<u>Date</u>	<u>Daytime</u>	<u>Nighttime</u>
September 17, 2004	8:00am - 9:30am 6:00pm - 7:30pm	10:00pm - 11:30pm
October 1, 2004	8:00am - 9:30am 6:00pm - 7:30pm	10:00pm - 11:30pm

During each measurement, the monitoring station and description, noise level in dBA, time, temperature and weather conditions, and wind direction were recorded. Detailed charts encompassing all results and factors as listed above are provided, and are designated as: Table 3.2, Table 3.3, and Table 3.4.

Due to the higher noise levels emitted by heavy duty trucks as compared to light trucks and cars, the percentage of each category for each road segment was identified for the resultant noise environment modeling discussed later. A traffic count of the main roadways surrounding the facility site was conducted to determine the current traffic mix. In the past, the county has directed the specific routes to be utilized by the transfer trailers and packer trucks to the facility. Since the northern portion of Falkenburg Road is more utilized by residential traffic, the county has directed facility traffic to be distributed in an estimated 90 percent southern and 10 percent northern split.

Table 3.1	NOISE BASELINE DATA SUMMARY SEPTEMBER 17, 2004 OCTOBER 1, 2004		
Site	Time	L _{eq} (dBA)	
1 (B&A) ^b	8:00am 6:00pm 10:00pm	64.1 63.3 50.7	
2 (B&A) ^c	8:00am 6:00pm 10:00pm	68.7 66.7 61.0	
3 (B&A) ^c	8:00am 6:00pm 10:00pm	74.8 ^a 75.0 ^a 65.1 ^a	
4 (B&A) ^c	8:00am 6:00pm 10:00pm	73.6 73.2 67.1	
5 (B&A) ^c	8:00am 6:00pm 10:00pm	64.8 64.5 52.8	
6 (B&A) ^c	8:00am 6:00pm 10:00pm	58.2 60.7 50.6	
7 (B&A) ^c	8:00am 6:00pm 10:00pm	52.1 50.6 45.4	

Source: Burcaw & Associates Incorporated, Public Sector Department, 2004

a - Level currently exceeds limits as set by Hillsborough County Environmental Protection Commission

b - Recorded on September 17, 2004

c - Recorded on October 1, 2004

Resultant Noise Environment

Construction Impacts. There are two basic areas of concern associated with potential noise related impacts. The first being the short-term noise impacts from the construction of the proposed expansion and the second being the longer-term impacts from the expanded facilities operation. While construction noise impacts are important, their short-term nature and the availability of effective mitigative measures minimizes their significance in what is essentially a noise analysis for long-term land use impacts.

Noise at a given construction site will depend on the phase of construction, the type of equipment being utilized, and the time of day. Also, the noise produced will depend upon the source of power used to operate the equipment, and the material properties and operational characteristics of the equipment itself. A characterization, based upon the dominant noise sources of commonly used construction equipment is as follows:

- Earth Moving equipment - including, but not limited to, such machinery as bulldozers, shovel-type excavators, front-end loaders, graders, and trucks.
- Erecting and Demolition equipment - such as cranes, concrete mixers, pile drivers, and pavers.
- Supporting equipment - including, but not limited to, pumps, generators, compressors, and light towers.

Table 4 represents typical construction equipment noise ranges.

Aforementioned construction noise impacts will be of short duration due to vegetative shielding coupled with the industrialized nature of the areas surrounding the facility and should result in only slightly adverse impacts.

Table 4	CONSTRUCTION EQUIPMENT SOUND LEVELS
Equipment	Sound Level at 50 ft. (dBA)
<u>Earth Moving</u> Bulldozer (250 to 700 horsepower) ^a Front-end loader (6 to 15 cubic yards) ^a Grader (13- to 16-foot blade) ^a Shovel (2 to 5 cubic yards) ^a Tractor (3/4 to 2 cubic yards) ^a Compactors/rollers ^b	 72 – 85 72 – 85 80 – 94 72 – 93 76 – 93 72 - 75
<u>Material Handling</u> Truck (200 to 400 horsepower) ^a Mobile crane (11 to 20 tons) ^a Concrete pumps (30 to 150 cubic yards) ^a Concrete mixers ^b	 83 - 95 76 - 87 82 - 85 75 – 88
<u>Impact Equipment</u> Pneumatic wrenches ^b Jack hammers & rock drills ^b	 82 – 89 81 – 98
<u>Miscellaneous</u> Portable generators (50 to 200 kilowatts) ^a Compressors ^b Pumps ^b	 71 – 83 75 – 87 69 - 71

Source: a - Barnes et al., 1976, 1977

b - US EPA, January 1971

Operational Impacts. The operation of the facility involves many noise generating activities through equipment, machinery, and activities relevant to said operation. Noise levels have been found to exceed 90 dBA in the tipping area of this mass-burning plant when refuse trucks dump within an enclosed building housing both tipping bays and charging floor. The primary sources of noise at all locations were the packer-ejection mechanism during truck dumping, truck traffic, and release of the air brakes on the packers and transfer vans. All noise levels, with the exception of truck traffic, are significantly attenuated or reduced outside the building and with increasing distance from the buildings.

Cinder block walls and heavy doors cause decibel loss during transmission through the material, ranging from 25 to 40 dBA. Thus, when a 100 dBA noise source is in operation within the facility structure, only about a 75 dBA level would be noted directly outside.

The facility has been identified as an omni directional noise source; therefore, noise levels are radiated equally in all directions from their source. Decibel loss over distance from this point was calculated using a normal atmospheric attenuation factor of 6dB loss with a doubling of distance. For the original noise analysis, it was found that the reference noise level and distance were measured to be at 75dBA when at a distance of 50 feet from the facility.

For the noise analysis, a sensitive receptor is defined as a residential area, school, hospital, or other type of community institution. There are two existing groups of receptors potentially affected by noise impacts. The closest sensitive receptor to the facility is the Hillsborough County Animal Services. Although not considered a "sensitive receptor", another receptor potentially affected by noise is S&S Electric Co. (a commercial manufacturing area) about 1600 feet east of the facility (represented by Monitoring Site 4 on Figure 1).

The sound pressure reduction over the 1,600 feet to the commercial manufacturing use area would be about 30 dBA (75 minus 30) resulting in a perceived sound pressure level of 45 dBA from the proposed facility. This being well below the current observed daytime ambient level, and coupled with the adjacent roadway noise levels, results in the absence of any increases in the ambient noise levels at this location. All other potential sensitive receptors are beyond this distance and, therefore, are not impacted by noise levels resultant from facility operations

From this analysis it can be seen that daytime operations of the facility would not result in any perceived noise impacts at the closest sensitive receptors. Nighttime ambient noise monitoring at the closest residence indicate nighttime noise levels of 50.7 dBA. With facility noise levels at the location of this sensitive receptor to be in the vicinity of 44 to 46 dBA, no impact is anticipated.

Efforts will be made during the design phases of this project to include appropriate mitigative measures for reducing these expected noise levels.

Such measures include, but are not limited to:

- Locating major noise producing components of the expanded facility, such as draft fans, conveyors, and screw type compressors.
- Completing all required building siding and structural modifications to new Grizzly Building and Main Process/Boiler Enclosure.
- Use of structural noise screens and if necessary, planting of vegetative buffers.

It should be noted that while an additional effort will be made to minimize noise levels, the resultant sound levels at the receiving receptors will be well below Hillsborough County EPC noise criteria. The rules of the Hillsborough County Environmental Protection Commission (Rule 1-10) allow a dBA sound level limit of 75 for a manufacturing/industrial land use category at all times. The predicted noise levels of the proposed facility expansion will be well below these limits.

Noise levels from the facility at other areas in the vicinity of the site will be well below existing day and nighttime ambient levels, save that of location 3. However, let it be noted that any exceeding levels in this location are due in their entirety to roadway traffic and not facility operations.

The operation of the expanded facility will increase daytime truck traffic levels along roadways in the vicinity of the site. Truck traffic is restricted to daytime hours, more specifically 8 a.m. to 5 p.m. As a result of the truck traffic, noise levels can be expected to increase minimally in the

vicinity of the site's access road, Falkenberg Road, and State Road 60. Table 5, as presented below, represents the increase in truck traffic.

Table 5	TRUCK TRAFFIC ANALYSIS	
Sources of Truck Traffic	Increased Volume Daily (8 ton/20 ton trailer ^a)	Increased Volume Hour (8 ton/20 ton trailer ^a)
Refuse/Ash Hauling	82 (75/7)	8 (7/1) ^b
Repair/Delivery	13	4
Total	95	12

Source: Covanta Energy (Covanta Hillsborough, Inc.) at the Resource Recovery Facility

Note: a - Where applicable, volumes are listed as Daily (8 ton/20 ton trailer) which accounts for differential truck/trailer loads.

b - The peak hour volume is disproportionately less than values which would be obtained from using *Institute of Transportation Engineer's (ITE) Trip Generation Manual, 7th Edition*. According to representatives at the Facility, truck traffic is always minimized during peak hours, therefore a factor of ten-percent is applied.

The noise that would be generated by traffic related to the proposed facility was determined by using the Traffic Impact Analysis as detailed in Appendix 10.1.3. The results compared the existing modeled sound levels with and without the proposed expansion to the resource recovery facility. The existing modeled noise levels, which are presented in Table 6 and 7, compare will with the 1 minute L_{eq}s monitored by B&A. Table 6 presents the predicted 1-hour equivalent sound levels for two daytime peak traffic hours and one nighttime traffic hour for each of the seven receptors with and without the addition to facility traffic and facility noise sources. Table 7 presents the peak traffic noise with and without the facility expansion at the given intervals of distance from the roadway. The hour which has the highest traffic volume for each road segment was used to determine the composite "peak" traffic hour in Table 7. These hours are typically associated with the afternoon rush hour.

Table 6	NOISE IMPACT ASSESSMENT SUMMARY FOR HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY						
Case	Receptor Site Locations						
	1	2	3	4	5	6	7
L _{eq} Noise Level without Facility Expansion 8:00am Peak Day Traffic	62.3	65.8	74.5	74.6	66.4	59.1	51.4
L _{eq} Noise Level with Facility Expansion 8:00am Peak Day Traffic	64.1 ^a	69.2 ^a	74.5	74.6	66.4	59.1	51.4
L _{eq} Noise Level without Facility Expansion 6:00pm Peak Day Traffic	61.3	68.7	74.7	74.0	64.6	61.6	50.6
L _{eq} Noise Level with Facility Expansion 6:00pm Peak Day Traffic	63.6 ^a	70.5 ^a	74.7	74.0	64.6	61.6	50.6
L _{eq} Noise Level without Facility Expansion 10:00pm Night Traffic	51.2	56.9	65.3	67.2	56.6	53.2	46.7
L _{eq} Noise Level with Facility Expansion 10:00pm Night Traffic	52.9 ^a	57.3 ^a	65.3	67.2	56.6	53.2	46.7

Source: Burcaw & Associates Incorporated, Public Sector Department, 2004

a - Increase due to facility expansion

NOTE: All values are 1-hour equivalent sound levels. See Figure 1 for location of receptors.

Table 7		PEAK HOUR NOISE LEVEL ATTENUATION FROM ROADWAYS							
Predicted Noise Levels									
Roadway Section	Distance	Leq ^a	Without Expansion			Leq ^a	With Expansion		
			L10	L50	L90		L10	L50	L90
1. Falkenburg SR-60 to SR-574	50	74.3	80.5	73.6	71.2	75.0	80.8	74.1	72.6
	100	69.6	75.9	69.1	66.5	70.3	76.1	69.4	67.9
	150	66.8	73.2	66.2	63.6	67.5	73.3	66.6	65.1
	200	64.7	71.1	64.3	61.4	65.4	71.2	64.5	63.0
	300	61.6	68.1	61.4	58.2	62.3	68.1	61.4	59.9
	500	57.6	64.2	57.3	54.1	58.3	64.1	57.4	55.9
	1,000	51.9	58.4	51.6	48.2	52.6	58.4	51.7	50.2
2. SR-60 US-301 to Falkenburg	50	76.7	81.4	75.0	72.8	76.7	81.4	75.0	72.8
	100	72.0	76.8	70.5	68.1	72.0	76.8	70.5	68.1
	150	69.2	74.1	67.6	65.2	69.2	74.1	67.6	65.2
	200	67.1	72.0	65.7	63.0	67.1	72.0	65.7	63.0
	300	64.0	69.0	62.8	59.8	64.0	69.0	62.8	59.8
	500	60.0	65.1	58.7	55.7	60.0	65.1	58.7	55.7
	1,000	54.3	59.3	53.0	49.8	54.3	59.3	53.0	49.8
3. SR-60 Falkenburg To Lakewood	50	76.1	82.6	75.3	73.3	76.1	82.6	75.3	73.3
	100	71.4	78.0	70.8	68.6	71.4	78.0	70.8	68.6
	150	68.6	75.3	67.9	65.7	68.6	75.3	67.9	65.7
	200	66.5	73.2	66.0	63.5	66.5	73.2	66.0	63.5
	300	63.4	70.2	63.1	60.3	63.4	70.2	63.1	60.3
	500	59.4	66.3	59.0	56.2	59.4	66.3	59.0	56.2
	1,000	53.7	60.5	53.3	50.3	53.7	60.5	53.3	50.3
4. SR-574 US-301 To Falkenburg	50	72.9	79.7	71.5	69.9	72.9	79.7	71.5	69.9
	100	68.2	75.1	67.0	65.2	68.2	75.1	67.0	65.2
	150	65.4	72.4	64.1	62.3	65.4	72.4	64.1	62.3
	200	63.3	70.3	62.2	60.1	63.3	70.3	62.2	60.1
	300	60.2	67.3	59.3	56.9	60.2	67.3	59.3	56.9
	500	56.2	63.4	55.2	52.8	56.2	63.4	55.2	52.8
	1,000	50.5	57.6	49.5	46.9	50.5	57.6	49.5	46.9
5. SR-574 Falkenburg To Williams	50	72.2	78.5	71.4	69.1	72.2	78.5	71.4	69.1
	100	67.5	73.9	66.9	64.4	67.5	73.9	66.9	64.4
	150	64.7	71.2	64.0	61.5	64.7	71.2	64.0	61.5
	200	62.6	69.1	62.1	59.3	62.6	69.1	62.1	59.3
	300	59.5	66.1	59.2	56.1	59.5	66.1	59.2	56.1
	500	55.5	62.2	55.1	52.0	55.5	62.2	55.1	52.0
	1,000	49.8	56.4	49.4	46.1	49.8	56.4	49.4	46.1

Source: Burcaw & Associates Incorporated, Public Sector Department, 2004

a - Hourly Leq

The noise level at a point away from the roadway is a function of:

- The distance from the roadway
- The relative elevations of roadway and receiver
- Traffic volume on the roadway
- The percentage of light-duty (two axles and four tires), medium duty (two axles and six tires), and heavy-duty (more than three axles) vehicles
- Vehicle speed
- Roadway grade
- Topographic features such as trees, shrubbery, and buildings
- The noise source height of the vehicles

Trucks traveling along Falkenberg Road maintain a relatively steady speed of 45 mph. At the railroad tracks and at the access road to the site these trucks will slow down to about 20 mph or stop.

Nevertheless, the model treated the velocity as a constant higher velocity to maintain the conservatism of the analysis. Trucks hauling along State Road 60 will maintain a speed of 50 mph. Falkenberg Road and the facility access road do not have grades that significantly increase truck generated noise levels.

Currently, hourly truck volume from the facility is 4 to 5 vehicle trips. The maximum hourly truck volume expected to be added to Falkenberg Road from the proposed facility expansion is 8 vehicle trips. At this volume, the median sound level recorded from the trucks along with the current existing trucks traveling along Falkenberg at 50 feet from the roadway is averaged to 73.6 dBA with or without the expansion. Additional truck traffic could be expected to slightly increase ambient noise levels by 0.5 to 1 dBA during this maximum truck volume period along Falkenberg Road. As stated earlier, an increase of 3dB is barely perceptible in the natural environment. The Hillsborough County EPC noise criteria allows a sound level limit of 75 dBA at manufacturing or industrial receiving land uses, a level of 65 dBA at commercial or business receiving land uses, and a sound level limit of 60 dBA at residential land uses between the hours of 7 a.m. and 10 p.m. The peak hourly traffic with the additional facility traffic is not expected to exceed the County criteria at any of the receptors except at Site 3. Noise levels at this location have been known to be in excess since prior to 1984, and the construction of the original Waste Treatment Facility.

Modeling of the existing traffic levels at all of the monitoring sites, as shown on Table 6 at the indicated peak and nighttime hours along with the steady noise source of 75 dBA at 50 ft from the facility, again predicts an insignificant increase of only 0.5 to 1.0 dBA above existing monitored and modeled data.

Figure 2 presents the contour analysis data from the modeling runs. Contours are shown as light green lines and are in 5dBA increments ranging from 75 to 60 dBA. These contours represent the worst case (maximum noise levels) for each receptor from peak traffic for the hour with the highest existing traffic volume as detailed in Appendix 13.1 and the peak hourly traffic associated with the facility operations. Care must be exercised when interpreting these results because the contour lines were generated using rush hour traffic values which occur only two hours a day and thus are not representative of a 24-hour period. This map indicates no substantial increase of noise levels (between 0 -1 dBA) due to this facility and its expansion.

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Appendix 11-2

Traffic Impact Analysis

TRAFFIC IMPACT ANALYSIS

FOR

HILLSBOROUGH COUNTY

RESOURCE RECOVERY FACILITY

PREPARED FOR:

CAMP DRESSER & McKEE, INC.

PREPARED BY:



6402 W. LINEBAUGH AVE. SUITE A
TAMPA, FLORIDA 33625

October 5, 2004

TABLE OF CONTENTS

INTRODUCTION	3
SCOPE OF PROJECT	3
LOCATION MAP	3
FIGURE 1 – PROJECT LOCATION	4
EXISTING ROADWAY NETWORK.....	4
FIGURE 2 – ROADWAY NETWORK.....	6
TABLE 1 – ROADWAY LEVEL OF SERVICE REPORT.....	7
TRIP GENERATION.....	7
EMPLOYEE VEHICULAR TRIP GENERATION	7
TABLE 2 - COMMUTING EMPLOYEE TRIP GENERATION	8
TRUCK TRAFFIC TRIP GENERATION.....	9
FIGURE 3 – COLLECTION ZONES	9
TABLE 3 - TRUCK TRAFFIC TRIP GENERATION	10
TABLE 4 - VISITOR / MAINTAINENCE TRIP GENERATION	11
TABLE 5 - FACILITY RELATED TRIPS GENERATED (DAILY)	11
TABLE 6 - FACILITY TRIPS GENERATED (PM PEAK HOUR).....	11
TABLE 7 - ROADWAY CAPACITY AND LEVEL OF SERVICE.....	12
CONCLUSIONS	12

INTRODUCTION

The Hillsborough County Resource Recovery Facility (RRF) is a proposed expansion to an existing energy recovery operation located on the west side of Falkenburg Road, north of SR-60 Adamo Drive. As indicated by this report, the Facility will have no adverse impact on the surrounding roadway network.

SCOPE OF PROJECT

The Hillsborough County Resource Recovery Facility is a proposed expansion to the existing energy recovery facility. The Facility incinerates processable solid waste (solid waste that can be incinerated), produces steam, and converts the steam to electricity which is sold to the Tampa Electric Company. The initial phase was completed in 1987 at a cost of approximately \$80,000,000 by Ogden Martin Systems of Hillsborough, Inc. and was designed to operate at a capacity of 1,200 tons per day (TPD).

The proposed expansion project will increase the capacity by 600 tons per day. This Traffic Impact Analysis evaluates the potential traffic-related impacts to the surrounding roadway network caused by the current and proposed trips generated by the operation and maintenance of the facility. Traffic associated with construction of this project is not evaluated in this report but is addressed in Section 4.6.3 Traffic Associated with Construction.

LOCATION MAP

The Facility is located on Falkenburg Road north of SR-60 Adamo Drive (between SR-60 Adamo Drive and SR-574 MLK Blvd.). The Facility is on the west side of Falkenburg Road, and is accessed by a driveway located approximately 1 mile north of SR-60. The project location is shown in **Figure 1**.

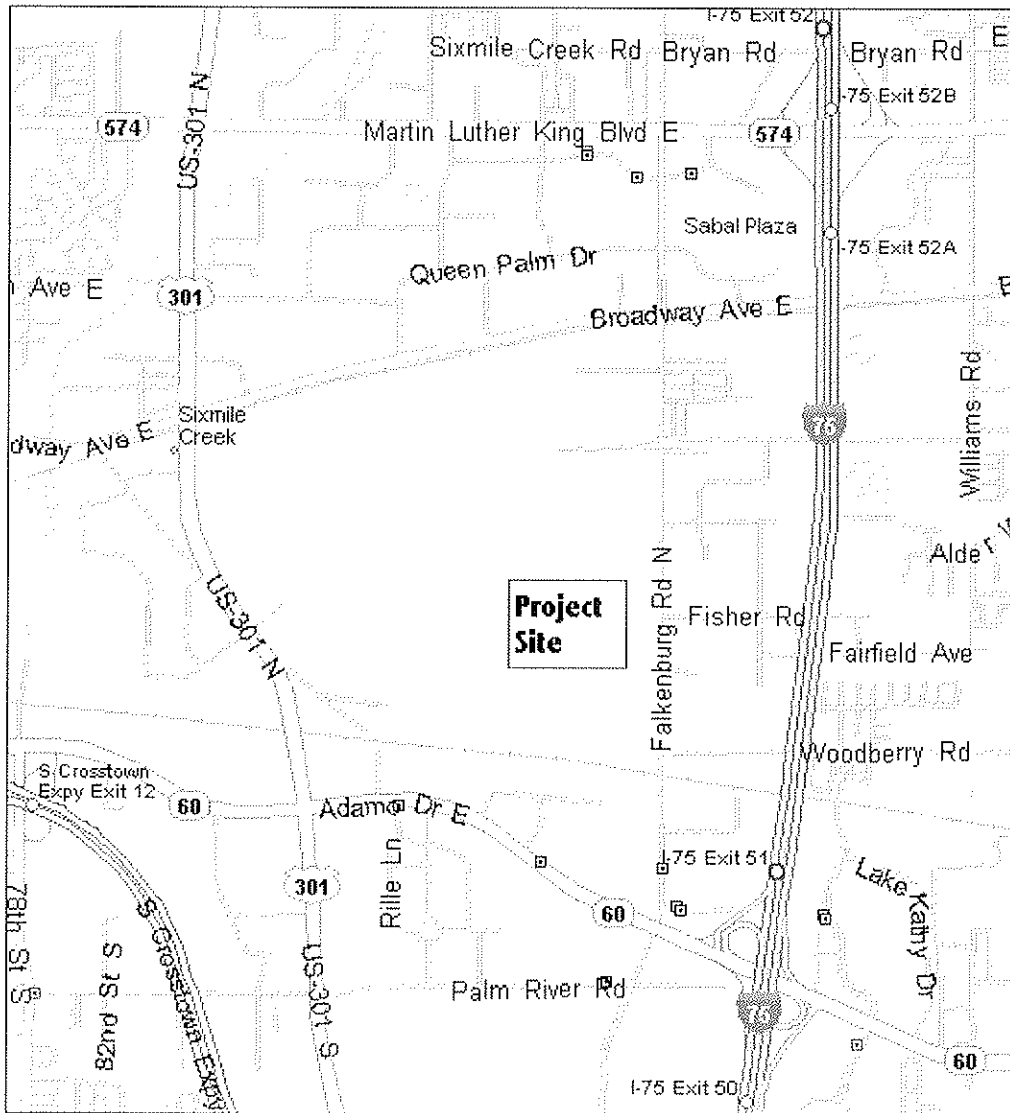


FIGURE 1 – PROJECT LOCATION

EXISTING ROADWAY NETWORK

The surrounding roadway networks which are evaluated in this analysis are those roads which could be impacted by traffic generated by the Facility. Existing traffic volumes and distribution patterns are used to determine traffic flow and proposed trip distributions.

The roadways which are evaluated for this traffic impact analysis are delineated and established by proposed conditions and the format and limits of existing traffic data. The roadways which are evaluated include:

Falkenburg Road

- (I) From SR-60 (Adamo Drive) to SR-574 (MLK Boulevard)

SR-60 (Adamo Drive/Brandon Boulevard)

- (II) From US-301 to Falkenburg Road
- (III) From Falkenburg Road to Lakewood Drive

SR-574 (MLK Boulevard)

- (IV) From US-301 to Falkenburg Road
- (V) From Falkenburg Road to Williams Road

These roadways are shown in the roadway network map in **Figure 2**.

The existing traffic volumes and level of service (LOS) for these roadways were obtained from the **Hillsborough County – Board of County Commissioners – 2004 Roadway Level of Service Report** prepared by **Planning & Growth Management - Transportation Division**. The results for the roadways which are evaluated in this analysis are summarized in **Table 1**.

TABLE 1 – ROADWAY LEVEL OF SERVICE REPORT

	Roadway (From/To)	FC	Road Type	Speed Limit	LOS Std.	AADT	Daily Cap	PM Pk Hr Dir Vol	PM Pk Hr Dir Cap	LOS
I	Falkenburg (SR-60 to SR-574)	MA	4D	45	E	29000	29700	1250	1410	C
II	SR-60 (US-301 to Falkenburg)	PA	4D	50	E	45700	43600	2600	2450	F
III	SR-60 (Falkenburg to Lakewood)	PA	8D	50	E	75500	78700	4000	4200	D
IV	SR-574 (US-301 to Falkenburg)	PA	6D	50	D	33000	53500	1800	2790	B
V	SR-574 (Falkenburg to Williams)	PA	4D	50	D	35600	35700	1900	1860	F

*See Appendix A and Appendix B for descriptions

TRIP GENERATION

Vehicular traffic associated with the Facility is anticipated to be generated primarily by delivery of refuse to the facility and the removal of ash for disposal. A much smaller volume of traffic will be generated from the commuting employees and from support vehicles performing delivery of supplies and facility repairs and maintenance.

EMPLOYEE VEHICULAR TRIP GENERATION

There are approximately 42 current employees at the facility. The current capacity of the facility is 1200 tons per day (TPD) which will be increased by 600 TPD with the expansion. According to Covanta Energy representatives, the expansion project will result in seven new employees operating the Facility, including four operators and 3 maintenance. Therefore, the projected number of employees will be 49, with the additional 7 employees.

The facility operates on a three-shift cycle with the day shift accounting for approximately 60 percent of the staff while the other two shifts each require another 20 percent of the work force. Most employees will commute via use of single rider automobiles. Although trips generated from commuting employees is anticipated to be distributed during any 24-hour period divided into shifts according to these ratios, the analysis for this study will be based on total employees with out reference to their shift. This will allow use of current trip generation data and account for the overlapping of trips during shift changes.

The additional 7 employees required to operate the facility will generate 38 additional trips per day (TPD) or 5 addition trips (TPD) during the entering PM Maximum Peak Hour traffic.

The results of trips generated from commuting employees are shown in **Table 2**.

TABLE 2 - COMMUTING EMPLOYEE TRIP GENERATION

Land Use	Condition	ITE Code	Units	Number Of Units	Daily		AM Peak				PM Peak			
					Rate ¹	Trips	Rate	Trips	Entering	Exiting	Rate	Trips	Entering	Exiting
Utility	Current	170	Empl.	42	1.80	76	0.76	32	(90%) 29	(10%) 3	0.76	32	(15%) 5	(85%) 27
Utility	Projected Increase	170	Empl.	7	1.80	12	0.76	5	(90%) ~5	(10%) ~1	0.76	6	(15%) ~1	(85%) ~5
Utility	Total	170	Empl.	49	1.80	88	0.76	38	(90%) 34	(10%) 4	0.76	38	(15%) 6	(85%) 32

1. Source derived from previous study
2. Rates and factors applied are derived from the *Institute of Transportation Engineer's (ITE) Trip Generation Manual, 7th Edition*.

Based on current population densities and proximity of major population centers to the planned project, it is anticipated that distribution of the traffic generated by commuting employees will be fairly evenly divided between population centers to the east and to the west (mainly Tampa and Brandon). It is further anticipated that based on the project location and existing traffic patterns that approximately 60 percent of the commuting employer trips generated will enter and exit the roadway network using SR-60 Adamo Drive while the remaining 40 percent will use SR-574 MLK Boulevard.

TRUCK TRAFFIC TRIP GENERATION

The major contributor to truck traffic for the facility is associated with the delivery of refuse to the facility to be incinerated, and the removal of ash residue to the land fill. A small amount of truck traffic will be generated from the delivery of supplies and from maintenance vehicles which will be discussed separately in the following section. Hillsborough County Solid Waste Management divides the county into three major collection zones as shown in **Figure 3**.

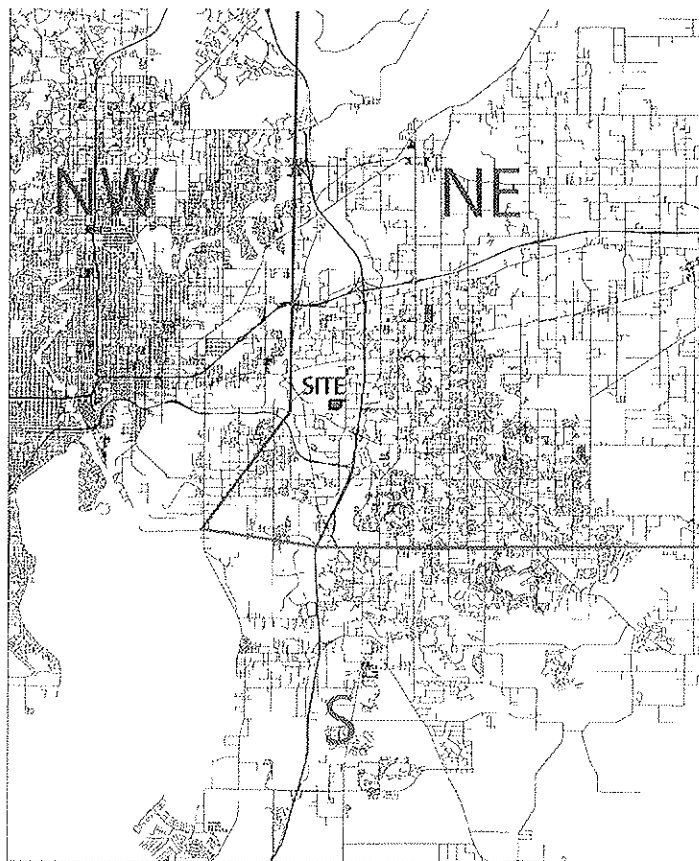


FIGURE 3 – COLLECTION ZONES

In order to provide more convenient disposition alternatives for processable solid waste the system utilizes two (2) transfer stations which are located in and service zones NW

and S and are designated as the Northwest County Solid Waste Transfer Station (NWTS) and the South County Solid Waste Transfer Station (SCTS). Most of the refuse from these zones is taken to the transfer stations by the hauler's roll-off or rear-end load trucks and then is transferred into county owned 40 foot trailers. The Facility can only accommodate approximately 15 transfer trailer loads each day of operation (Monday – Saturday) all originating from the NWTS Facility. The remainder of the transfer trailer loads are diverted to the landfill in southern Hillsborough County. At the current time all transfer trailer loads originating from the SCTS Facility are directed straight to the landfill.

Information derived from a field inspection and visit indicates that the facility currently receives approximately 200-250 trucks a day delivering refuse to incinerate. Of these 15 are county trailers (20 cubic yard) from the Northwest County Refuse Station. The balance of the daily truck traffic is composed of refuse trucks, roll-off or rear-end loaders (~8 cubic yard).

Trips generated from truck traffic (refuse and ash hauling) as shown in Table 3.

TABLE 3 - TRUCK TRAFFIC TRIP GENERATION

Condition	Truck Volume					
	Daily			Peak Hour		
	Total	Light	Trailer	Total	Light	Trailer
Current	250	235	15	25	24	1
Proposed Increase	125	118	8	12	11	1
Total	375	353	23	37	35	2

TABLE 4 - VISITOR / MAINTAINENCE TRIP GENERATION

Condition	Volume	
	Daily	Peak Hour
	Total	Total
Current	30	10
Proposed Increase	6	2
Total	36	12

Combining the different sources of trip generations and appropriating the volumes as current, proposed increase and total the results are shown in Table 5 (Daily Volume) and Table 6 (PM Peak Hour).

TABLE 5 - FACILITY RELATED TRIPS GENERATED (DAILY)

Source of Trips Generated	Existing Volume ¹ (trips/day)	Proposed Volume (trips/day)	Increase Volume (trips/day)
Commuting Employees	76	88	12
Refuse/Ash Hauling	250(235/15)	375 (353/23)	125(118/8)
Repair/Delivery/Visitors	30	36	6
TOTAL	356	499	143

TABLE 6 - FACILITY TRIPS GENERATED (PM PEAK HOUR)

Source of Trips Generated	Existing Volume (trips/peak hour)	Proposed Volume (trips/peak hour)	Increase Volume (trips/peak hour)
Commuting Employees	32	38	5
Refuse/Ash Hauling	25 (24/1)	37(35/2)	12 (11/1)
Repair/Delivery/Visitors	10	12	2
TOTAL	67	87	19

The data obtained indicates that the facility will produce an additional 143 trips a day, with an additional 19 trips during peak hour. These trips are applied to the local roadway network to evaluate the impact on these roadways. Table 7 list the roadway capacity and level of service (LOS) for the impacted roadways. Using the peak hour volume of 19 trips generated, these trips are applied to the roadway network by two methods. No roadway segment will have a significant change in its level of service (LOS) as a result of additional traffic generated by this project.

TABLE 7 - ROADWAY CAPACITY AND LEVEL OF SERVICE

Roadway	Segment	Standard LOS ¹ / Capacity ²	Existing LOS / Volume ³	Anticipated Volume Increase ⁴	
				Method 1	Method 2
Falkenburg Road	SR-60 to SR-574	E / 1410	C / 1250	19	17
SR-60/Adamo Dr	US-301 to Falkenburg	E / 2450	F / 2600	10	4
SR-60/Adamo Dr/ Brandon Blvd	Falkenburg to Lakewood	E / 4200	D / 4000	9	6
SR-574/MLK Blvd	US-301 to Falkenburg	D / 2790	B / 1800	0	3
SR-574/MLK Blvd	Falkenburg to Williams	D / 1860	F / 1900	0	3

Source: Hillsborough County 2004 Roadway Level of Service Report

Notes:

1. LOS is level of service
2. Using PM Peak Hour Direction Capacity
3. Using PM Peak Hour Direction Volume
4. Volume Increase Based on anticipated traffic from one of two methods:
 - a. Method 1 – Assuming all traffic approaches and departs south of the facility and then equally east or west on US-60.
 - b. Method 2 – Assuming traffic approaches and departs based on established traffic distribution patterns on major surrounding roadway network.

CONCLUSIONS

As depicted in Table 2-22, the anticipated volume increase does not add significantly to the existing volume as to affect the level of service (LOS) at any of the surrounding roadway segments. The trips generated from this project will not significantly impact the surrounding roadway network.

Appendix 11-3

Ash Management Plan



**INTEROFFICE
CORRESPONDENCE**

To: Glenn Hoag, Facility Manager

From: Rebecca Macionski, Environmental Engineer

Date: May 26, 2004 *BA* 5/28/04

Subject: Ash Management Plan Revisions

Attached please find the latest version to the Hillsborough County Resource Recovery Facility's Ash Management Plan in accordance with 62-702.400 F. A. C. Please keep all memorandums notifying you of these periodic updates within Attachment 3 of the enclosed document.

If you have any further comments upon the Ash Management Plan, please feel free to contact me.

Cc: S. Haas
Shift Supervisor(s)
File

HILLSBOROUGH COUNTY

SOLID WASTE ENERGY RECOVERY FACILITY

ASH RESIDUE MANAGEMENT PLAN

HILLSBOROUGH COUNTY SOLID WASTE ENERGY RECOVERY FACILITY

ASH RESIDUE MANAGEMENT PLAN

The Hillsborough County Solid Waste Energy Recovery Facility is located on a 40-acre site in Tampa, Florida. The facility receives, stores, and combusts municipal solid waste and other solid wastes items. The technology used by the facility is a process generally known as "mass-burning" in which solid waste is burned (90% volume reduction) with little or no pre-combustion processing. Fly ash (from the boiler and air pollution control devices) and bottom ash are combined within the fully enclosed Martin residue handling system.

The facility, consists of three (3) MWC combustion trains, at full load generates approximately 300 TPD (100,000 tons-per-year) of residue, which is disposed of in the Southeast County Sanitary Landfill in Picnic, Florida. Approximately 7% of the ash residue is recovered ferrous metals which are removed prior to disposal.

The residue handling methods, equipment, ash disposal site, analytical QA/QC for ash characterization, potential for ash recycling, and conditions of assuring that hazardous wastes are not received or incinerated at the facility are all discussed within this ash residue management plan, per the requirements of Rule 62-702.400, F.A.C.

1. Residue Handling Equipment

The residues of combustion consist of non-combustible by-products, fly ash, reacted lime products, excess lime, and bottom ash siftings. The resultant ash residue is approximately 25 to 30 percent (by weight) of the incoming MSW. It is not possible to accurately estimate the fly ash component generated from the total ash residue produced. Most facilities currently in operation in the United States combine fly ash and bottom ash in the ash quench system. Thus, there is little information for calculating the precise amounts of fly versus bottom ash.

The fly ash system collects and handles material discharged from the superheater, economizer, spray dry gas absorber, and particulate removal systems. The air pollution control (APC) systems and boiler ash hoppers discharge to screw conveyors through dump valves. These provide a barrier between the air pressure in the conveyors and the various pressure levels at different points in the combustion train. The collected stream is combined with the bottom ash for quenching and removal in the ash discharger.

Each stoker is furnished with one proprietary Martin GmbH residue discharger that receives, combines, wets and quenches burned out waste residues, grate siftings and fly ash. The ash discharger is totally enclosed, thus preventing siftings from becoming airborne prior to quenching.

Once the ash is quenched, the excess water from the residual materials drains back into the ash discharger quench tank. The ash is then transported to the main conveyor; the ash will retain approximately 10 to 25 percent moisture content. The mechanical nature of the ash handling and disposal operations, in combination with enclosed systems whenever possible will minimize the potential for inhalation, ingestion or body contact with the material.

From the quench chamber, a hydraulically driven ram pushes the residue up an inclined draining/drying chute. In the chute, excess water from the residue drains back into the quench bath. Residue, containing enough moisture to prevent dusting (10 to 25 percent by weight), then falls on to the main vibrating residue conveyor.

The main conveyor carries discharged residue from the boilers to a grizzly scalper. The grizzly scalper extracts large residue pieces from the main residue stream. Oversized pieces are transported to the residue storage building via front-end loader. Undersized pieces are fed to an inclined belt conveyor for transport to the residue storage building. Just prior to the incline belt conveyor, dolomitic lime is spread over the undersized ash pieces at a fixed rate using a rotary feeder. Two fine water sprays are utilized to aid in controlling dust issues associated with the dolomitic lime feed onto the incline belt conveyor. The ash transport conveyors that are exterior to the buildings are covered to limit fugitive emission during transport.

The residue storage building contains two separate storage bunkers, one for ash residue and another for recovered ferrous metals. An iron-aggregate shake-on concrete surface hardener is applied to the entire floor of the building. Joints are sealed to prevent water from seeping out at walls and construction joints in the floor. Each storage compartment is sized to allow a naturally forming residue pile in order to minimize the amount of residue recast required. Each residue pile consists of a cone with its lower portion constrained by the compartment walls. Sufficient storage volume will be provided for approximately three days of material (38,000 ft³ cubic feet).

Processed residue is then removed from storage and loaded into trucks by a front-end loader for

ultimate disposal in the designated landfill. The moisture content of the ash (10 to 25 percent by weight) minimizes any potential fugitive dust emissions and possible human exposure through inhalation during the handling, conveying, and transport activities. The consistency and appearance of the ash residue is comparable to wet aggregate. This moisture condition continues to be maintained during transport to the landfill. The facility uses mulch from the adjacent Hillsborough County yard waste processing facility to aid in absorbing moisture in the truck access ways on the ash management building floor. The addition of the mulch aids in limiting the amount of ash being tracked outside the ash management building by the exiting truck tires.

Separation and recovery of ferrous metals is also done in the residue building. When the residue first enters the building, it passes under a magnet which is designed to remove at least 80 % of the ferrous metals in residue containing at least 8 % by weight of magnetic ferrous metals greater than 1" in size. The separated metals pass through a rotating drum trommel that conditions the ferrous by removing adhering ash particles. The recovered ferrous is directed to the second bay of the building. The separated ash then falls in the ash bunker directly beneath the trommel.

Please note the addendum to the Ash Management Plan addressed to the Hillsborough County Environmental Protection Commission dated March 16, 1994. *See Attachment 2.*

The trucks used to transport the residue material to the landfill are typically leak-resistant containerized vehicles that have the capability of conveying up to 25 tons of material per load. The vehicle is covered with a canvas tarp during transport to the landfill to help prevent any potential spillage or fugitive dust. The vehicle makes approximately five or six round trips per day, operating six days per week.

The ash materials will be managed in compliance with Chapter 62-702, F.A.C. and in a manner (i.e., moist) such that an extremely low potential for inhalation ingestion or direct dermal contact will exist. HC-RRF has developed a detailed and specific employee safety-training program. The program provides effective personal respiratory protection equipment as necessary to promote a high degree of protection to facility personnel who may have excessive contact with the ash material. This program will be continuously updated as new information and equipment is developed to assure compliance with all OSHA standards and FDEP requirements.

2. Ash Disposal Site

The current ash residue disposal site is located in a portion of the Southeast County Sanitary Landfill at Picnic, FL which is approximately 20 miles from the HC-RRF facility. It is a co-disposal landfill with a composite lining and leachate collection and removal system that complies with the requirements of Rule 62-701.050, F.A.C. The landfill started receiving ash from the HC-RRF facility January 1987.

3. Analytical Quality Assurance/Quality Control Plan

Sampling and analysis analytical procedures used for characterization of the ash residue will be in accordance with the following EPA documents:

1. Test Methods for Evaluating Solid Waste - Physical/Chemical Methods (SW-846), September 1986, 2nd Edition
2. FDEP - Quality Assurance Standard Operating Procedure Manual for Sampling of Ash Residue from Solid Waste Combustors issued in December 1993.

A representative sample combined from the monthly ash samples will be obtained on a quarterly basis using procedures outlined in the ASTM "Belt Sampling Protocol" (ASTM D2234-86) and Rule 62-702.570, F.A.C. The sample will be sent to an independent laboratory and analyzed using appropriate methods and techniques. Analysis will include total metals analysis for the thirteen priority pollutant metals using EPA method 3050 (Acid Digestion of Sediments, Sludges, and Soils). The priority pollutant metals include: silver, arsenic, beryllium, cadmium, chromium, copper, mercury, nickel, lead, antimony, selenium, thallium, and zinc.

The laboratory will adhere to a strict quality control program and adhering to the requirements contained within SW-846. The State of Florida also has an extremely stringent certification process.

The destination landfill is also required to collect and analyze the leachate for the priority pollutant metals on a quarterly basis. The results of the ash and leachate analyses will be submitted in separate reports annually to the FDEP.

4. Recycling of Ash Residue

As part of the total ash management program, the County will be alert to potential uses of ash. Currently, various pilot projects are underway in Florida and other states to study the possibility of reusing the ash. For example, several communities are studying the effects of incorporating ash materials into asphalt and concrete aggregate materials used in roadway pavements. This work is still in the development and research stages however, and will require additional study regarding mixing ratios, leachability, and encapsulation techniques for the material. If these programs are successful, the County may pursue ash reuse programs of its own.

5. Non-Processible Wastes

Per contractual obligations, as specified by the Consolidated Operation and Management Agreement (Amendment No. 10) between Hillsborough County and Ogden Martin Systems of Hillsborough, Inc. (May 20, 1998), the facility may neither receive nor burn non-processible waste (Section 7.3.3). The definition of a "non-processible waste" as defined by the Operation and Management Agreement, is:

"...ashes, foundry sand, cesspool and other human waste, human remains and animal carcasses, tree trunk sections, branches and stumps longer than 5 feet or more than 8 inches in diameter, matter or material longer than 5 feet, motor vehicles (including major parts such as transmissions, rear ends, springs, and fenders), agriculture machinery and

equipment, marine vessels and their major parts, any other large machinery or equipment, liquid waste, any matter or material the combustion of which in the Project is prohibited by any law, ordinance, rule, or regulation of any government or public agency having jurisdiction over the Project and its operations, noncombustible construction material or demolition debris, and hazardous waste, such as but not limited to, explosives, hazardous chemicals, radioactive materials, cleaning fluids, crank case oils, cutting oils, paints, acids, caustics, poisons or drugs."

Per Section 7.3.3 of the Operation and Management Agreement, the County is responsible for removing any non-processible waste (including hazardous waste) delivered to the facility. To prevent hazardous waste delivery to the facility, the County has adopted an ordinance prohibiting the deliveries of such wastes and will conduct periodic random inspection of vehicles delivering waste to the facility.

In addition to these contractual obligations, HC-RRF has an Unacceptable Waste Screening Protocol (see Attachment 1) which is included as part of the facility's Operation and Maintenance Manual. This protocol establishes methods for screening the incoming waste stream for unacceptable and hazardous wastes.

The Hillsborough County Department of Solid Waste also employs a full-time tipping floor attendant to assist in screening efforts.

Attachment 1

UNACCEPTABLE WASTE SCREENING PROCEDURE

Unacceptable waste screening will be conducted on a random basis as necessary to ensure compliance with the Unacceptable Waste Program.

Prerequisites

1. Safety equipment including appropriate personnel protective gear (i.e., Scott Air Packs, respirators, protective clothing, gloves, boots, first aid kit, etc.), emergency fire fighting equipment, and clean up equipment will be stored near the tipping floor and be readily available. Appropriate materials (e.g., rope, pylons, etc.) needed to isolate any potentially dangerous waste will also be stored near by and be readily available.
2. The Facility Superintendent will assign a "trained" employee to serve as Inspector. He will conduct the screening and complete the necessary reports.
3. A front-end loader and operator will be standing by to help with the screening.

Types of Screening

- I. On-Board Screening (only done on open type vehicles)
 1. The Inspector shall select a vehicle for screening and upon entering the tipping floor inform the driver of this fact.
 2. The driver will be asked to fold back the screens or tarpaulin covering his load.
 3. The Inspector shall then position himself such as to obtain the maximum possible view of the load.
 4. If the load is observed to contain unacceptable materials, the Inspector will immediately notify the Facility Superintendent or other designated management representative who will inspect the load and determine if the hauler is to be turned away.
 5. If the load is acceptable, the driver will be told to discharge into the pit.

6. If unsure, the Inspector will direct the driver to a designated area of the tipping floor where floor screening will be conducted, as described below.
7. The Inspector will complete the Waste Screening Report that will be submitted to the Facility Superintendent for appropriate disposition. The driver will be asked to sign the report before leaving the facility.

II. Pit Screening

1. The Inspector shall select a vehicle for screening and inform the driver of this fact.
2. The Inspector shall position himself so as to obtain maximum view of the load as it is discharged into the pit.
3. If unacceptable waste is observed, the crane operator will be directed to remove it for proper disposal.
4. In cases where potentially dangerous materials are found and are considered to present a possible immediate threat (such as explosives or large quantities of infectious materials), no attempt will be made by facility personnel to move these materials. The material will be left in place and that portion of the tipping floor or tipping bay roped off. Personnel and traffic will be prevented from operating in that section of the plant. Danger signs and warnings will be posted. No attempt will be made to open suspect waste containers. OMSH will notify appropriate government agencies, including the local Fire and Rescue Department and/or Police Department, for dispatch to the facility.
5. The Inspector will complete the Waste Screening Report that will be submitted to the Facility Superintendent for appropriate disposition. The driver will be asked to sign the report before leaving the facility.

III. Floor Screening

1. The Inspector shall select a vehicle for screening and inform the driver of this fact.
2. The driver shall be directed to a designated area of the tipping floor where he will dump and spread his load, ensuring that the complete load is discharged. The front-end loader shall be utilized as necessary to spread the load uniformly to a minimal depth.
3. The driver will park his vehicle ensuring that he does not interfere with the existing traffic pattern or impede other haulers.

4. The Inspector will watch the unloading process and, if possible, stop the process if he observes unacceptable or potentially dangerous material.
5. If unacceptable waste is found, the Facility Superintendent or designated management representative is to be notified and the hauler may be required to remove it from the facility. A screening report and notice of infraction will be issued as appropriate.
6. The Inspector will complete the Waste Screening Report, which will be submitted to the Facility Superintendent for appropriate disposition. The driver will be asked to sign the report before leaving the facility.
7. After conclusion of screening, acceptable waste will be charged to the pit by the front-end loader and the hauler will leave the facility.
8. In cases where potentially dangerous materials are found and considered to present a possible immediate threat (such as explosives or large quantities of infectious materials), no attempt will be made by facility personnel to move these materials. The material will be left in place and that portion of the tipping floor or tipping bay roped off. Personnel and traffic will be prevented from operating in that section of the plant. Danger signs and warnings will be posted. No attempt will be made to open suspect waste containers. OMSH will notify appropriate government agencies, including the local Fire and Rescue Department and/or Police Department, for dispatch to the facility.

Attachment 2

HILLSBOROUGH COUNTY

Florida

Office of the County Administrator
Frederick B. Karl

Phyllis Busanick
Joe Chulura
Sylvia Klinebell
Lynda Miller
Jim Norman
Jeri Platt
Ed Turanchuk



Senior Assistant County Administrator
Patricia Beers

Assistant County Administrators
Edwin Hunter
Crista Johnson (Interim Administrator)
Joune Keel
Robert Taylor (Interim Administrator)

March 16, 1994

RECEIVED

MAR 21 1994

DREW LEHMAN

Mr. Carl J. Heintz, Hydrogeologist
Environmental Protection Commission
Waste Management Division
1900 - 9th Avenue
Tampa, Florida 33605

RE: Ash Residue Management - Hillsborough County Waste-to-Energy Facility
EPC Complaint # 35868

Dear Mr. Heintz:

The Department of Solid Waste (DSW) is in receipt of your March 3, 1994 letter (received by DSW 3/10/94) requesting a plan addendum to the December 21, 1993 DSW proposal for additional ash residue management. First, the DSW is disappointed that the Environmental Protection Commission (EPC) did not deem it necessary to respond to the DSW's February 9, 1994 request for clarification and/or additional information relative to the ash residue issue (letter attached).

Below, each of the EPC comments contained in your January 27, 1994 letter are restated in bold and are followed by the DSW response.

1. The EPC requests the immediate removal of visible ash residue that has been tracked into the environment. This includes, but is not limited to, ash residue that has been deposited along the edges of the roadway. The EPC agrees with Ogden Martin Systems of Hillsborough, Inc.'s proposal to install curbing on both sides of the ash residue storage building's exit roadway.

The visible ash residue along the edges of the roadway outside of the ash residue storage building has been removed. Installation of curbing on both sides of the ash residue storage building's exit roadway will commence as soon as the plan is approved by EPC.

2. Please specifically address how your agency intends "to improve ash truck loading procedures to reduce spillage on the Ash Building floor."

The residue ash is placed in transport vehicles by a front-end loader. The loader operator has been advised of the problems associated with the spillage and has been instructed to be more prudent and observant in his loading techniques.

3. Please provide the approximate hour of the day when the "daily cleaning of the Ash Building" will be performed. What specific procedures will the daily cleaning of the ash residue storage building entail? What procedures will be taken during the daily cleaning ritual to keep any ash residue from being emitted to the environment?

Daily cleaning of the ash residue storage building will entail the removal of ash from that portion of the building traversed by ash transport vehicles. At a minimum, the cleaning will be performed at the end of each working day by a vacuum-type mechanical sweeper or by the front-end loader bucket blade. Any ash residue that may escape from the building during the daily cleaning process will be vacuumed and redeposited into the ash residue storage building.

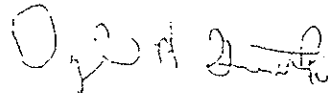
4. Your agency proposes to "increase general housekeeping activities (street sweeping, etc.) in the area of the Ash Building from three (3) days to six (6) days per week." The EPC requests that the general housekeeping activities be performed during every day of the facility's out loading operations. Please provide the approximate hour of the day that the daily "general housekeeping activities" will be performed. Street sweeping might exacerbate ash residue dispersal to the environment. What specific measures will be taken to control further ash residue dispersal to the environment during the daily street sweeping activities?

The proposed increase in general housekeeping activities from three (3) days to six (6) days per week will cover all days when ash residue is transported from the facility. This daily activity will occur during the later part of the day after ash residue transport activities have ceased. That is not to say, however, that this activity will not occur on a more frequent or as-needed basis. With regard to the potential exacerbation of ash residue dispersal to the environment by the street sweeping, the street sweeper utilized is a vacuum-type which collects the ash residue into a self-contained bin. In addition, the curbing proposed in Item 1 should prevent the ash residue from leaving the roadway. For aesthetic reasons, the white rock in the road shoulder of the Ash Residue Building exit road is routinely removed and disposed of at the County's landfill as part of normal facility clean-up procedures. This activity will continue on an as-needed basis and will address any ash residue that may leave the roadway. Based upon all correspondence and discussions to date, it is our understanding that the environment, as it relates to this issue, is the roadway and the roadway edges.

Carl J. Heintz
March 16, 1994
Page Three

Please advise should you have any questions concerning the responses or wish to discuss this matter further. You may contact me at 276-2900 or Thomas Smith at 276-2909.

Sincerely,



Daryl H. Smith, Director
Department of Solid Waste

DHS/lgs

Attachment

cc:

Thomas G. Smith, DSW
Susan Allan, County Attorney's Office
John Burbridge, OMSH
Allison Amram, FDEP Southwest District
Hooshang Boostani, EPC
Paul Schipfer, EPC
Ron Cope, EPC

Attachment 3



INTEROFFICE
CORRESPONDENCE

To: Glenn Hoag, Facility Manager

From: Rebecca Macionski, Environmental Engineer *RM*

Date: December 18, 2002

Subject: Ash Management Plan Revisions

Attached please find the latest version to the Hillsborough County Resource Recovery Facility's Ash Management Plan in accordance with 62-702.400 F. A. C. Please keep all memorandum notifying you of these periodic updates within Attachment 3 of the enclosed document.

If you have any further comments upon the Ash Management Plan, please feel free to contact me.

Cc: J. Howard
Shift Supervisor(s)
File



INTEROFFICE
CORRESPONDENCE

To: Glenn Hoag, Facility Manager

From: Rebecca Macionski, Environmental Engineer

A handwritten signature in black ink, appearing to be "RM" or "Rebecca Macionski" in a stylized script.

Date: March 14, 2001

Subject: Ash Management Plan Revisions

Attached please find the latest version to the Hillsborough County Resource Recovery Facility's Ash Management Plan in accordance with 62-702.400 F. A. C. Please keep all memorandum notifying you of these periodic updates within Attachment 3 of the enclosed document.

If you have any further comments upon the Ash Management Plan, please feel free to contact me.

Cc: J. Howard
Shift Supervisor(s)
File



INTEROFFICE
CORRESPONDENCE

To: John Burbridge
From: Becky Bigari 
Date: September 1, 1998
Subject: Revision to the facility's Ash Management Plan

The Hillsborough County Resource Recovery Facility's ash management plan is reviewed and updated in accordance with 62-702.400 F.A.C. The facility's combustion ash is properly disposed of at the Southeast County - Class I Landfill which operates in accordance with permit number S029-256427.

Include the enclosed copy of the Southeast County Landfill's operating permit as Attachment 4 to the HC-RRF ash management plan. Please keep all memorandum notifying you of these periodic updates within Attachment 3 of the ash management plan.

If you have any further question or comments, please feel free to contact me.

cc: R. Kilgore
Shift Supervisor(s)
File



INTEROFFICE
CORRESPONDENCE

To: John Burbridge
From: Becky Bigari *BB*
Date: July 24, 1998
Subject: Revision to the facility's Ash Management Plan

Attached is the latest revision to Hillsborough County Resource Recovery Facility's Ash Management Plan in accordance with 62-702.400 F.A.C. Please keep all memorandum notifying you of these periodic updates within Attachment 3 of the enclosed document.

If you have any comments upon the Ash Management Plan, please feel free to contact me.

cc: R. Kilgore
Shift Supervisors;
File

OGDEN

Ogden Martin Systems of Hillsborough, Inc.
350 N. Falkenberg Road
Tampa, FL 33619
Tel: 813 684 5688
Fax: 813 684 7964

August 11, 1997

Ms. Allison Amram
Solid Waste Section
Florida Department of Environmental Protection
3804 Coconut Palm Drive
Tampa, Florida 33619

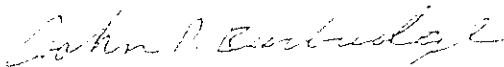
SUBJECT: Hillsborough County Resource Recovery Facility
Ash Residue Management Plan

Dear Ms. Amram,

The Hillsborough County Resource Recovery Facility is attaching a copy of the latest version of the facility's ash residue management plan per the requirements of Chapter 62-702 F.A.C. which regulates ash management practices.

If you have any further questions regarding this matter, please contact me at 684-5688.

Sincerely,



John Burbridge
Facility Manager

cc: T. Smith (HC-SWMD)
S. Woodard (HC-EPC)
B. Bigari (OMSH)
File

asnoiam llr



Ogden Martin Systems of Hillsborough, Inc.
350 N. Falkenberg Road
Tampa, FL 33619
Tel: 813 684 5688
Fax: 813 684 7964

August 11, 1997

Ms. Allison Amram
Solid Waste Section
Florida Department of Environmental Protection
3804 Coconut Palm Drive
Tampa, Florida 33619

SUBJECT: Hillsborough County Resource Recovery Facility
Ash Residue Management Plan

Dear Ms. Amram,

The Hillsborough County Resource Recovery Facility is attaching a copy of the latest version of the facility's ash residue management plan per the requirements of Chapter 62-702 F.A.C. which regulates ash management practices.

If you have any further questions regarding this matter, please contact me at 684-5688.

Sincerely,

A handwritten signature in cursive script, appearing to read "John P. Burridge".

John Burridge
Facility Manager

cc: T. Smith (HC-SWMD)
S. Woodard (HC-EPC)
B. Bigari (CMSH)
File

asmmam ltr

Appendix 12

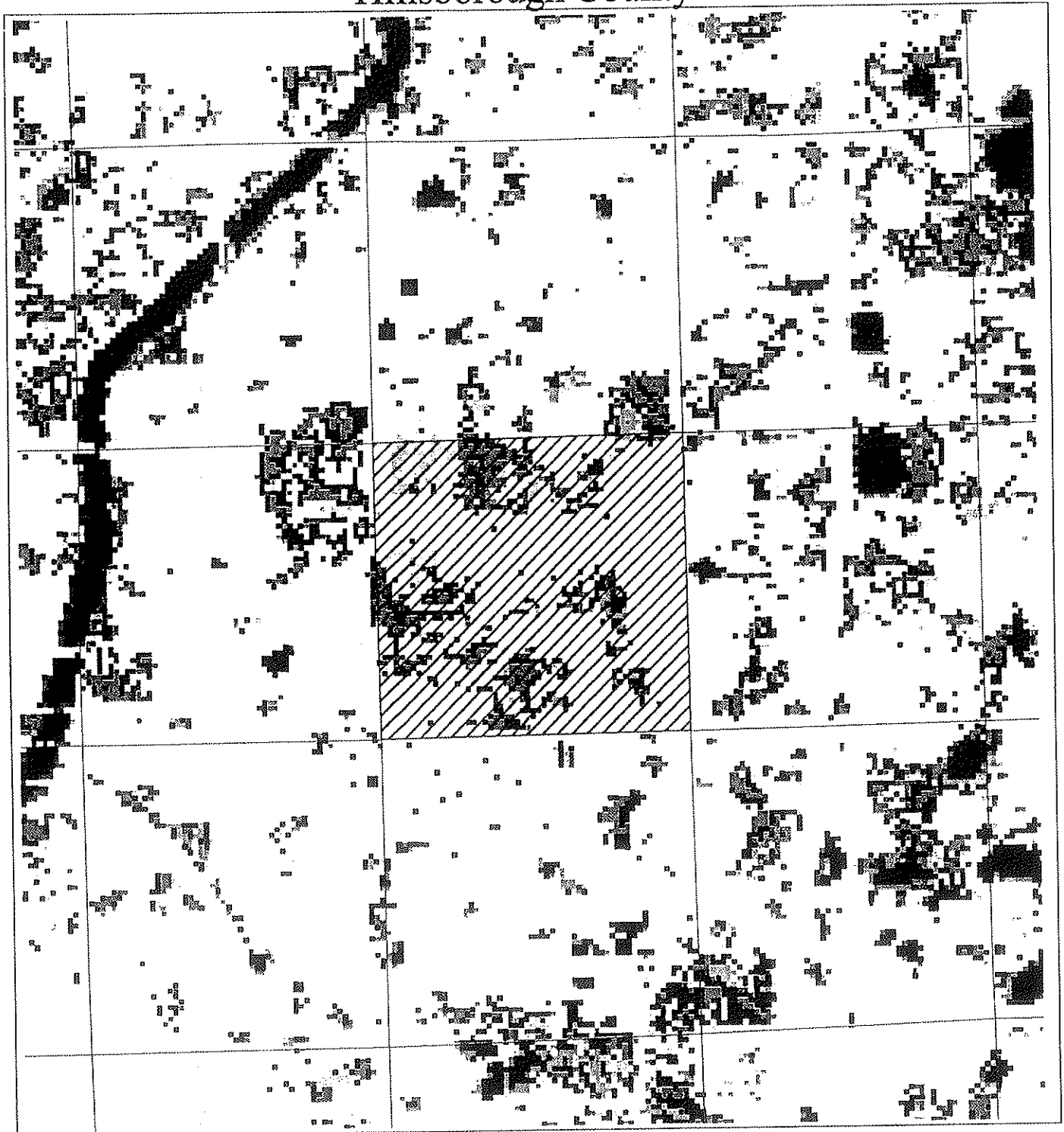
Other Supplemental Information

Appendix 12-1

Ecology

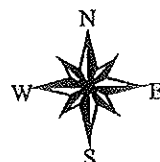
29s20e18 Hillsborough County

Land Cover



Legend

Coastal Strand	Mixed Wetland Forest
Sand/Beach	Hardwood Swamp
Xeric Oak Scrub	Hydric Hammock
Sand Pine Scrub	Bottomland Hardwood Forest
Sandhill	Salt Marsh
Dry Prairie	Mangrove Swamp
Mixed Hardwood-Pine Forest	Scrub Mangrove
Hardwood Hammocks and Forests	Tidal Flats
Pinelands	Open Water
Cabbage Palm-Live Oak Hammock	Shrub and Brushland
Tropical Hardwood Hammock	Bare Soil/Clearcut
Freshwater Marsh and Wet Prairie	Improved Pasture
Sawgrass Marsh	Unimproved Pasture
Cellulose Marsh	Citrus
Shrub Swamp	Agriculture/Grassland
Bay Swamp	Exotic Plants
Cypress Swamp	Urban
Cypress/Pine/Cabbage Palm	Extractive



September 29, 2004



1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
fax 850-681-9364
www.fnai.org

October 1, 2004

Brad Rosenblatt
Burcaw and Associates, Inc.
6402 W. Linebaugh Avenue, Suite A
Tampa, FL 33625

Dear Mr. Rosenblatt:

Thank you for your request for information from the Florida Natural Areas Inventory (FNAI). We have compiled the following information for your project area.

Project: Hillsborough County Waste Recovery Facility
Date Received: September 28, 2004
Location: Township 29 S, Range 20 E, Section 18
Hillsborough County

Element Occurrences

A search of our maps and database indicates that currently we have several Element Occurrences mapped within the vicinity of the study area (see enclosed map and table). Please be advised that a lack of element occurrences in the FNAI database is not a sufficient indication of the absence of rare or endangered species on a site.

The Element Occurrences data layer includes occurrences of rare species and natural communities. The map legend indicates the precision of the element occurrence location, defined as second (within about 300 feet of the point), minute (within about one mile), or general (within about 5 miles). For animals and plants, Element Occurrences generally refer to more than a casual sighting; they usually indicate a viable population of the species. Note that some element occurrences represent historically documented observations that may no longer be extant.

Potential Natural Areas

Portions of the site appear to be located on or near Potential Natural Areas (PNA). These PNA are priority 5 and may include the following community types: scrub, xeric hammock, scrubby flatwoods, mesic flatwoods or depression swamp.

Potential Natural Areas are lands that appear to be relatively intact areas of natural vegetation based on aerial photography, as determined by FNAI scientists. Please see the enclosed explanation sheet for more information. PNAs are not a regulatory designation; they are intended for conservation planning purposes. The maps show a revised version of the PNAs, based on 1995 land use land cover data from the water management districts.



Florida Resources
and Environmental
Analysis Center

Institute of Science
and Public Affairs

The Florida State University

Tracking Florida's Biodiversity

Potential Habitat for Rare Species

Portions of the site appear to be located on or near Potential Habitat for Rare Species. This potential habitat is associated with a known occurrence in the vicinity of: wood stork (*Mycteria americana*), Florida sandhill crane (*Grus canadensis pratensis*), manatee (*Trichechus manatus*), bald eagle (*Haliaeetus leucocephalus*) and eastern indigo snake (*Drymarchon couperi*).

FNAI Potential Habitat for Rare Species indicates areas, which based on landcover type, offer suitable habitat for one or more rare species that is known to occur in the vicinity. Potential habitat layers have been developed for approximately 250 of the most rare species tracked by the Inventory, including all federally listed species.

Potential Habitat is not a regulatory designation, and should not be confused with "critical habitat", which is an official designation made by the U.S. Fish and Wildlife Service. Information on critical habitats can be found in the Code of Federal Regulations, 50 CFR 17.95, which lists all critical habitats that have been designated. The Code of Federal Regulations can be accessed through the following website: "www.access.gpo.gov/nara/cfr/cfr-table-search.html".

The Inventory always recommends that a site-specific survey be conducted to determine the current presence or absence of rare, threatened, or endangered species. Surveys should be conducted by persons familiar with Florida's flora and fauna. For your convenience, a summary of the elements documented or reported for Hillsborough County is enclosed. For more information about the rare plants and animals that may be found in the region around your project site, please visit our searchable tracking list at: www.fnai.org/data.cfm

The database maintained by the Florida Natural Areas Inventory is the single most comprehensive source of information available on the locations of rare species and other significant ecological resources. However, the data are not always based on comprehensive or site-specific field surveys. Therefore, this information should not be regarded as a final statement on the biological resources of the site being considered, nor should it be substituted for on-site surveys. Inventory data are designed for the purposes of conservation planning and scientific research, and are not intended for use as the primary criteria for regulatory decisions.

Information provided by this database may not be published without prior written notification to the Florida Natural Areas Inventory, and the Inventory must be credited as an information source in these publications. FNAI data may not be resold for profit.

Thank you for your use of FNAI services. An invoice will be mailed to your accounts payable department. If I can be of further assistance, please give me a call at (850) 224-8207.

Sincerely,

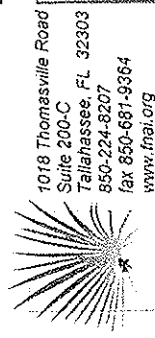
Edwin A. Abbey

Edwin A. Abbey
Environmental Reviewer

encl

Hillsborough County

Township 29 S, Range 20 E, Section 18



Element Occurrences

- Precision:
second minute general
- Animals
 - Plants
 - Communities
 - Other

- U.S. Fish & Wildlife Service
Scrub Jay Survey 1992-96
- FL Fish & Wildlife Cons. Comm.
Breeding Bird Atlas Project 1986-91
center point of 10 sq mi survey block

Conservation Lands

- Federal
- State
- Local
- Private
- State Aquatic Preserves

Land Acquisition Projects

- Florida Forever
- Board of Trustees Projects

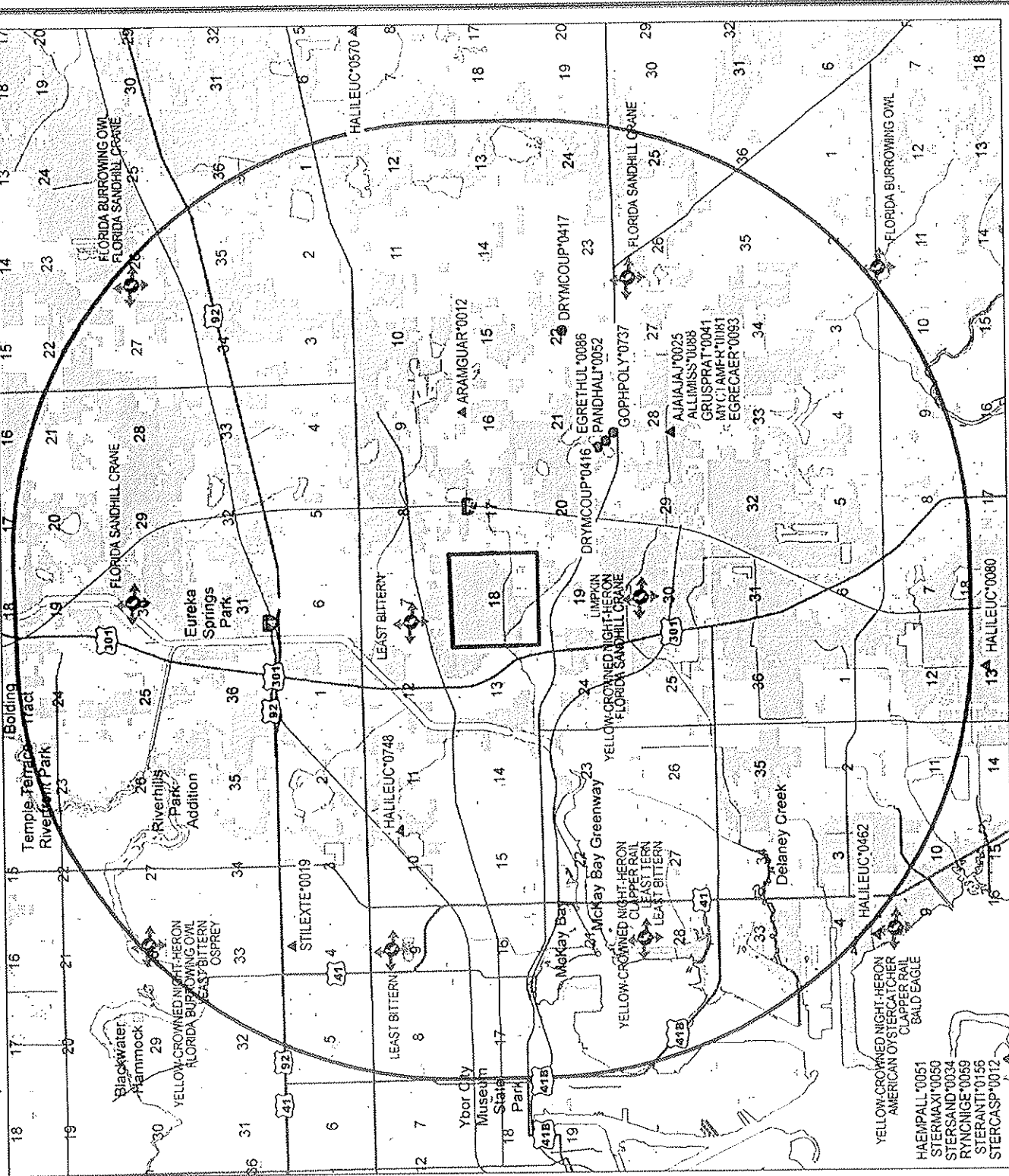
Non-Managed Natural Areas

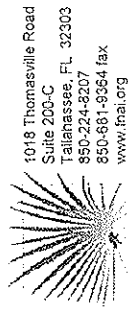
- FNAI Potential Habitat
for Rare Species
- FNAI Potential
Natural Areas

County Boundary

- Interstate
- Turnpike
- Major Highway
- Local Road
- Water

Map produced
by EAA
Data Source: 06/2004
NOTE:
Map should not be interpreted without
accompanying documents.





FLORIDA
Natural Areas
INVENTORY

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
950-224-8207
850-681-9354 fax
www.fnai.org

Florida Natural Areas Inventory

ELEMENT OCCURRENCES MAPPED WITHIN 5 MILES OF
PROJECT SITE



Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing	Observation Date	Description	EO Comments
DRYMCUP*0416	Drymarchon couperi	Eastern Indigo Snake	G3	S3	N	LT	1987	No general description given	1 INDIVIDUAL OBSERVED. NEST AT FOOT OF HALF FALLEN LIVE OAK NEAR LAKE SHORE. 1 SNAKE OBSERVED.
DRYMCUP*0417	Drymarchon couperi	Eastern Indigo Snake	G3	S3	N	LT	1991	SHALLOW LAKE AND WETLAND AREA.	ADULTS AND YOUNG OBSERVED. INDIVIDUALS HAVE BEEN KILLED ON SR-60. +/- 90 ANIMALS FORAGING OVER 3 LAKES.
GRUSPAT*0041	Grus canadensis pratensis	Florida Sandhill Crane	G5T2T3	S2S3	N	LT	1991-06	No general description given	3 INDIVIDUALS (2 ADULTS, 1 CHICK) OBSERVED FEEDING.
EGRECAER*0093	Egretta caerulea	Little Blue Heron	G5	S4	N	LS	1991-06	No general description given	4 TO 22+ BIRDS ROOST IN WILLOWS AT EDGE OF POND IN WINTER MONTHS (8 MONTHS +/-). NEST; 1991: PRODUCED 2 YOUNG; 1990; PRODUCTIVITY UNKNOWN.
ARAMGUAR*0012	Aramus guarana	Limpkin	G5	S3	N	LS	1990-07	AREA OF KARST DEPRESSIONS.	+/- 6 BURROWS OBSERVED. EST. 2-10 INDIVIDUALS. FEEDING AND NESTING OBSERVED. OBSERVED ON SITE SINCE THE 1940'S.
EGRETHUL*0086	Egretta thula	Snowy Egret	G5	S3	N	LS	1991-07	WETLAND LAKE SHORE.	1-6 INDIVIDUALS OBSERVED, VARYING WITH YEAR.
HALILEUC*0748	Haliaeetus leucocephalus	Bald Eagle	G4	S3	LT	LT	1991	No general description given	SPECIMEN COLLECTED CA 1600 HR, 1971-11-07.
GOPHPOLY*0737	Gopherus polyphemus	Gopher Tortoise	G3	S3	N	LS	1991-08	SCRUBBY OAK COMMUNITY GRADING TO MESIC FLATWOODS.	2 BIRDS OBSERVED FEEDING IN AREA FROM 1989-1991.
AJAJAJAJ*0025	Aiaia ajaja	Roseate Spoonbill	G5	S2	N	LS	1991	No general description given	ADULTS AND YOUNG OBSERVED.
STILEXTE*0019	Stilosoma extenuatum	Short-tailed Snake	G3	S3	N	LT	1971-11-07	No general description given	1-50+ INDIVIDUALS DEPENDING ON THE YEAR.
PANDHAL*0052	Pandion haliaetus	Osprey	G5	S3S4	N	LS*	1991-07	LAKE AND MESIC HAMMOCK.	
ALLIMISS*0088	Alligator mississippiensis	American Alligator	G5	S4	T(S/A)	LS	1991-06	No general description given	
MYCTAMER*0081	Mycteria americana	Wood Stork	G4	S2	LE	LE	1991-06	No general description given	

Florida Natural Areas Inventory Potential Natural Areas (PNA) Data Layer

POTENTIAL NATURAL AREAS (PNA)

The Potential Natural Areas data layer indicates, throughout the State of Florida, lands that are in private ownership and are not managed or listed for conservation purposes that are possible examples of good quality natural communities. These areas were determined from FNAI's scientific staff vegetative interpretation of 1988-1993 FDOT aerial photographs and from input received during Regional Ecological Workshops held for each regional planning council. These workshops were attended by experts familiar with natural areas in the region. Element occurrences in the FNAI database may or may not be present on these sites. In order to be classified as a Potential Natural Area (with the exception of internal rank PNA-5) the natural communities identified through aerial photographs must meet the following criteria:

1. Must be a minimum of 500 acres. *Exceptions:* sandhill, min. 320 acres; scrub, min. 80 acres; pine rockland, min. 20 acres; dry prairie, min. 320 acres; *or* any example of coastal rock barren, upland glade, coastal dune lake, spring-run stream or terrestrial cave.
2. Must contain at least one of the following:
 - a. One or more high quality examples of FNAI state ranked S3 or above natural communities.
 - b. An outstanding example of any FNAI tracked natural community.

Potential Natural Areas have been assigned ranks of PNA-1 through PNA-4 mostly based on size and perceived quality and type of natural community present. The areas included in internal rank PNA-5 (former ACI Category C) are exceptions to the above criteria. These areas were identified through the same process of aerial photographic interpretation and regional workshops as the PNA 1 through 4 ranked sites, but do not meet the standard criteria. These PNA 5 areas are considered lower priority for conservation than areas ranked PNA 1- 4, but nonetheless are believed to be ecologically viable tracts of land representative of Florida's natural ecosystems.



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FLORIDA NATURAL AREAS INVENTORY

Florida Scrub-Jay Survey and Breeding Bird Atlas Data Layers

In addition to our element occurrence database of rare species and natural community locations, the Inventory has additional data layers that have been provided by state and federal agencies.

Florida Scrub-Jay Survey - U.S. Fish and Wildlife Service

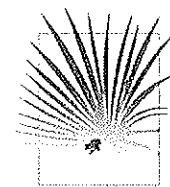
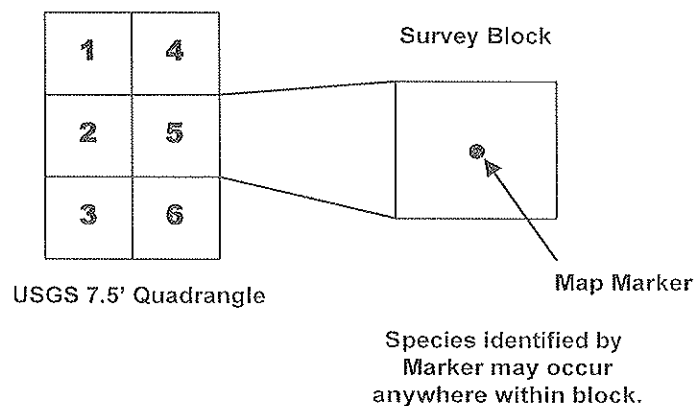
This survey was conducted by staff and associates of the Archbold Biological Station from 1992 to 1996. An attempt was made to record all scrub-jay (*Aphelocoma coerulescens*) groups, although most federal lands were not officially surveyed.

Each map point represents one or more groups.

Florida Breeding Bird Atlas Project - Florida Game and Fresh Water Fish Commission (now Florida Fish and Wildlife Conservation Commission)

This study was conducted from 1986 to 1991, (final report, *An Atlas of Florida's Breeding Birds* by Kale, Pranty, Stith, and Biggs, Nongame Wildlife Program, Florida Game and Fresh Water Fish Commission). The study divided the state into "blocks", with each block representing one-sixth of a U.S. Geological Survey 7.5 minute topographic quadrangle map. Several categories of breeding activity were recorded by observers.

Each map point is located at the center of a block, and represents species listed as Possible or Probable Breeders within the surrounding block (approximately 10 square miles in area).



FLORIDA
Natural Areas
INVENTORY

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
fax 850-681-9364
www.fnai.org



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Tracking Florida's Biodiversity



FLORIDA NATURAL AREAS INVENTORY
1018 Thomasville Road, Suite 200-C
Tallahassee, FL 32303
(850) 224-8207, FAX (850) 681-9364



October 2004

Hillsborough County Summary

Page 1

Rare Species and Natural Communities Documented or Reported

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
<u>FISH</u>					
<i>Microphis brachyurus</i>	Opossum Pipefish	G4G5	S2	PS:C	N
<u>AMPHIBIANS</u>					
<i>Rana capito</i>	Gopher Frog	G3	S3	N	LS
<u>REPTILES</u>					
<i>Alligator mississippiensis</i>	American Alligator	G5	S4		LS
<i>Caretta caretta</i>	Loggerhead	G3	S3	LT	LT
<i>Chelonia mydas</i>	Green Turtle	G3	S2	LE, LT	LE
<i>Crocodylus acutus</i>	American Crocodile	G2	S1	LE	LE
<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake	G4	S3	N	N
<i>Dermochelys coriacea</i>	Leatherback	G2	S2	LE	LE
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S3	LT	LT
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	N	LS
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2	N	N
<i>Lepidochelys kempii</i>	Kemp's Ridley	G1	S1	LE	LE
<i>Pituophis melanoleucus mugitus</i>	Florida Pine Snake	G4T3?	S3	N	LS
<i>Pseudemys concinna suwanneensis</i>	Suwannee Cooter	G5T3	S3	N	LS
<i>Stilosoma extenuatum</i>	Short-tailed Snake	G3	S3	N	LT
<u>BIRDS</u>					
<i>Accipiter cooperii</i>	Cooper's Hawk	G5	S3	N	N
<i>Aimophila aestivialis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Ajaia ajaja</i>	Roseate Spoonbill	G5	S2	N	LS
<i>Aphelocoma coerulescens</i>	Florida Scrub-jay	G3	S2	LT	LT
<i>Aramus guarania</i>	Limpkin	G5	S3	N	LS
<i>Ardea alba</i>	Great Egret	G5	S4	N	N
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	LS
<i>Buteo brachyurus</i>	Short-tailed Hawk	G4G5	S1	N	N
<i>Charadrius alexandrinus</i>	Snowy Plover	G4	S1	N	LT
<i>Charadrius melodus</i>	Piping Plover	G3	S2	LE, LT	LT
<i>Dendroica discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Egretta caerulea</i>	Little Blue Heron	G5	S4	N	LS
<i>Egretta rufescens</i>	Reddish Egret	G4	S2	N	LS
<i>Egretta thula</i>	Snowy Egret	G5	S3	N	LS
<i>Egretta tricolor</i>	Tricolored Heron	G5	S4	N	LS
<i>Elanoides forficatus</i>	Swallow-tailed Kite	G5	S2	N	N
<i>Eudocimus albus</i>	White Ibis	G5	S4	N	LS
<i>Falco columbarius</i>	Merlin	G5	S2	N	N
<i>Falco peregrinus</i>	Peregrine Falcon	G4	S2	N	LE
<i>Falco sparverius paulus</i>	Southeastern American Kestrel	G5T4	S3	N	LT
<i>Fregata magnificens</i>	Magnificent Frigatebird	G5	S1	N	N
<i>Grus canadensis pratensis</i>	Florida Sandhill Crane	G5T2T3	S2S3	N	LT
<i>Haematopus palliatus</i>	American Oystercatcher	G5	S2	N	LS
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S3	N	LT
<i>Ixobrychus exilis</i>	Least Bittern	G5	S4	N	N
<i>Laterallus jamaicensis</i>	Black Rail	G4	S2	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	N	LE
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	G5	S3	N	N
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	G5	S3	N	N
<i>Pandion haliaetus</i>	Osprey	G5	S3S4	N	LS*
<i>Pelecanus occidentalis</i>	Brown Pelican	G4	S3	N	LS

Rare Species and Natural Communities Documented or Reported

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
<u>BIRDS</u>					
<i>Picoides villosus</i>	Hairy Woodpecker	G5	S3	N	N
<i>Plegadis falcinellus</i>	Glossy Ibis	G5	S3	N	N
<i>Rallus longirostris scottii</i>	Florida Clapper Rail	G5T3?	S3?	N	N
<i>Recurvirostra americana</i>	American Avocet	G5	S2	N	N
<i>Rynchops niger</i>	Black Skimmer	G5	S3	N	LS
<i>Sterna antillarum</i>	Least Tern	G4	S3	N	LT
<i>Sterna caspia</i>	Caspian Tern	G5	S2	N	N
<i>Sterna maxima</i>	Royal Tern	G5	S3	N	N
<i>Sterna sandvicensis</i>	Sandwich Tern	G5	S2	N	N
<i>Vireo altiloquus</i>	Black-whiskered Vireo	G5	S3	N	N
<u>MAMMALS</u>					
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	G3G4	S2	N	N
<i>Eptesicus fuscus</i>	Big Brown Bat	G5	S3	N	N
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3	S3	N	N
<i>Neofiber alleni</i>	Round-tailed Muskrat	G3	S3	N	N
<i>Podomys floridanus</i>	Florida Mouse	G3	S3	N	LS
<i>Sciurus niger shermani</i>	Sherman's Fox Squirrel	G5T3	S3	N	LS
<i>Trichechus manatus</i>	Manatee	G2	S2	LE	LE
<u>INVERTEBRATES</u>					
<i>Utterbackia peninsularis</i>	Peninsular Floater	G3	S2	N	N
<u>PLANTS</u>					
<i>Andropogon arctatus</i>	Pine-woods Bluestem	G3	S3	N	LT
<i>Asplenium erosum</i>	Auricled Spleenwort	G5	S2	N	LE
<i>Bonania grandiflora</i>	Florida Bonamia	G3	S3	LT	LE
<i>Carex chapmanii</i>	Chapman's Sedge	G3	S3	N	LE
<i>Centrosema arenicola</i>	Sand Butterfly Pea	G2Q	S2	N	LE
<i>Chrysopsis floridana</i>	Florida Golden Aster	G1	S1	LE	LE
<i>Glandularia tampensis</i>	Tampa Vervain	G2	S2	N	LE
<i>Gymnopogon chapmanianus</i>	Chapman's Skeletongrass	G3	S3	N	N
<i>Helianthus debilis ssp. vestitus</i>	Hairy Beach Sunflower	G5T2	S2	N	N
<i>Lechea cernua</i>	Nodding Pinweed	G3	S3	N	LT
<i>Ophioglossum palmatum</i>	Hand Fern	G4	S2	N	LE
<i>Pteroglossaspis ecrinata</i>	Giant Orchid	G2	S2	N	LT
<i>Rhynchospora harveyi var. culixa</i>	Georgia Beakrush	G1Q	S1	N	N
<i>Thelypteris serrata</i>	Toothed Maiden Fern	G5	S1	N	LE
<i>Triphora amazonica</i>	Broad-leaved Nodding-caps	G1?Q	S1	N	LE
<u>NATURAL COMMUNITIES</u>					
Beach dune		G3	S2	N	N
Coastal grassland		G3	S2	N	N
Estuarine composite substrate		G3	S3	N	N
Estuarine consolidated substrate		G3	S3	N	N
Estuarine tidal marsh		G5	S4	N	N
Estuarine tidal swamp		G5	S4	N	N
Estuarine unconsolidated substrate		G5	S5	N	N
Hydric hammock		G4	S4	N	N
Marine grass bed		G3	S2	N	N
Marine mollusk reef		G3	S3	N	N
Marine tidal swamp		G5	S4	N	N
Maritime hammock		G3	S2	N	N
Sandhill		G3	S2	N	N
Scrub		G2	S2	N	N
<u>OTHER ELEMENTS</u>					
Bird rookery		GNR	SNR	N	N
Geological feature		GNR	SNR	N	N
Manatee aggregation site		GNR	SNR	N	N

October 2004

Hillsborough County Summary

Page 3

Rare Species and Natural Communities Documented or Reported

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
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Total count:

Number of tracked elements: 96

Number of distinct occurrences: 318



GLOBAL AND STATE RANKS

Florida Natural Areas Inventory (FNAI) defines an **element** as any rare or exemplary component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature. FNAI assigns two ranks to each element found in Florida: the **global rank**, which is based on an element's worldwide status, and the **state rank**, which is based on the status of the element within Florida. Element ranks are based on many factors, including estimated number of occurrences, estimated abundance (for species and populations) or area (for natural communities), estimated number of adequately protected occurrences, range, threats, and ecological fragility.

GLOBAL RANK DEFINITIONS

- G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or human factor.
- G2 Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or human factor.
- G3 Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals), or found locally in a restricted range, or vulnerable to extinction from other factors.
- G4 Apparently secure globally (may be rare in parts of range).
- G5 Demonstrably secure globally.
- GH Occurred historically throughout its range, but has not been observed for many years.
- GX Believed to be extinct throughout range.
- GXC Extirpated from the wild but still known from captivity or cultivation.
- G#? Rank uncertain (e.g., G2?).
- G#G# Range of rank; insufficient data to assign specific global rank (e.g., G2G3)
- G#T# Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species, and the T portion refers to the subgroup; T# has same definition as G#.
- G#Q Ranked as species but there is some question as to whether it is a valid species.
- G#T#Q Same as above, but validity as subspecies or variety is questioned.
- GU Global rank unknown; due to lack of information, no rank or range can be assigned.
- G? Temporarily not ranked.

STATE RANK DEFINITIONS

State ranks (S#) follow the same system and have the same definitions as global ranks, except they apply only to Florida, with the following additions:

- SA Accidental in Florida and not part of the established biota.
- SE Exotic species established in Florida (may be native elsewhere in North America).
- SX Believed to be extirpated from state.



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FEDERAL AND STATE LEGAL STATUSES

Provided by FNAI for information only.

For official definitions and lists of protected species, consult the relevant state or federal agency.

FEDERAL LEGAL STATUS

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.

LE	Endangered: species in danger of extinction throughout all or a significant portion of its range.
LT	Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
E(S/A)	Endangered due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
T(S/A)	Threatened due to similarity of appearance (see above).
PE	Proposed for listing as Endangered species.
PT	Proposed for listing as Threatened species.
C	Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.
XN	Non-essential experimental population.
MC	Not currently listed, but of management concern to USFWS.
N	Not currently listed, nor currently being considered for listing as Endangered or Threatened.

FLORIDA LEGAL STATUSES

Animals: Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission, 1 August 1997, and subsequent updates.

LE	Endangered: species, subspecies, or isolated population so few or depleted in number or so restricted in range that it is in imminent danger of extinction.
LT	Threatened: species, subspecies, or isolated population facing a very high risk of extinction in the future.
LS	Species of Special Concern is a species, subspecies, or isolated population which is facing a moderate risk of extinction in the future.
PE	Proposed for listing as Endangered.
PT	Proposed for listing as Threatened.
PS	Proposed for listing as Species of Special Concern.
N	Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505.

LE	Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.
LT	Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.
PE	Proposed for listing as Endangered.
PT	Proposed for listing as Threatened.
N	Not currently listed, nor currently being considered for listing.

WOOD STORK

Mycteria americana

Order: Ciconiiformes

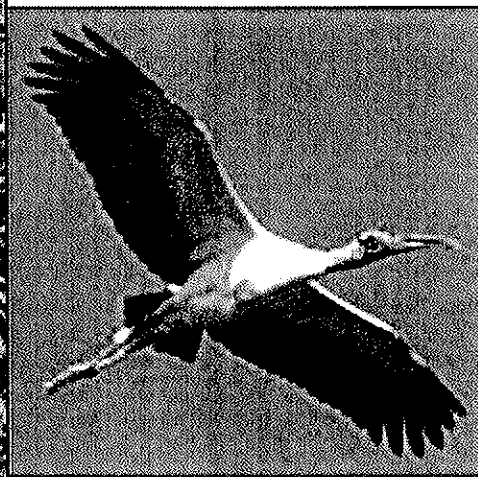
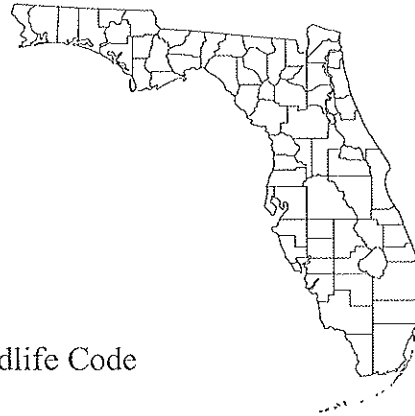
Family: Ciconiidae

FNAI Ranks: G4/S2

U.S. Status: Endangered

FL Status: Endangered

U.S. Migratory Bird Treaty Act and state Wildlife Code prohibit take of birds, nests, or eggs.



immatures
© Barry Mansell

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Description: Very large, white wader with black in wings and a short black tail. Soars with neck and legs extended, displaying its long, broad wings; black flight feathers contrast with white along length of wings. Legs are dark and feet are beige. Adults have bare, scaly, dark-gray heads and necks and long, heavy, decurved bills. Head and neck of immature storks have grayish brown feathering, and their bills are yellowish.

Similar Species: American white pelicans (*Pelecanus erythrorhynchos*) have a similar wing pattern and also soar but have short legs, white tail, and do not fly with necks extended. White ibis (*Eudocimus albus*; see species account) is much smaller and only has black on wing tips. Great egret (*Ardea alba*) lacks black on wings.

Habitat: Nests colonially in a variety of inundated forested wetlands, including cypress strands and domes, mixed hardwood swamps, sloughs,

WOOD STORK

Mycteria americana

and mangroves. Increasingly nesting in artificial habitats (e.g., impoundments and dredged areas with native or exotic vegetation) in north and central Florida. Forages mainly in shallow water in freshwater marshes, swamps, lagoons, ponds, tidal creeks, flooded pastures and ditches, where they are attracted to falling water levels that concentrate food sources (mainly fish).

Seasonal Occurrence: Post-breeding dispersal carries large numbers from more southern locales to more northern parts of range; in winter, northern birds move south. Annual and long-term use of nesting sites is very dependent on feeding conditions, which may be affected dramatically by altered hydrologic patterns. Colonies may form late November - early March in south Florida and February - March in central and northern Florida.

Florida Distribution: Locally rare to abundant in the peninsula and Big Bend, but generally rare or lacking in panhandle and the Florida Keys. Uncommon to rare in winter in north.

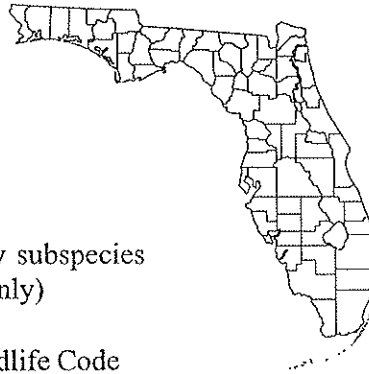
Range-wide Distribution: In U.S., breeds locally in South Carolina, Georgia, and Florida (formerly west to Texas). South, locally in lowlands from Mexico and northern Central America to South America (to western Ecuador, eastern Peru, Bolivia, northern Argentina), and rarely in Cuba and the Dominican Republic. Winters throughout breeding range except in South Carolina and Georgia.

Conservation Status: Many known breeding sites occur within public and private conservation lands. Dramatic decline in the large colonies (>500 individuals) formerly found in south Florida, and trend toward fewer birds distributed among smaller, more numerous colonies in central and northern Florida. Very sensitive to manipulation of water regimes and loss of wetland habitat, which affect both nesting sites and feeding areas.

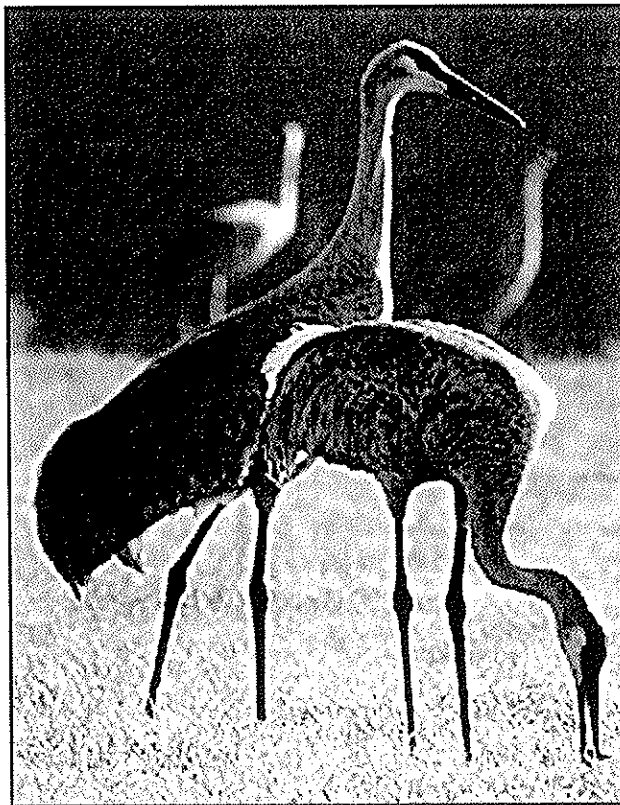
Protection and Management: Survey colony sites and important feeding areas regularly. Essential to protect wetland areas, closely monitor water quality, and manage hydrologic patterns that consider the needs of the wood stork.

Selected References: Poole and Gill (eds.) 1999, Robertson and Woolfenden 1992, Rodgers et al. (eds.) 1996, Runde et al. 1991, Stevenson and Anderson 1994.

FLORIDA SANDHILL CRANE
Grus canadensis pratensis



Order: Gruiformes
Family: Gruidae
FNAI Ranks: G5T2T3/S2S3
U.S. Status: Endangered (nonmigratory subspecies in Cuba and Mississippi only)
FL Status: Threatened
U.S. Migratory Bird Treaty Act and state Wildlife Code prohibit take of birds, nests, or eggs.



© Karla Brandt

Description: A tall, long-necked, long-legged bird with a clump of feathers that droops over the rump. Adult is gray overall, with a whitish chin, cheek, and upper throat, and dull red skin on the crown and lores (lacking in immatures); feathers may have brownish-red staining resulting from preening with muddy bill. Immature has pale to tawny feathers on head and neck and a gray body with brownish-red mottling. Flies with neck extended. Their distinctive rolling call can be heard from far away.

Similar Species: Indistinguishable from greater sandhill crane (*Grus canadensis tabida*), which winters in Florida. Greater sandhill crane generally arrives in Florida in October and leaves in March, so the date observed or definite evidence of reproduction may be used to differentiate the two. Great blue heron (*Ardea herodias*) is sometimes mistakenly

FLORIDA SANDHILL CRANE *Grus canadensis pratensis*

identified as a crane. This heron lacks the bald, red crown of the sandhill and flies with its neck tucked in, typical of herons and egrets. Whooping crane (*G. americana*) is white.

Habitat: Prairies, freshwater marshes, and pasture lands. Avoids forests and deep marshes but uses transition zones and edges between these and prairies or pasture lands. Will frequent agricultural areas like feed lots and crop fields, and also golf courses and other open lawns, especially in winter and early spring. Nest is a mound of herbaceous plant material in shallow water or on the ground in marshy areas. Favors wetlands dominated by pickerelweed and maidencane.

Seasonal Occurrence: Nonmigratory. Very sedentary, although may forage widely. Large influx of northern migratory subspecies in winter (October - March).

Florida Distribution: Most of peninsular Florida within appropriate habitat, though not as common south of Lake Okeechobee. Rarely reported west of Taylor County.

Range-wide Distribution: Florida range plus extreme southeastern Georgia (Okefenokee Swamp).

Conservation Status: Population estimate in 1975 of approximately 4,000 birds (25 percent are nonbreeding subadults) is still considered accurate. Habitat availability will become more and more of concern as Florida continues to lose open rangeland and native prairie to development and more intensive agricultural uses (e.g., citrus, row crops). Nesting success in human-altered areas is well below that of native areas. Shallow wetlands used by cranes are easily affected by drainage of adjacent uplands even if they are not directly disturbed. Florida sandhill cranes are found on federal and state lands and on local government lands (e.g., wellfields).

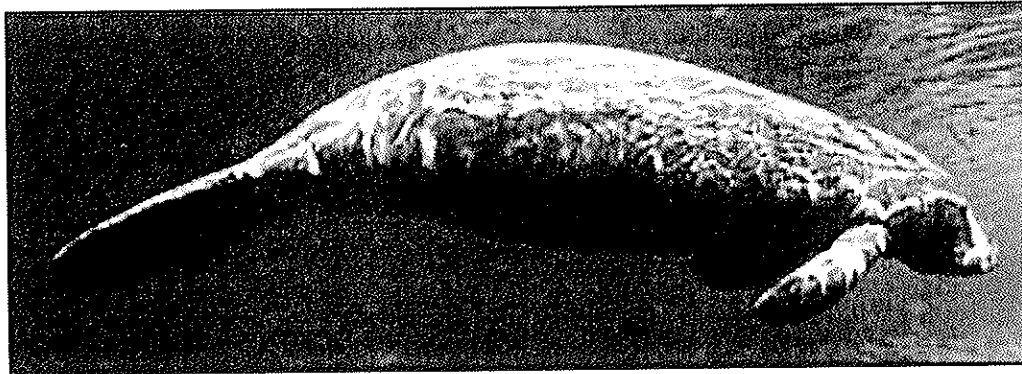
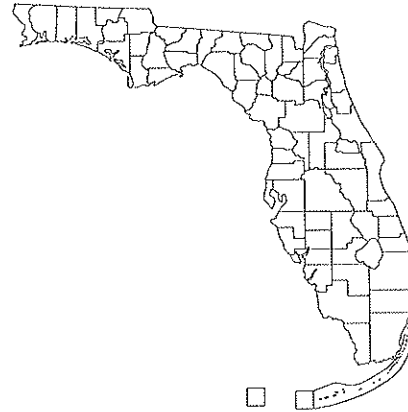
Protection and Management: Because of large home-range requirements, public lands do not protect large populations of cranes. Acquire land, through fee-simple acquisition and conservation easements on suitable ranchlands, in areas that bolster existing protected populations. Periodic fire important to retard invasion of woody vegetation in crane habitat. Filling drainage ditches to restore natural hydrological conditions important in some areas.

Selected References: Poole and Gill (eds.) 1992, Robertson and Woolfenden 1992, Rodgers et al. (eds.) 1996, Stevenson and Anderson 1994, Toland 1999a.

MANATEE

Trichechus manatus

Order: Sirenia
Family: Trichechidae
FNAI Ranks: G2/S2
U.S. Status: Endangered
FL Status: Endangered



© Brad Stith

Description: A large (182 - 400 lbs. = 400 - 900 kg), gray, nearly hairless, walrus-like aquatic mammal. Tail is broad, rounded, and flattened. Front limbs are flipper-like, with three nails; hind limbs are absent. Head is broad and undifferentiated from body. Upper lip deeply cleft and bearing stiff bristles. Eyes are small. No external ears.

Similar Species: Dolphins (Delphinidae) have dorsal fins and long, cylindrical snouts. Mermaids have long, flowing hair.

Habitat: Coastal waters, bays, rivers, and (occasionally) lakes. Requires warm-water refugia such as springs or cooling effluent during cold weather. Sheltered coves are important for feeding, resting, and calving.

Seasonal Occurrence: Wide-ranging during warm months; restricted to springs and other warm-water areas during the winter.

Florida Distribution: May be found in any coastal or estuarine waters, but most common in peninsular Florida.

Range-wide Distribution: During warm-water periods, coastal waters from Texas to North Carolina, but restricted to Florida during the winter.

MANATEE

Trichechus manatus

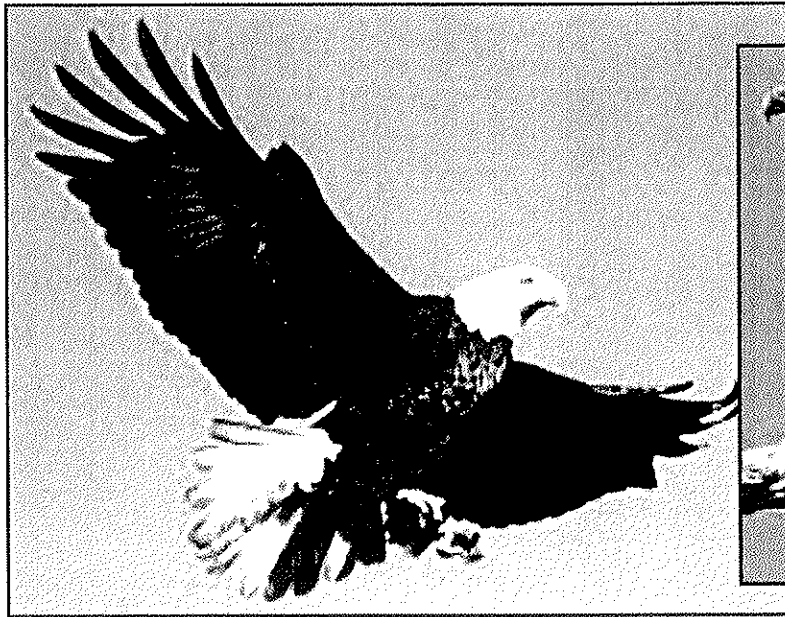
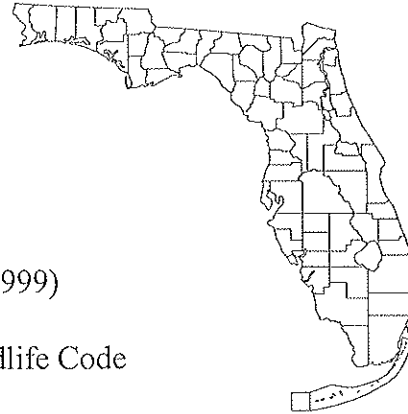
Conservation Status: There are no reliable population estimates because of the difficulty in censusing. Recent winter counts at aggregation areas have been in the vicinity of 2,000 individuals. Overall population may be stable, but is threatened by increased boat traffic and other accidents associated with expanding development in Florida. Sanctuaries have been established to protect some wintering and calving areas.

Protection and Management: Reduce boat traffic in waters that manatees use regularly. Provide sanctuaries to prevent accidental collisions and harassment. Implement the manatee protection plan developed by the USGS Caribbean Science Center's Sirenia Project.

Selected References: Brown 1997, Hall 1981, Humphrey (ed.) 1992, Whitaker 1996.

BALD EAGLE
Haliaeetus leucocephalus

Order: Falconiformes
Family: Accipitridae
FNAI Ranks: G4/S3
U.S. Status: Threatened
(proposed for delisting in 1999)
FL Status: Threatened
U.S. Migratory Bird Treaty Act and state Wildlife Code
prohibit take of birds, nests, or eggs.



© Tom Vezo



immature

© Barry Mansell

Description: Adult has white head, white tail, and large, bright yellow bill; other plumage is dark. Immatures dark with variable amounts of light splotching on body, wings, and tail; head and bill are dark. In flight wings are broad and wide and held horizontally, presenting a flat profile when soaring and gliding. Flies with slow, powerful wing-beats.

Similar Species: At a distance, in flight, eagle's size and lack of white in wings should help differentiate it from the crested caracara (*Caracara cheriway*; see species account), which also has a white head. Flattened aspect of the eagle's wings is unlike the teetering, V-shaped flight of the turkey vulture (*Cathartes aura*).

Habitat: Most commonly includes areas close to coastal areas, bays, rivers, lakes, or other bodies of water that provide concentrations of food sources, including fish, waterfowl, and wading birds. Usually nests in tall trees (mostly live pines) that provide clear views of surrounding area. In Florida Bay, where there are few predators and few tall emergent trees, eagles nest in crowns of mangroves and even on the ground.

BALD EAGLE

Haliaeetus leucocephalus

Seasonal Occurrence: In extreme southern Florida, most adults are resident, but most birds in northern and central Florida migrate north out of state after breeding season (late May - July). Juveniles and younger birds mostly migrate north in summer and may range as far as Canada. Also, in winter, some birds from northern populations migrate to northern Florida.

Florida Distribution: Florida has largest breeding population of any state outside Alaska. Breeds throughout most of peninsular Florida and Keys, mainly along coast in eastern panhandle, and is rare in western panhandle. Greatest concentrations of nesting eagles occur around Lake Kissimmee in Polk and Osceola counties, around Lake George in Putnam, Volusia, and Lake counties, lakes Jessup, Monroe, and Harney in Seminole and Volusia counties, along Gulf coast north of Tampa, and Florida Bay and southwest peninsula area.

Range-wide Distribution: North America. Breeding range extends from Alaska, across Canada, south to Baja California, the Gulf coast and Florida Keys, although very local in the Great Basin and prairie and plains regions in interior U.S., where range has expanded to include Nebraska and Kansas. Non-breeding range is generally throughout breeding range except in far north, most commonly from southern Alaska and southern Canada southward.

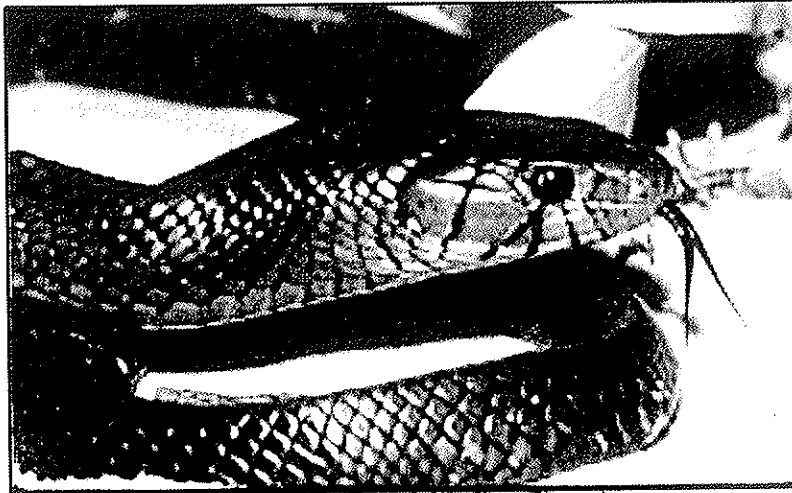
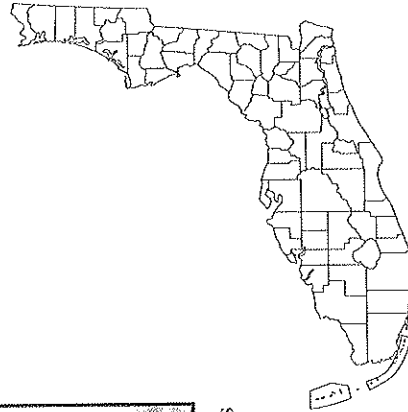
Conservation Status: Original population in Florida could be found throughout state and likely numbered well over 1,000 pairs. Population declined sharply after late 1940s, reaching a low of 120 active nests in 1973, and by 1978 was considered rare as a breeder. Use of pesticide DDT and related compounds and development of coastal habitat are probably chief causes of decline. Numbers have steadily increased, especially since 1989. In 1993, 667 active territories were reported, and in 1999, 996 active nests were recorded. Major threats include habitat loss because of development and commercial timber harvest; pollutants and decreasing food supply are also of concern.

Protection and Management: Monitored annually by Fish and Wildlife Conservation Commission (FFWCC). Continue acquisition of breeding territories and protection of foraging and roosting sites. Incorporate information known about buffer zones around nesting areas into state and local development regulations to help mitigate losses as Florida's human population continues to expand. Monitor pesticides and other environmental contaminants that affect reproduction and food supply.

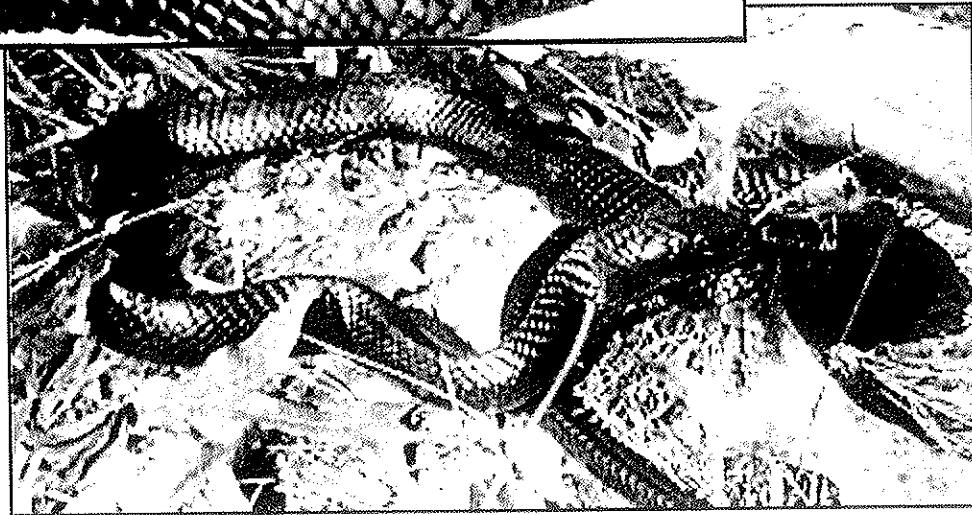
Selected References: FFWCC 2001, Kale (ed.) 1978, Poole and Gill (eds.) 2000, Robertson and Woolfenden 1992, Rodgers et. al. (eds.) 1996, Stevenson and Anderson 1994.

EASTERN INDIGO SNAKE
Drymarchon corais couperi

Order: Squamata
Family: Colubridae
FNAI Ranks: G4T3/S3
U.S. Status: Threatened
FL Status: Threatened



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Description: A very large, stout-bodied, shiny black snake reaching lengths as great as 8 ft. (244 cm). Black ventrally, but chin, throat, and sides of head may be reddish or (rarely) white. Scales typically smooth (no ridges), though adult males have keel on front half of some scales along back; anal scale undivided. Young similar to adults though often more reddish anteriorly, 17 - 24 in. (430 - 610 mm) at hatching. When encountered, often hisses, flattens neck vertically (from side to side), and vibrates tail, but rarely bites.

EASTERN INDIGO SNAKE *Drymarchon corais couperi*

Similar Species: Black racer (*Coluber constrictor*), which rarely exceeds 5 ft. (152 cm), is more slender, a duller sooty black usually with a white chin and throat, and has a divided anal scale. The mostly aquatic mud snake (*Farancia abacura*) is glossy black above and can grow to 6 ft. (183 cm), but has a reddish, rarely white, belly, with the coloration encroaching the sides, and a sharp-pointed tail tip.

Habitat: Broad range of habitats, from scrub and sandhill to wet prairies and mangrove swamps. In northern part of range, often winters in gopher tortoise burrows in sandy uplands but forages in more hydric habitats. Requires very large tracts to survive.

Seasonal Occurrence: Active nearly year-round in southern Florida but winters underground farther north. Lays eggs in May and June.

Florida Distribution: Statewide, including Upper and Lower Keys, but rare in panhandle.

Range-wide Distribution: Florida and southern Georgia; formerly extended from southern South Carolina to southeastern Mississippi.

Conservation Status: Rare in most areas, though species has been recorded from many public lands statewide; however, whether most of these support viable populations is uncertain. Major threats are habitat loss, degradation, and fragmentation, with associated highway mortality. Other threats include gassing of tortoise burrows for rattlesnakes, collection for pets, and deliberate persecution, all of which are illegal.

Protection and Management: Protect very large tracts (> 5000 acres = 2025 ha) of appropriate natural habitat unfragmented by roads; use prescribed fire as needed. Maintain gopher tortoise populations and dead stumps to provide natural subterranean refugia. Enforce bans on tortoise burrow gassing and on collection or molestation of snake. Avoid construction of roads through unfragmented habitat. Educate public to avoid wanton destruction of large snakes.

Selected References: Ashton and Ashton 1988b, Conant and Collins 1991, Ernst and Barbour 1989, Georgia DNR 1999, Lazell 1989, Moler (ed.) 1992, Mount 1975, Tenant 1997.

Common Plant Communities in Southwest Florida

and their respective vegetation stratum:

Depression marsh, south Florida - are often rounded, often inundated for a portion of their hydroperiod and are dominated by herbaceous perennial plant species. They are typically found in landscapes with sandy soils, very little relief, especially in pine flatwoods and hammocks. The groundcover usually forms concentric rings from the landward edge to the frequently flooded center. A common pattern is a ring of hummocked grasses and sedges, a zone of St. John's wort, maidencane, pickeralweed, buttonbush, coastal plain willow, fire flag or scattered swamp tupelo in the center. Fluctuating water levels may make it difficult for plants to colonize the ecotone between the upland and marsh, this may appear as a band of white sand around concentric bands of vegetation. Look for adventitious roots on woody vegetation, especially the St. John's wort and buttonbush. The ecotone between the pine flatwoods and depression marsh is often demarcated by a ring of saw palmetto, sometimes the saw palmetto will form a short "trunk" in the ecotone. The vegetation of depression marshes is related to that of savannas, the Everglades, freshwater lakes and ponds. Often you will see similar species composition in depression marshes, ditches, swales, freshwater lakes and ponds. The following is a list of the major plants associated with depression marshes in south Florida.

Canopy		
<u>Botanical Latin</u>	<u>Common Name</u>	<u>Wetland Status</u>
<i>Nyssa sylvatica var. biflora</i>	swamp tupelo	OBL
<i>Salix caroliniana</i>	coastal plain willow	OBL
Groundcover:		
<u>Botanical Latin</u>	<u>Common Name</u>	<u>Wetland Status</u>
<i>Aristida affinis</i>	long-leaf three-awn grass	OBL
<i>Aristida spiciformis</i>	three-awn bottlebrush	FAC
<i>Aristida stricta</i>	wiregrass; pineland three-awn grass	FAC
<i>Cephalanthus occidentalis</i>	buttonbush	OBL

<i>Cladium jamaicense</i>	sawgrass	OBL
<i>Dichromena latifolia</i>	sandswamp whitetop	OBL
<i>Eleocharis sp.</i>	spikerush	OBL
<i>Hypericum fasciculatum</i>	marsh St. John's-wort	OBL
<i>Myrica cerifera</i>	southern bayberry	FAC
<i>Panicum hemitomon</i>	maidencane	OBL
<i>Panicum rigidulum</i>	red-top panicum	FACW
<i>Panicum virgatum</i>	switchgrass	FACW
<i>Pontederia cordata</i>	pickerelweed	OBL
<i>Rhynchospora inundata</i>	horned beakrush	OBL
<i>Rhynchospora microcarpa</i>	southern beakrush	OBL
<i>Rhynchospora tracyi</i>	Tracy's beakrush	OBL
<i>Sagittaria lancifolia</i>	bulltongue arrowhead	OBL
<i>Stillingia aquatica</i>	corkwood	OBL
<i>Thalia geniculata</i>	thalia; fire flag	OBL
<i>Woodwardia virginica</i>	chainfern	FACW

Cypress domes are forested wetlands (swamps) that are dominated by bald cypress and/or pond cypress. Generally these are depression wetlands with a domed canopy and mucky, organic soils. Often this plant community is associated with a seepage bog or savanna and is related to the bayhead community. Most of the characteristics of cypress dome swamps overlap with a bayhead. Pond cypress usually dominate these dome swamps in pine flatwoods, a variation on this type of community occurs along karst rivers (Aucilla river), here the dominant is bald cypress. Swamp gum, red maple, sweetbay (magnolia), dahoon holly, swamp bay and slash pine may be found in the canopy. Tropical species such as pond apple may be found in cypress domes in south Florida. Groundcover plants may be sparse due to prolonged inundation of these landscapes. Typical hydrologic indicators include: algal mats, aquatic mosses and liverworts, aquatic plants, elevated lichen lines, evidence of aquatic fauna, morphological plant adaptations, vegetated hummocks and tussocks, and water marks.

Canopy		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Acer rubrum</i>	red maple	FACW
<i>Gordonia lasianthus</i>	loblolly bay	FACW
<i>Magnolia virginiana</i> var. <i>australis</i>	sweetbay magnolia	OBL
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo	OBL
<i>Persea palustris</i>	swamp bay	OBL
<i>Pinus ellottii</i>	slash pine	UPLAND
<i>Taxodium ascendens</i>	pond cypress	OBL
<i>Taxodium distichum</i>	bald cypress	OBL
Subcanopy and groundcover		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Annona glabra</i>	pond apple	OBL
<i>Ilex cassine</i>	dahoon holly	OBL
<i>Itea virginica</i>	Virginia willow	OBL
<i>Lyonia lucida</i>	fetter-bush	FACW
<i>Viburnum nudum</i>	possum-haw viburnum	FACW
Groundcover		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Blechnum serrulatum</i>	swamp fern	FACW
<i>Osmunda cinnamomea</i>	cinnamon fern	FACW
<i>Osmunda regalis</i>	royal fern	OBL
<i>Woodwardia areolata</i>	chainfern	OBL
<i>Woodwardia virginica</i>	chainfern	FACW

Hydric Hammocks are forested wetlands (swamps) that are dominated by a mixture of primarily hardwood tree species with sabal palms. Hydric hammocks are typically found in areas where limestone is close to the soil surface. Soils are variable; often a clay layer or limestone layer helps keep the soil saturated for long periods. Look for stripped matrix in the upper six inches of the soil column. Typical hydrologic indicators include buttressing, loop roots, elevated lichen lines and crayfish chimneys.

Canopy		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Acer rubrum</i>	red maple	FACW
<i>Celtis laevigata</i>	sugar-berry; hackberry	FACW
<i>Diospyros virginiana</i>	common persimmon	FAC
<i>Fraxinus americana</i>	white ash	UPLAND
<i>Fraxinus profunda</i>	pumpkin ash	OBL
<i>Gleditsia aquatica</i>	water-locust	OBL
<i>Gleditsia triacanthos</i>	honey-locust	FACW
<i>Ilex cassine</i>	dahoon holly	OBL
<i>Ilex opaca</i>	American holly	FAC
<i>Juniperus virginiana</i>	eastern red cedar	UPLAND
<i>Liquidambar styraciflua</i>	sweetgum	FACW
<i>Liriodendron tulipifera</i>	tulip tree	FACW
<i>Magnolia grandiflora</i>	southern magnolia	UPLAND
<i>Magnolia virginiana</i> var. <i>australis</i>	sweetbay magnolia	OBL
<i>Morus rubra</i>	red mulberry	FAC
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo	OBL
<i>Persea palustris</i>	swamp bay	OBL

<i>Pinus ellottii</i>	slash pine	UPLAND
<i>Pinus teada</i>	loblolly pine	UPLAND
<i>Quercus laurifolia</i>	laurel oak	FACW
<i>Quercus michauxii</i>	swamp chestnut oak	FACW
<i>Quercus nigra</i>	water oak	FACW
<i>Quercus virginiana</i>	live oak	UPLAND
<i>Sabal palmetto</i>	cabbage palm	FAC
<i>Tilia americana</i>	American basswood	FACW
<i>Ulmus americana</i> var. <i>floridana</i>	American elm	FACW
Subcanopy and groundcover		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Aesculus pavia</i>	red buckeye	UPLAND
<i>Arisaema</i> spp.	jack-in-the-pulpit; green-dragon	FACW
<i>Berchemia scandens</i>	rattan vine	VINE
<i>Carpinus caroliniana</i>	American hornbeam	FACW
<i>Chasmanthium latifolium</i>	spangle grass	FAC
<i>Chasmanthium sessiliflorum</i>	longleaf chasmanthium	FAC
<i>Chasmanthium</i> spp.	spanglegrass	FACW
<i>Crataegus marshallii</i>	parsley haw	FACW
<i>Crataegus viridis</i>	green haw	FACW
<i>Decumaria barbara</i>	climbing hydrangea	VINE
<i>Elephantopus nudatus</i>	purple elephant's foot	UPLAND
<i>Elytraria caroliniensis</i>	Carolina scaly-stem	FAC

<i>Itea virginica</i>	Virginia willow	OBL
<i>Lyonia lucida</i>	fetter-bush	FACW
<i>Mitchella repens</i>	partridge berry	UPLAND
<i>Osmunda cinnamomea</i>	cinnamon fern	FACW
<i>Rhapidophyllum hystrix</i>	needle palm	FACW
<i>Rhynchospora</i> spp.	beakrush	FACW
<i>Sabal minor</i>	dwarf palmetto	FACW
<i>Viburnum dentatum</i>	arrow-wood	FACW
<i>Viburnum obovatum</i>	Walter viburnum	FACW
<i>Woodwardia areolata</i>	chainfern	OBL
<i>Woodwardia virginica</i>	chainfern	FACW

Hydric Pine Flatwoods are forests with a canopy of slash pine (*Pinus elliotii*) or pond pine (*Pinus serotina*) on flat, poorly drained land. Where fires are frequent, the subcanopy is sparse or absent and the groundcover is a diverse mix of grasses and herbs—a wet prairie with pines. Common groundcover plants include wiregrass (*Aristida stricta*), yellow-eyed grass (*Xyris* spp.), meadow-beauty (*Rhexia* spp.), bog-buttons (Eriocaulaceae), and carnivores like pitcher plants (*Sarracenia* spp.), sundews (*Drosera* spp.), and butterworts (*Pinguicula* spp.). Saw palmetto (*Serenoa repens*) is patchy or absent. Where fire has been suppressed, shrubs and trees like titi (*Cyrilla racemiflora* and *Cliftonia monophylla*), gallberry (*Ilex glabra*), big gallberry (*Ilex coriacea*), myrtle-leaved holly (*Ilex myrtifolia*), sweet bay (*Magnolia virginiana*), black gum (*Nyssa sylvatica* var. *biflora*) and swamp bay (*Persea palustris*) become dense and the groundcover disappears. Dense tangles of laurel-leaved greenbriar (*Smilax laurifolia*) often drape these shrubs. The longer fire is excluded, the more these flatwoods approach bay swamps. Hydric pine flatwoods are common throughout the lower parts of the panhandle, especially near the coast, and are absent in the higher clayey land toward the Georgia and Alabama lines.

Canopy		
<u>Botanical Latin</u>	<u>Common Name</u>	<u>Wetland Status</u>
<i>Pinus elliotii</i>	slash pine	UPL
<i>Pinus serotina</i>	pond pine	FACW

<i>Cliftonia monophylla</i>	buckwheat-tree	FACW
<i>Cyrilla racemiflora</i>	swamp cyrilla	FAC
<i>Magnolia virginiana</i>	sweetbay	OBL
<i>Nyssa sylv. var. biflora</i>	swamp tupelo	OBL
<i>Persea palustris</i>	swamp bay	OBL
<i>Ilex myrtifolia</i>	myrtle holly	OBL
Subcanopy		
<u>Botanical Latin</u>	<u>Common Name</u>	<u>Wetland Status</u>
<i>Ilex glabra</i>	gallberry	UPL
<i>Ilex coriacea</i>	bay-gall holly	FACW
<i>Myrica cerifera</i>	southern bayberry	FAC
<i>Myrica heterophylla</i>	evergreen bayberry	FACW
<i>Serenoa repens</i>	saw palmetto	UPL
Groundcover and vines		
<u>Botanical Latin</u>	<u>Common Name</u>	<u>Wetland Status</u>
<i>Aristida stricta</i>	wiregrass	FAC
<i>Calamovilfa curtissii</i>	Curtiss' reed grass	FACW
<i>Smilax laurifolia</i>	laurel greenbrier	vine
<i>Rhynchospora</i> sp.	beakrush	
<i>Rhexia</i> sp.	meadow-beauty	
<i>Eriocaulon</i> sp.	pipewort	OBL
<i>Lachnocaulon</i> sp.	lachnocaulon	

<i>Sarracenia</i> sp.	pitcher-plant	OBL
<i>Xyris</i> sp.	yellow-eyed grass	OBL
<i>Scleria</i> sp.	nutrush	FACW
<i>Drosera</i> sp.	sundew	OBL
<i>Pinguicula</i> sp.	butterwort	OBL
<i>Lilium catesbaei</i>	southern red lily	FAC
<i>Liatris spicata</i>	spiked gayfeather	FAC
<i>Sabatia</i> sp.	rose-gentian	FACW
<i>Anthraenantia rufa</i>	purple silky-scale	FACW

Bayheads are forested wetlands (swamps) that include a variety of dominant tree species. Generally these are depression wetlands with a canopy and mucky, organic soils. Often this plant community is associated with a seepage bog and may represent a fire suppressed version of a typically open seepage bog in some areas. Bayheads are related to dome swamps. Typically bayheads are dominated by evergreen tree and shrub species. In north Florida deciduous taxa such as pond cypress and swamp gum are often co-dominants and share the canopy with sweetbay (magnolia), loblolly bay, white cedar and slash pine. The understory is typically dominated by holly species and fetter-bush. Bayheads in central and south Florida tend to have more sweetbay and loblolly bay with subtropical species such as myrsine and tropical fern species in the groundcover. With the widespread fire suppression in Florida, bayheads are often difficult to delineate using the unified wetland delineation methodology (in rule 62-340, F.A.C.) as the ecotone between the bayhead and pine dominated flatwoods is often obscured.

Canopy		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Acer rubrum</i>	red maple	FACW
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	OBL
<i>Gordonia lasianthus</i>	loblolly bay	FACW
<i>Magnolia virginiana</i> var. <i>australis</i>	sweetbay magnolia	OBL
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo	OBL
<i>Persea palustris</i>	swamp bay	OBL

<i>Pinus ellottii</i>	slash pine	UPLAND
<i>Quercus laurifolia</i>	laurel oak	FACW
<i>Quercus nigra</i>	water oak	FACW
<i>Taxodium ascendens</i>	pond cypress	OBL
Subcanopy and groundcover		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Ilex cassine</i>	dahoon holly	OBL
<i>Ilex coriacea</i>	bay-gall holly	FACW
<i>Itea virginica</i>	Virginia willow	OBL
<i>Lyonia lucida</i>	fetter-bush	FACW
<i>Myrica cerifera</i>	southern bayberry	FAC
<i>Myrsine guianensis</i>	Guiana myrsine	FAC
<i>Viburnum nudum</i>	possum-haw viburnum	FACW
Groundcover		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Blechnum serrulatum</i>	swamp fern	FACW
<i>Osmunda cinnamomea</i>	cinnamon fern	FACW
<i>Osmunda regalis</i>	royal fern	OBL
<i>Woodwardia areolata</i>	chainfern	OBL
<i>Woodwardia virginica</i>	chainfern	FACW

Floodplain Swamps are associated with rivers and streams. These are natural features influenced by overflow and inundation from a flood event. The most diverse assemblage of floodplain trees are found on the larger rivers of northwest Florida. While in subtropical Florida, rare ferns and orchids might be discovered in the floodplains of south Florida. Although there are few rivers that have not been severely hydrologically altered in south Florida, the St. Lucie and Loxahatchee River have remnant examples of floodplain forest (salt water intrusion is slowly converting freshwater floodplain into mangrove swamp). Floodplains are both wetlands and surface waters and are typically

flooded for a portion of the growing season. Look for hydrologic indicators during dry periods such as rafted debris, elevated lichen lines, buttressed trees, river wash and sediment deposition and stain lines. Often the *ordinary high water line* can be determined by observing the elevation of hydrologic indicators. When gauge data is available the *mean annual flood* can be calculated. As their name would indicate floodplains are important landscapes that help alleviate the disastrous effects of flooding and provide important habitat for many of Florida's most imperiled plants and animals. The following is a list of the major plants associated with floodplains swamps in south Florida.

Canopy		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Acer rubrum</i>	red maple	FACW
<i>Annona glabra</i>	pond apple	OBL
<i>Carya aquatica</i>	water hickory	OBL
<i>Ficus aurea</i>	strangler fig	FAC
<i>Fraxinus caroliniana</i>	popash	OBL
<i>Ilex cassine</i>	dahoon holly	OBL
<i>Magnolia virginiana</i> var. <i>australis</i>	sweetbay magnolia	OBL
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo	OBL
<i>Persea palustris</i>	swamp bay	OBL
<i>Quercus laurifolia</i>	swamp laurel oak	FACW
<i>Quercus virginiana</i>	live oak	UPLAND
<i>Sabal palmetto</i>	cabbage palm	FAC
<i>Taxodium ascendens</i>	pond cypress	OBL
<i>Taxodium distichum</i>	bald cypress	OBL
Subcanopy and Groundcover		
<i>Acrostichum danaeifolium</i>	leather fern	OBL
<i>Aster carolinianus</i>	climbing aster	OBL
<i>Blechnum serrulatum</i>	swamp fern	FACW

<i>Cornus foemina</i>	swamp dogwood	OBL
<i>Crinum americanum</i>	swamp lily	OBL
<i>Itea virginica</i>	Virginia willow	OBL
<i>Osmunda cinnamomea</i>	cinnamon fern	FACW
<i>Osmunda regalis</i>	royal fern	OBL
<i>Thalia geniculata</i>	fire flag	OBL
<i>Viburnum obovatum</i>	Walter's viburnum	FACW
<i>Woodwardia virginica</i>	chainfern	FACW

Floodplain marshes are typically associated with floodplain swamps along rivers and streams. These are natural features influenced by overflow and inundation from a flood event. Floodplain marshes are both wetlands and surface waters and are typically flooded for a portion of the growing season. Look for hydrologic indicators during dry periods such as rafted debris, elevated lichen lines, adventitious rooting, river wash, sediment deposition and stain lines. Often the ordinary high water line (OHWL) can be determined by observing the elevation of hydrologic indicators. When gauge data is available the *mean annual flood* can be calculated and used as an approximation of the OHWL. As their name would indicate floodplain marshes are important landscapes that help alleviate the disastrous effects of flooding and provide important habitat for many wetland dependent species. The following is a list of the common plants associated with floodplain marshes in south Florida.

Groundcover		
<u>Botanical name</u>	<u>Common name</u>	<u>DEP status</u>
<i>Acrostichum danaeifolium</i>	leather fern	OBL
<i>Aeschynomene sp.</i>	jointvetch	FACW, OBL
<i>Amaranthus australis</i>	southern amaranth	OBL
<i>Aster carolinianus</i>	climbing aster	OBL
<i>Blechnum serrulatum</i>	swamp fern	FACW
<i>Brachiaria mutica</i>	para grass	FACW
<i>Canna flaccida</i>	bandanna of the	OBL

	Everglades	
<i>Carex gigantea</i>	large sedge	OBL
<i>Crinum americanum</i>	swamp lily	OBL
<i>Cynodon dactylon</i>	bermudagrass	UPL
<i>Cyperus sp.</i>	flatsedge	OBL, FACW
<i>Echinochloa crus-galli</i>	barnyardgrass	FACW
<i>Echinochloa walteri</i>	coast cockspur	FACW
<i>Eleocharis baldwinii</i>	Baldwin's spikerush	OBL
<i>Hibiscus grandiflorus</i>	swamp rosemallow	OBL
<i>Hydrochloa caroliniensis</i>	watergrass	OBL
<i>Hydrocotyle ranunculoides</i>	floating penny-wort	OBL
<i>Hymenachne amplexicaulis</i>	trompetilla	OBL
<i>Hymenocallis crassifolia</i>	spider lily	OBL
<i>Juncus repens</i>	lesser creeping rush	OBL
<i>Justicia angusta</i>	pineland waterwillow	OBL
<i>Limnobium spongia</i>	frogbit	OBL
<i>Ludwigia leptocarpa</i>	anglestem primrosewillow	OBL
<i>Ludwigia palustris</i>	marsh seedbox	OBL
<i>Ludwigia peruviana</i>	Peruvian primrosewillow	OBL
<i>Ludwigia repens</i>	creeping primrosewillow	OBL
<i>Panicum dichotomiflorum</i>	fall panicum	FACW
<i>Panicum hemitomon</i>	maidencane	OBL

<i>Panicum rigidulum</i>	red-top panicum	FACW
<i>Paspalum repens</i>	water paspalum	OBL
<i>Polygonum sp.</i>	smartweed	OBL
<i>Proserpinaca palustris</i>	marsh mermaidweed	OBL
<i>Rumex verticillatus</i>	swamp dock	FACW
<i>Sagittaria lancifolia</i>	bulltongue arrowhead	OBL
<i>Scirpus cubensis</i>	Cuban bulrush	OBL
<i>Sesbania emerus</i>	danglepod	FAC
<i>Thalia geniculata</i>	fire flag	OBL
<i>Typha sp.</i>	cattail	OBL
<i>Woodwardia virginica</i>	chainfern	FACW

Mangrove Swamps are wetlands dominated by red, black and/or white mangroves. The large, arching prop roots are characteristic of red mangrove, while the upright roots called, "pneumatophores" are characteristic of black and white mangroves. Mangroves are distributed in coastal landscape by their ecological tolerance, i.e. there is zonation associated with a mangrove swamp. Look carefully and you may notice that black mangrove is the most salt tolerant mangrove species, often growing where the soils are hypersaline. The following is a list of the major plants associated with mangrove swamps.

Canopy		
<u>Botanical Latin</u>	<u>Common Name</u>	<u>Wetland Status</u>
<i>Avicennia germinans</i>	black mangrove	OBL
<i>Conocarpus erectus</i>	buttonwood	FACW
<i>Laguncularia racemosa</i>	white mangrove	OBL
<i>Rhizophora mangle</i>	red mangrove	OBL
Groundcover		
<u>Botanical Latin</u>	<u>Common Name</u>	<u>Wetland Status</u>

<i>Batis maritima</i>	saltwort	OBL
<i>Borrchia spp.</i>	seaside tansy	OBL
<i>Lycium carolinianum</i>	Christmas berry	OBL
<i>Monanthochloe littoralis</i>	keygrass	OBL
<i>Salicornia sp.</i>	glasswort	OBL
<i>Spartina alterniflora</i>	saltmarsh cordgrass	OBL
<i>Suaeda sp.</i>	sea-blight	OBL

Other wetland communities which may occur throughout Hillsborough County include:

- **Savanna, wet prairie** – locally common, associated with pine flatwoods.
- **Lakeshore marsh/swamp** – Associated with large lakes, throughout.
- **Spring-run** – includes floodplains/marsh in part – found wherever there are springs.
- **Salt marsh** – only in coastal areas, tends to be replaced by mangroves as one moves south from Tampa Bay. Extensive salt marsh is found in the big bend of Florida, north of the Tampa Bay area. Good examples of salt marsh are found in Upper Tampa Bay (county) Park (Hillsborough County).

Appendix 12-2
Growth Management Strategy
Information

Land Use Element:

Growth Management Strategy:

"Goal: Ensure that character and location of land uses optimizes the combined potentials for economic benefit and the enjoyment and the protection of natural resources while minimizing the threat to health, safety and welfare posed by hazards, nuisances, incompatible land uses and environmental degradation."

Policy A 2.9:

"Prior to the placement of any new or expanded major public facility or public building or grounds, such as landfills, correctional facilities and wastewater treatment plants, the proposed site and possible impacts shall be evaluated in accordance with the criteria specified below:

General Criteria

- a) The County shall provide opportunities at the time of planning and site selection for citizens and neighborhoods to express their viewpoints on major facility siting and design; and in order to ensure neighborhood preservation, the County shall take into consideration the viewpoints of citizens and neighborhoods in the final decision making process in major facility siting and design.
- b) In the planning, siting, land acquisition and development of major public facilities the County shall consider alternatives, including not siting the facility. The alternatives evaluation shall include consideration of such factors as technical aspects of the facility, costs, design, impacts on the environment and availability of public facilities and services, including transportation impacts and future operation and maintenance costs of alternative sites as well as public safety and welfare factors.
- c) Opportunities shall be provided for adjacent property owners and neighbor-hoods to choose to participate in the review process.
- d) The siting process for these facilities shall also avoid any detrimental effects on existing and planned development in the study area as well as consider the ancillary impacts associated with the particular facility and ensure that those uses also will not negatively affect the community.

Policy A-2.10:

New development and redevelopment must mitigate the adverse noise, visual, odor and vibration impacts created by that development upon all adjacent land uses.

Policy B-7.1:

Economic development areas shall be any area with land use designation consistent with the potential impacts of desirable economic growth.

Policy B-7.2:

Economic development areas should be within designated transit corridors.

Policy B-7.3:

Economic development areas shall be within the County's Urban Growth Boundaries.

Electrical Power Generation Facilities

Because of the growth in all classifications experienced by Hillsborough County and projected increases as supported by this Plan, Hillsborough County is expected to require additional electric generation capacity to serve the needs of its citizens in all of their endeavors - industrial, commercial, agricultural and residential. In order to maximize a desirable development pattern and to minimize the potential for adverse impacts upon other types of land uses, it is necessary to provide the policy framework to analyze such facilities based upon various factors, such as the nature of the facility, the compatibility with surrounding uses, the need and obligation of Tampa Electric Company to provide reliable, low cost electric service and the County's obligations to require needed infrastructure for future growth. Development of an Electrical Power Generation Facility (EPGF) is subject to the Goals, Objectives and Policies of the Land Use Element, applicable development regulations and established locational criteria for specific land use.

Objective C-33: To locate future electric power generation facilities in geographical areas which are compatible with such use considering surrounding areas, accessibility to modes of transportation to support the facilities' fuel requirements, enhancement of employment and minimization of any potentially adverse impact to environmentally sensitive areas and residential areas, while balancing Tampa Electric Company's legal obligations to provide reliable, low cost electric service to all citizens in strict compliance with all Federal, State and local environmental laws, rules and regulations.

Policy C-33.1:

Placement of future electric power generating facilities shall be given consideration in areas adjacent to other industrial areas, and/or adjacent to rail and/or adjacent to rail and/or water borne transportation for fuel required to serve that type of use.

Policy C-33.3:

All land approved for an electrical power generation facility shall require a planned unit development rezoning.

Policy C-33.4:

Electric power generating facilities shall have an affirmative duty to protect any environmentally sensitive areas through buffering and/or other mitigating techniques. The environmentally sensitive areas shall be specifically detailed on the site plan submitted as part of the rezoning.

Policy C-33.5:

The location of all electric power generating facilities shall strictly comply with all federal, state, and local laws, rules, and regulations pertaining to the site, certification, permitting,

and environmental requirements pertaining to same. See tables in background report for a listing of the minimum local, state and federal requirements which apply.

Policy C-33.6:

The Board of County Commissioners shall not approve any rezoning for an electrical power generating facility that does not demonstrate adequate protection and reservation of natural resources, including air, water, plant and animal life, and adequate protection of human health, safety and welfare.

Policy C-33.7:

An application for rezoning for the purpose of utilizing land for an Electrical Power Generating Facility may only be filed after submission of an application to the State under the Power Plant Siting Act. Further said zoning application shall include all information required by the State Department of Environmental Protection for initial submission in accordance with the Power Plant Siting Act and any additional studies required by the County. For the purposes of rezoning review the standard time requirements for processing an application shall be waived or otherwise altered to allow appropriate consideration of all information. Any rezoning shall be conditioned upon the issuance of a written order approving in whole, or approving with conditions, the application for power plant siting by the Governor and Cabinet sitting as the Siting Board. If the Siting Board denies the siting, then the zoning shall revert to Agricultural or the zoning in existence at the time of rezoning application if other than Agricultural.

Solid Waste Element:

Goal 1:

Hillsborough County shall provide for an environmentally sound and efficient solid waste management system.

ISSUES: The impact of commercial, industrial and residential growth in Hillsborough County is readily apparent. As growth continues, responsibilities for collections, handling and disposal of the growing volumes of solid waste must be undertaken by the County for its residents. The County government must plan and operate its solid waste management system in an efficient and environmentally sensitive manner.

OBJECTIVE 1.2: The County shall provide for increases in disposal capacity of solid waste facilities to meet future needs.

Policy 1.2.1:

The County shall conduct an annual review of future facility needs and budget for those needs within the Capital Improvements Element.

OBJECTIVE 1.3: The County shall continue to operate solid waste facilities in compliance with minimum air, groundwater and surface water pollution standards established by federal, state and local laws, regulations and guidelines.

Policy 1.3.1:

The County shall conduct an annual review of facility operations and operating practices to evaluate compliance with federal and state requirements.

Policy 1.3.2:

The County shall conduct an annual review of technology and innovations available in solid waste management to exceed federal and state requirements.

Policy 1.3.3:

Based on annual reviews, county staff shall provide recommendations of measures to correct or enhance the existing solid waste management system.

Policy 1.3.4:

The level of service to be maintained by all facilities shall be as stated in the Capital Improvements Element.

OBJECTIVE 1.5: The County's solid waste management system shall take all practical measures to minimize the volume of the solid waste stream.

Policy 1.5.1:

The County shall continue recycling programs to separate the majority of newspaper, glass, plastic bottles, steel cans and aluminum cans reaching County disposal facilities.

Policy 1.5.2:

The County shall continue to review and implement recycling and waste reduction programs designed to reduce the per capita solid waste stream reaching County disposal facilities in compliance with state legislative guidelines.

The proposed County resource recovery facility, has been evaluated to determine whether it is consistent with the Comprehensive Plan. As presented in Section 2.2.2.1 of this chapter, the definition of Public/Quasi-Public refers to the Goals, Policies, and objectives of the 2015 Hillsborough Comprehensive Plan. In order to determine consistency, the development proposal has been considered within the context of the standards and criteria found within those Goals, Policies and Objectives.

Appendix 12-3
Nitrogen Deposition to Tampa Bay

Section 1

Introduction

The combustion of municipal solid waste results in the formation of oxides of nitrogen (NO_x). Complex chemical processes transform the nitrogen in the atmosphere and the nitrogen is eventually deposited on land and in water bodies through wet and/or dry deposition mechanisms. Concern has been expressed in recent years about excessive amounts of atmospheric-based nitrogen ending up in Tampa Bay - a sensitive estuary prone to eutrophication problems. To address these concerns, CDM has estimated the total amount of nitrogen that could be deposited in Tampa Bay from the expansion project. Our estimates show that the annual amount of nitrogen deposition from the project is *de minimus* compared to the total amount of nitrogen being deposited from all other sources.

To estimate the amount of nitrogen deposited, CDM first estimated the total amount of NO_x to be emitted from a fourth unit at the facility. CDM estimated these emissions as explained in detail throughout Volume III of the Power Plant Siting Application. Next, CDM utilized accepted air dispersion modeling techniques to predict deposition values at various “receptors” (or locations) throughout Tampa Bay. Section 2 of this report presents the complete modeling methodology.

Finally, CDM compared the predicted deposition impact from the proposed fourth unit to existing deposition values. Numerous studies have been undertaken in recent years to quantify the amount of atmospheric nitrogen deposited in Tampa Bay annually. A 2002 study commissioned by the Tampa Bay Estuary Program concluded that total atmospheric deposition of nitrogen to Tampa Bay was approximately 880 tons.¹ In contrast, our modeling results show that total wet and dry deposition of nitrogen from the proposed fourth unit to Tampa Bay will be approximately 0.5 tons per year.

¹ Poor, N.D., “*Atmospheric Deposition of Nitrogen and Air Toxins to the Tampa Bay Estuary*”, Tampa Bay Estuary Program, 2002.

Section 2

Modeling Methodology

2.1 Model Selection

Steady-state Gaussian plume models are valid for distances to 50 kilometers. This assumes that the transport time is less than or equal to the averaging time, since the plume is instantaneously assumed to travel any distance downwind.

The preferred model for near source impact assessments, such as this, is the Industrial Source Complex – Short Term (ISCST3) dispersion model. The ISCST3 model is a steady-state Gaussian plume model used to assess pollutant impacts from a variety of sources. This model can account for the following: Settling and dry deposition of particles; downwash; area, line and volume sources; plume rise as a function of downwind distance; separation of point sources; and limited terrain adjustment. ISCST3 operates in both long-term and short-term modes.

Currently, Version 02035 of ISCST3 is used. The graphical user interface, ISC-AERMOD View, created by Lakes Environmental was used to facilitate model setup and post processing. ISCST3 was used in “refined” mode, with full receptor grids and five years of meteorological data.

2.2 Modeling Options

ISCST3 was run to produce values of concentration and total, wet and dry deposition. Dry and wet depletion of the plume were selected. Modeling options included the following: Rural dispersion coefficients; Final Plume Rise; Stack-tip Downwash; Buoyancy-induced Dispersion; Calms Processing Routine; Missing Data Processing Routine; Default Wind Profile Exponents; Default Vertical Potential Temperature Gradients; and HE>ZI - Adjusts Vertical Term for cases when HE > ZI, which may occur for receptors below source base elevation.

Modeled averaging times included 1-hour, 24-hour and annual periods.

2.3 Source Characteristics

Only the proposed fourth unit was included in the NO_x deposition analysis of greater Tampa Bay. Since the stack height is not considered Good Engineering Practice, the effects of building downwash were included in the modeling. The stack parameters associated with the fourth unit are presented in **Table 2-1**.

Table 2-1
Bay Deposition Modeling Stack Parameters

Stack Parameter	Value
Stack base elevation (meters)	12
Stack height (meters)	67
Stack diameter (meters)	2.26
Gas exit temperature (degrees-Kelvin)	405.4
Gas exit velocity (meters per second)	17.06
NO _x emission rate (grams per second)	7.37

2.4 Receptors

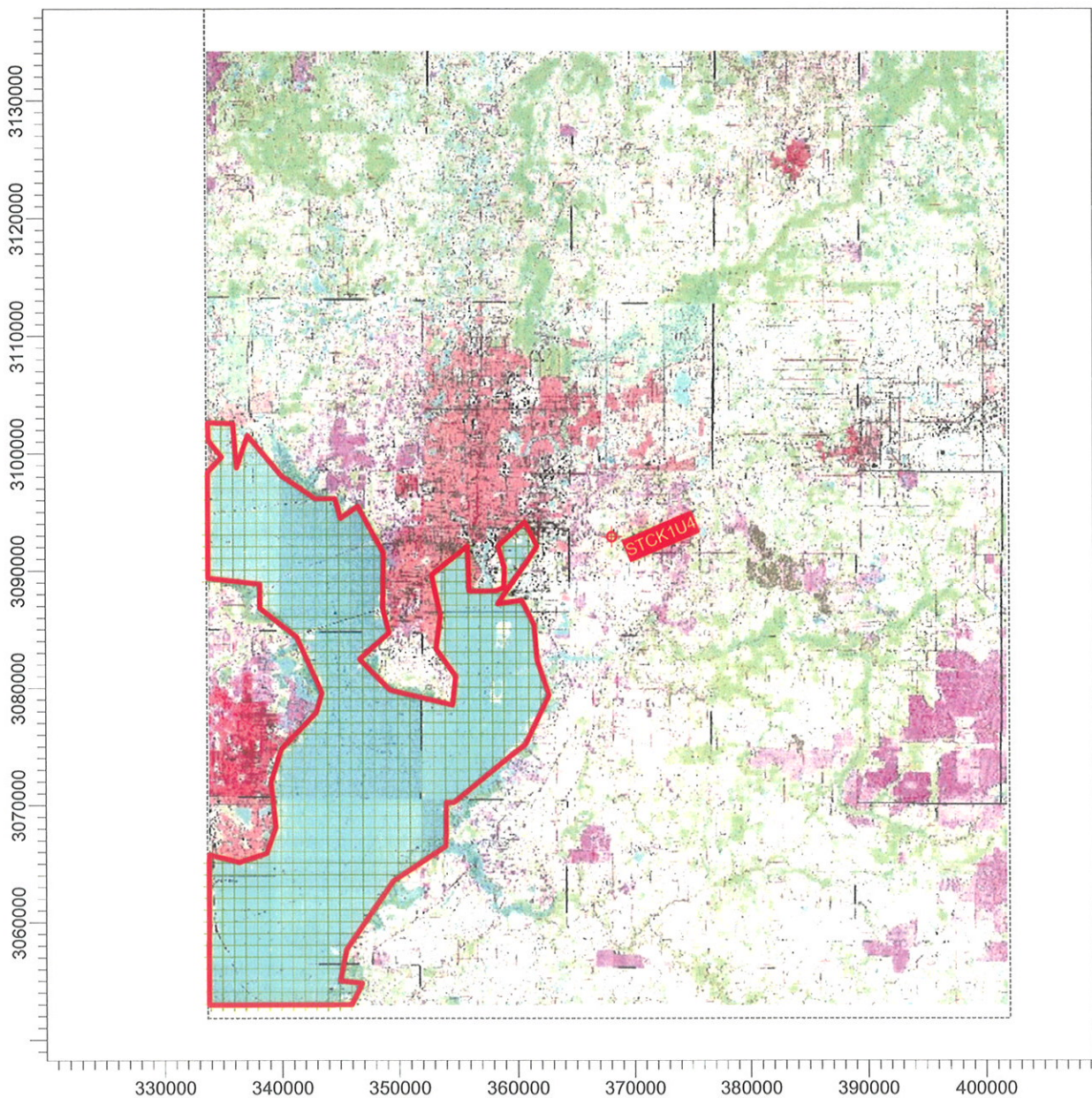
A total of 729 receptors were modeled. All receptors were within the area encompassed by McKay Bay, East Bay, Hillsborough Bay, Tampa Bay, and Old Tampa Bay. They were spaced one kilometer apart, aligned in a Cartesian (rectangular) grid, and given elevations at or just above sea level. The modeled area is shown in **Figure 2-1**.

2.5 Meteorology

Meteorological data from Tampa International Airport for 1986 through 1990 was used in the deposition modeling analyses for the Bay areas. Tampa International Airport is the National Weather Service Station (WBAN Station No. 12842) closest to the site. It is approximately 6.7 miles (10.8 km) to the west of the Hillsborough County Facility and observed meteorological data is most representative of the site vicinity. Meteorological data available from this station, include hourly readings of temperature, wind speed, wind direction, and total opaque cloud cover (atmospheric stability), as well as twice-daily measurements of upper air data used to calculate mixing heights. In addition, micrometeorological data (friction velocity, Monin-Obukhov length, surface roughness length) and precipitation data (type and rate) are required for dry and wet deposition calculations. All of this information was used to run the ISCST3 model.

PROJECT TITLE:

Hillsborough County Resource Recovery Facility Expansion Project
Unit 4 - Nitrogen Deposition to Tampa Bay



COMMENTS:

Nitrogen Deposition To Greater
Tampa Bay

Modeling Domain Receptors

SOURCES :

1

RECEPTORS :

729

COMPANY NAME:

CDM

MODELER:

Vincent R. Tino, CCM

0  20 km

DATE:

5/24/2005

CDM

PROJECT NO.:

6033-40441-PartII.Permit.PSD

Section 3

Modeling Results

3.1 Summary of Results

Table 3-1 presents the ISCST modeling results for Unit 4 over the years where meteorological data was available. The model calculated total nitrogen dioxide deposition, and total nitrogen deposition is calculated based the molecular weight ratio of nitrogen to nitrogen dioxide. For these years, the total annual nitrogen deposition to the receptor area is estimated to range from 0.3 to 0.5 tons/year.

Table 3-1
Annual Average Nitrogen Dioxide and Total Nitrogen Deposition
ISCST Modeling Results – Unit 4 Only

Model Result	Year				
	1986	1987	1988	1989	1990
Max. Annual NO ₂ Concentration (µg/m ³)	0.02638	0.02628	0.02885	0.02342	0.02598
Avg. Annual NO ₂ Concentration (µg/m ³)	0.08929	0.09543	0.08397	0.06465	0.10809
Max. Annual Dry NO ₂ Deposition (µg/m ²)	0.00094	0.00106	0.00120	0.00082	0.00103
Avg. Annual Dry NO ₂ Deposition (µg/m ²)	0.00348	0.00452	0.00413	0.00252	0.00523
Max. Annual Wet NO ₂ Deposition (µg/m ²)	0.00068	0.00095	0.00065	0.00056	0.00044
Avg. Annual Wet NO ₂ Deposition (µg/m ²)	0.00733	0.00933	0.00393	0.00465	0.00583
Max. Annual Total NO ₂ Deposition (µg/m ²)	0.00163	0.00201	0.00186	0.00138	0.00148
Avg. Annual Total NO ₂ Deposition (µg/m ²)	0.01081	0.01337	0.00773	0.00701	0.01036

Table 3-1
Annual Average Nitrogen Dioxide and Total Nitrogen Deposition
ISCST Modeling Results – Unit 4 Only

Model Result	Year				
	1986	1987	1988	1989	1990
Sum of all Annual Total NO ₂ Deposition (g/m ²)	1.18576	1.46830	1.35373	1.00806	1.07545
Spacing of each receptor (m)	1,000	1,000	1,000	1,000	1,000
Area each receptor "encompasses" (m ²)	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Total Annual NO ₂ Deposition estimate to entire Bay (g)	1185760	1468300	1353730	1008060	1075450
Total Annual N Deposition estimate to entire Bay (g) ¹	360883.5	446873.9	412004.8	306800.9	327310.9
Total Annual N Deposition estimate to entire Bay (lb) ¹	795.6	985.2	908.3	676.4	721.6
Total Annual N Deposition estimate to entire Bay (tons)¹	0.4	0.5	0.5	0.3	0.4

¹Total N estimated using ratio of molecular weight of N (14) to molecular weight of NO₂ (46).

3.2 Deposition Contours

Figures 3-1 through 3-5 present contours of the annual average total deposition of nitrogen oxide (NO₂) throughout the receptor area. The results show that the deposition decreases as the distance from the stack increases, with a vast majority of the receptor area receiving depositions in the range of 0.000 to 0.002 g/m² of NO₂. This area represents a majority of Tampa Bay. Areas closest to the stack are calculated to receive depositions in the range of 0.006 to 0.010 g/m² of NO₂. This area encompasses McKay Bay, East Bay, Hillsborough Bay and a portion of Tampa Bay.

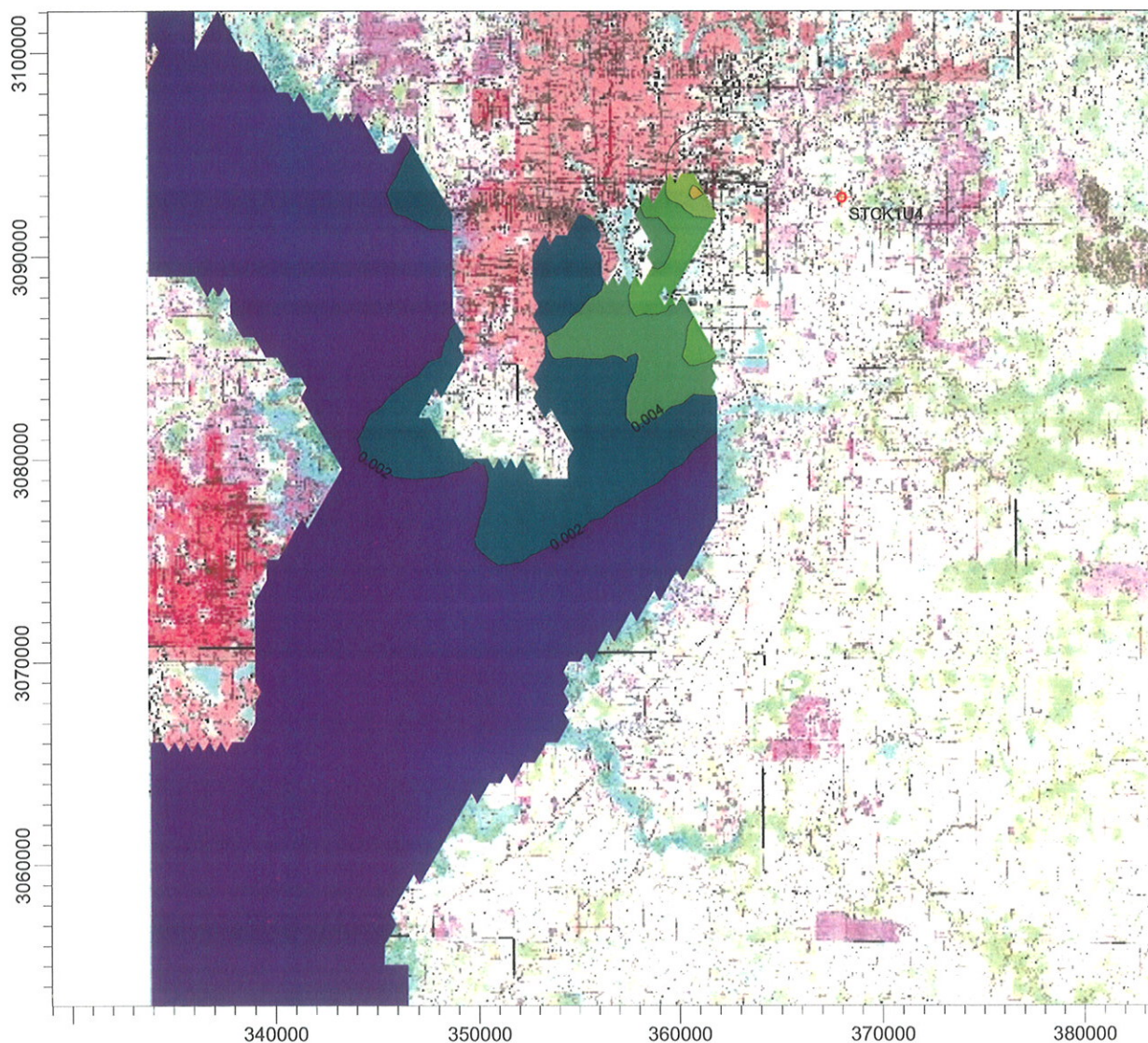
3.3 Conclusions

The modeling data show that the proposed fourth unit contributes a total annual average nitrogen deposition of 0.5 tons to the Bay. This is less than one-half of one percent of the total annual atmospheric deposition of nitrogen into the Bay, which was estimated at 880 tons by a 2002 study commissioned by the Tampa Bay Estuary

Program. In the aggregate, CDM's estimate shows that the impact of nitrogen deposition to the Bay is *de minimus*.

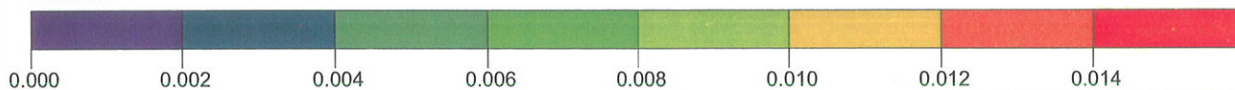
PROJECT TITLE:

**HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY EXPANSION PROJECT
PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SRCGP1**



Contours

g/m²



COMMENTS:

1986 Annual Average Total Deposition
Bay Areas Only

MODELING OPTIONS:

CONC, DEPOS, DDEP, WDEP,
RURAL, ELEV, MSGPRO,
DRYDPL, WETDPL, HE>ZI

OUTPUT TYPE:

DEPOS

MAX:
0.01081

RECEPTORS:

729

UNITS:
g/m²

COMPANY NAME:

CDM

MODELER:

Vincent Tino, CCM

0 10 km

DATE:

7/18/2005

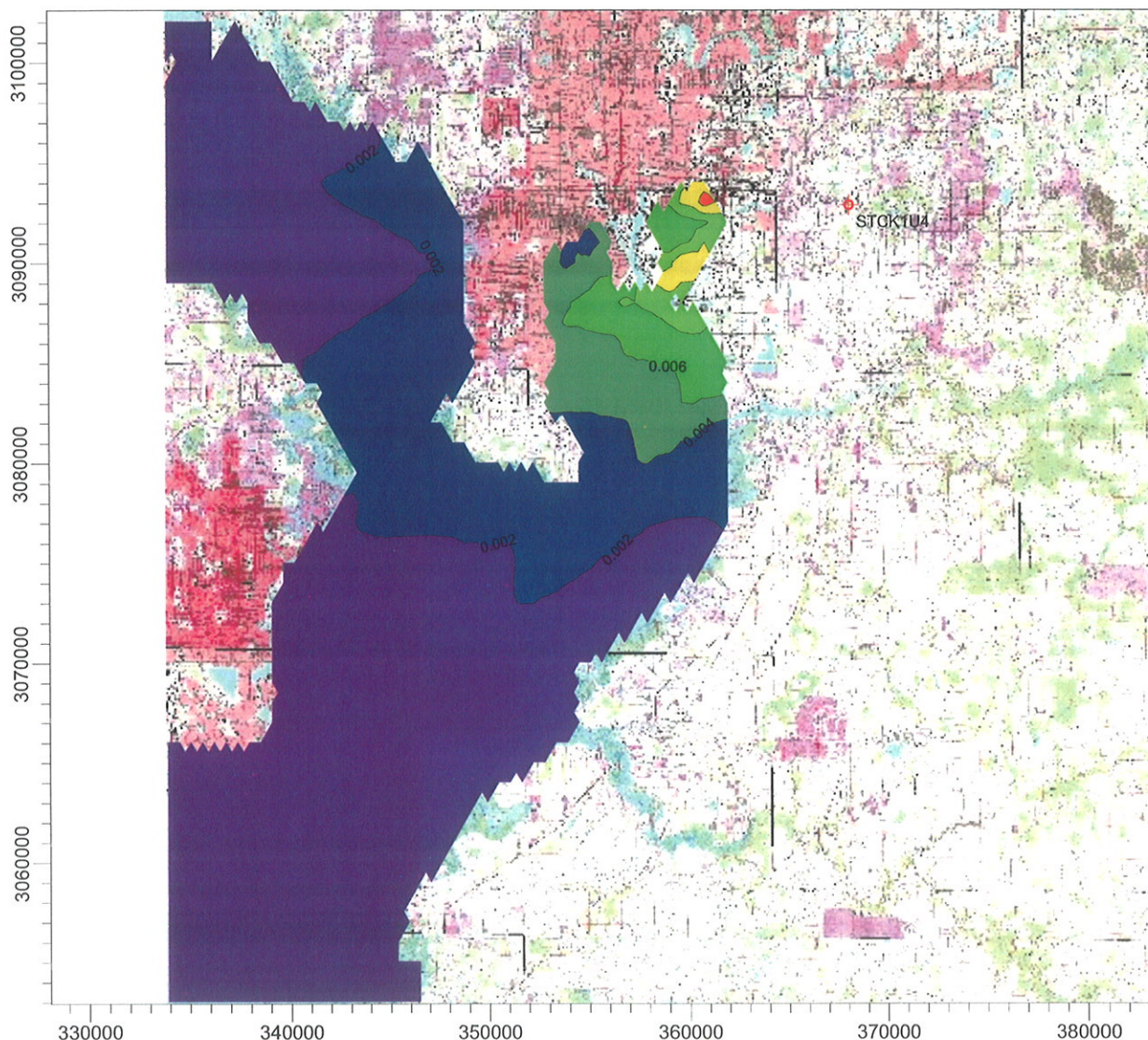
CDM

PROJECT NO.:

033-44077-PARTII.PERMIT.PSI

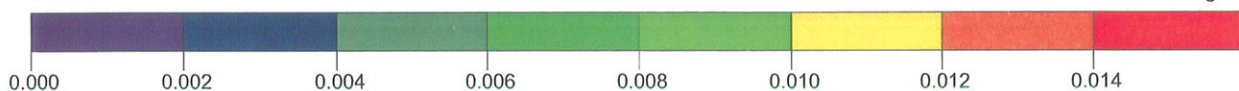
PROJECT TITLE:

**HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY EXPANSION PROJECT
PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SRCGP1**



Contours

g/m²



COMMENTS:

1987 Annual Average Total Deposition
Bay Areas Only

MODELING OPTIONS:

CONC, DEPOS, DDEP, WDEP,
RURAL, ELEV, MSGPRO,
DRYDPL, WETDPL, HE>ZI

OUTPUT TYPE:

DEPOS

MAX:
0.01337

RECEPTORS:

729

UNITS:
g/m²

COMPANY NAME:

CDM

MODELER:

Vincent Tino, CCM

0 10 km

DATE:

7/18/2005

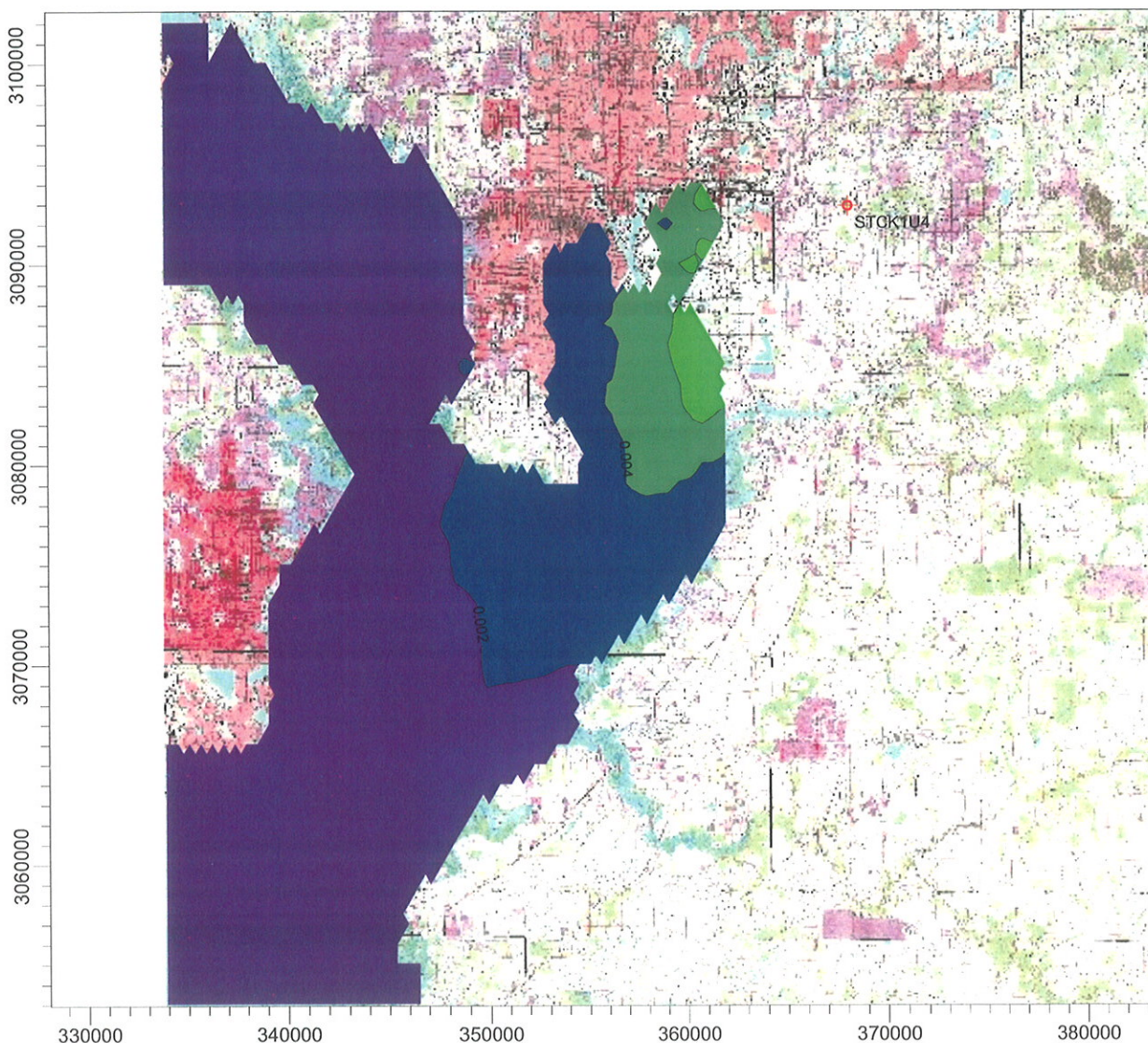
CDM

PROJECT NO.:

1033-44077-PARTII.PERMIT.PSI

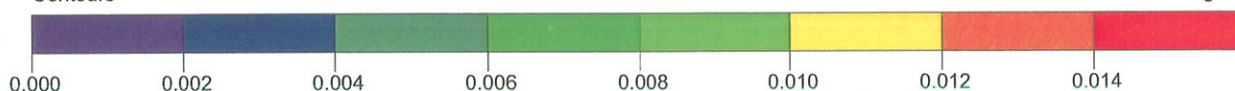
PROJECT TITLE:

HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY EXPANSION PROJECT
PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SRCGP1



Contours

g/m²



COMMENTS:

1988 Annual Average Total Deposition
 Bay Areas Only

MODELING OPTIONS:

**CONC, DEPOS, DDEP, WDEP,
 RURAL, ELEV, MSGPRO,
 DRYDPL, WETDPL, HE>ZI**

OUTPUT TYPE:

DEPOS

MAX:
0.00773

RECEPTORS:

729

UNITS:
g/m²

COMPANY NAME:

CDM

MODELER:

Vincent Tino, CCM

0 10 km

DATE:

7/18/2005

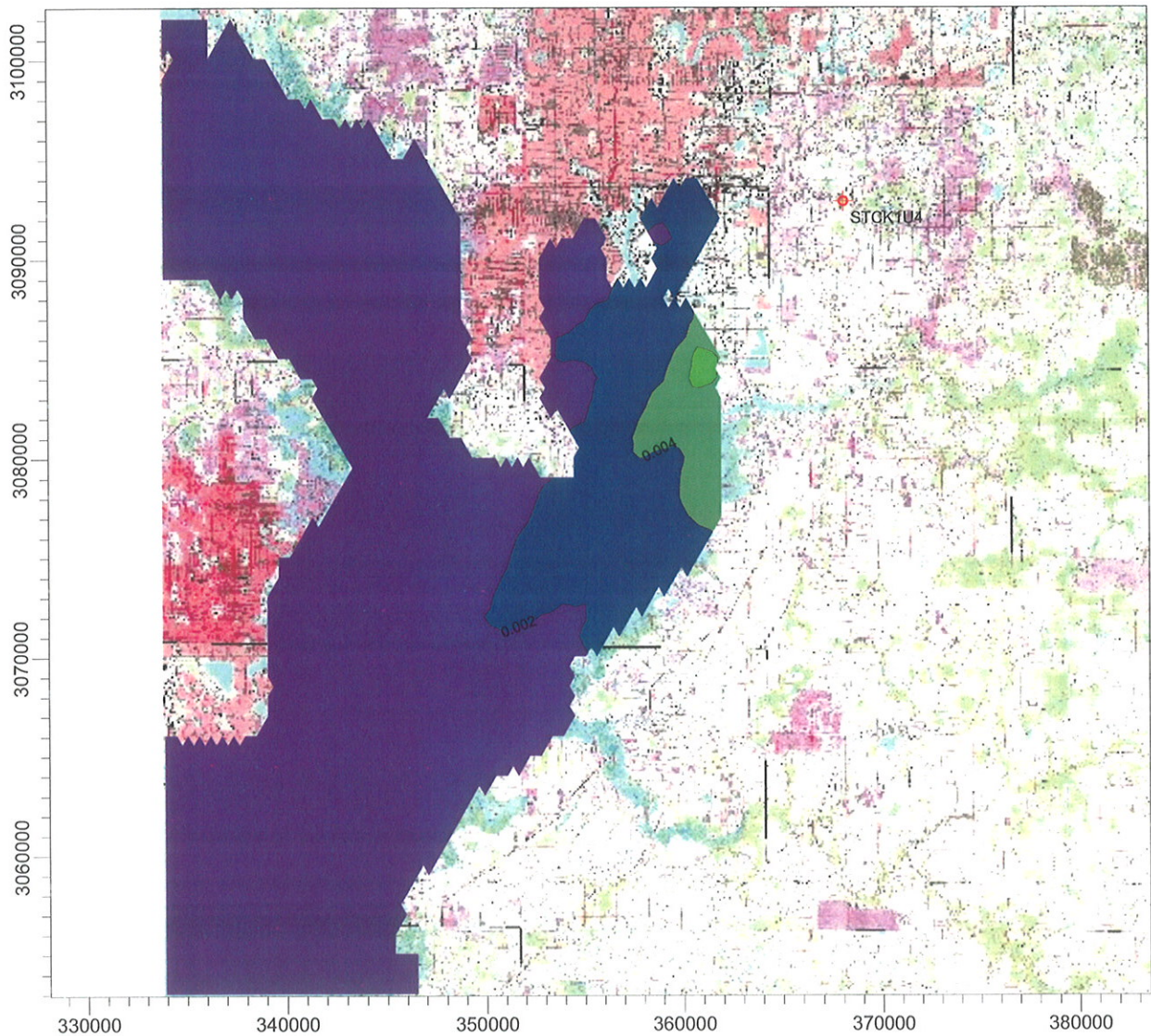
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PROJECT NO.:

1033-44077-PARTII.PERMIT.PSI

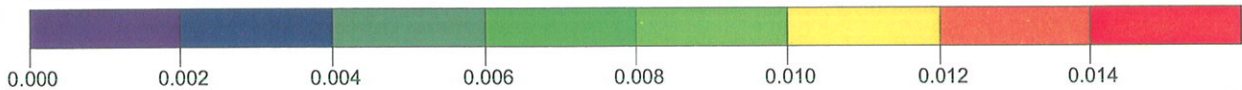
PROJECT TITLE:

HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY EXPANSION PROJECT
PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SRCGP1



Contours

g/m²



COMMENTS:

1989 Annual Average Total Deposition
Bay Areas Only

MODELING OPTIONS:

CONC, DEPOS, DDEP, WDEP,
RURAL, ELEV, MSGPRO,
DRYDPL, WETDPL, HE>ZI

OUTPUT TYPE:

DEPOS

MAX:
0.00701

RECEPTORS:

729

UNITS:
g/m²

COMPANY NAME:

CDM

MODELER:

Vincent Tino, CCM

0 10 km

DATE:

7/18/2005

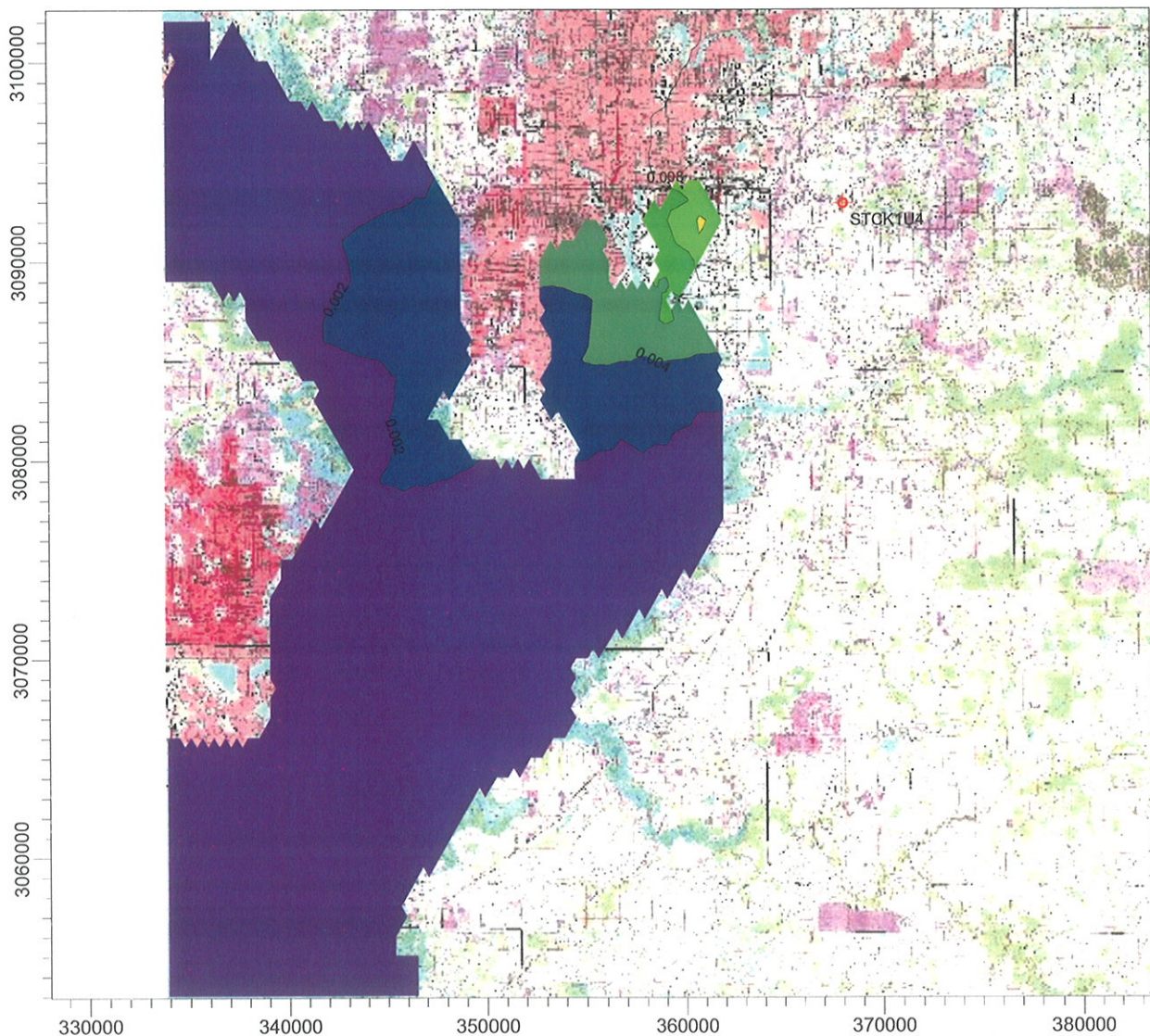
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PROJECT NO.:

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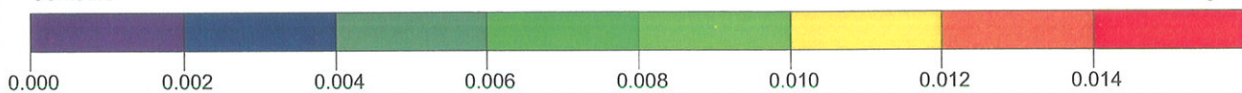
PROJECT TITLE:

**HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY EXPANSION PROJECT
PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SRCGP1**



Contours

g/m²



COMMENTS:

1990 Annual Average Total Deposition
Bay Areas Only

MODELING OPTIONS:

CONC, DEPOS, DDEP, WDEP,
RURAL, ELEV, MSGPRO,
DRYDPL, WETDPL, HE>ZI

OUTPUT TYPE:

DEPOS

MAX:
0.01036

RECEPTORS:

729

UNITS:
g/m²

COMPANY NAME:

CDM

MODELER:

Vincent Tino, CCM

0 10 km

DATE:

7/18/2005

CDM

PROJECT NO.:

033-44077-PARTII.PERMIT.PSI

Appendix 13
APC Technical Specifications
(Attachments 1-5)

ATTACHMENT 1

PROJECT SPECIFIC REQUIREMENTS

1. Number of Trains/Train MSW Capacity (TPD) One (1) / 600
2. ID Fans by Seller (yes/no) Yes
3. The following economic factors shall be used in evaluating the vendors proposals:
 - A. Lime (\$/LB/HR of 90% CaO): N.A.
 - B. Power Consumption (\$/KW): \$2300/kW
 - C. Pressure Drop (\$/In. w.g./train): Based on \$2300/kW
5. Seller to provide test ports and instrument connections for Purchaser's opacity and CEMS instruments located on the ID fan inlet duct (Ref. Section 2.6.1 and Attachment 18) plus associated access platforms (Ref. Section 2.6.4) (Yes/No/Option) Yes
6. Design (outdoor) summer/winter ambient temperature (°F) 110 / 35
7. Structural Design Criteria:

Florida Building Code and
Governing Code ASCE -7-98 Year 2001
Wind Speed 120 MPH C Exposure Tw = 1.0
Earthquake Seismic Coefficients Av Very Low - N. A.
Aa Very Low - N.A.
Ground Snow Load (Minimum) 0 psf
8. Boiler auxiliary fuel (fuel oil, natural gas, propane) Natural Gas
9. APC area to be enclosed (Yes/No) Yes (See Dwg. SKS001)
10. The balance of the plant control system is:

☐ Single Loop Control System
☒ Distributed Control System;
Manuf./Model Bailey or Equal
11. Seller to provide the Control System interface in accordance with page:

☒ A10-1
☐ A10-2

12. Boiler will have urea injection and flue gas recirculation (FGR) for reduction of NO_x (Yes/No) Yes
13. Additional economizer outlet particulate loading (Above those shown in Attachment 2 due to Purchaser's furnace dry lime injection system, gr/scf dry (Expected Continuous/Design) N.A. / N.A.
14. Cooling Water Pressure at interface point, psig
- A. Supply available Later
- B. Return required Later
15. The Purchaser's CEMS system shall provide the following SO₂ and HCl control signals
- A. SO₂
1. Inlet to scrubber (yes/no) Yes
2. Outlet to stack (yes/no) Yes
3. "Sample and Hold"/Dedicated Dedicated
4. Continuous Signal time (minutes) Updated every ten (10) seconds
5. "Hold"/Calibration time (minutes) 15-once every 24 hrs.
- B. HCl
1. Inlet to scrubber (yes/no) No
2. Outlet to stack (yes/no) No
3. "Sample and Hold"/Dedicated N.A.
4. Continuous Signal time (minutes) N.A.
5. "Hold"/Calibration time (minutes) N.A.
16. Mercury reduction system required by the Facility (Yes/No) Yes
- To be provided by Seller (Yes/No)
(If yes, per Specification SM-155) No
17. Proposals shall be provided for the following system configurations:
- | | | |
|-------------------------------------|--------------|-------------|
| Electrostatic Precipitator Only | _____ Yes | <u>X</u> No |
| Scrubber/Electrostatic Precipitator | _____ Yes | <u>X</u> No |
| Scrubber/Baghouse | <u>X</u> Yes | _____ No |

Refer to General Arrangement Drawings (See Attachment 8)

- | | | |
|-----|---|-------------------------|
| 18. | *Economizer Outlet Connection (Ref. Section 2.1.7) | |
| | Centerline Height above grade | ** |
| | Height/Width (ft.) | ** / |
| | Distance inside Boiler Building Column Line (ft.) *** | N.A. |
| | Stoker Width (ft.) | 29' - 5 9/16" (approx.) |
| 19. | *Stack Interface **** | See Zurn Drawing |
| | Maximum Breeching Width/Height (ft.) | GA-1 and GA-2 |
| | Stack Shell Outside Dimensions (ft.) | See Zurn Dwg. GA-2 |
| | Stack Foundation Dimensions (ft.) | 63' x 63' |

* These dimensions are preliminary.

** See Boiler Sketch -- Martin GMBH Drawing 2A459Q03

*** Economizer outlet is located beneath the superheater.

**** The existing chimney has a spare flue that was designed for a 400 TPD expansion (and not the 600 TPD planned. The flue will be modified or replaced by others to provide a velocity of ~ 65 ft./sec. @ 270 °F at the outlet.

20. The attached Project Specific Requirements, if any, are clarifications additions, deletions, and/or revisions to the preceding Specification requirements and shall be considered as part of this Specification.

General Overview: The existing and operating Hillsborough County WTE facility consists of three (3) stoker/boiler units rated each at 400 TPD fired by 4,500 Btu/lb municipal solid waste or refuse. Steam produced in these boilers drives a nominal 29 MW condensing steam turbine generator. The expansion will consist of a new independent combustion unit (stoker/boiler/APC train) rated at 600 TPD fired by 5,000 Btu/lb refuse, and a new steam turbine. The specific requirements for the new APC system are per this Specification and as follows.

20.1 Page 1, Section 1.0, General: The APC system described herein is for a 4th boiler train. As such, Seller's supply shall be a complete and independent system for this boiler unit (scrubber, baghouse, ID Fan, etc.) except as amended below.

20.2 Page 1, Section 1.0, General: Seller shall be responsible for field verification of all dimensions for their design and erection. Seller shall note that the drawings included with this specification (ref Attachment 8) may not reflect all the as-built conditions. It is imperative that the Seller make as many field visits as necessary to completely familiarize himself with any and all potential interferences/impacts to his design/erection whether identified on the attached drawings or not.

20.3 Page 1, Section 1.0, General: Seller's design/erection shall minimize impacts to the facility. The design/erection of the new APC train shall not require shut down of the existing equipment. **Any impact shall be noted in the Seller's bid.**

20.4 Page 3, Section 1.2.5, Structural: The APC equipment will be enclosed in an area 121 feet long and 74.5 feet in width. The clear height above the scrubber will be 108 feet and the clear height above the baghouse will be 82.25 feet (See Roof Framing Plan and Steel drawings SK-S-015 and SK-S-016). **Seller to confirm in his proposal that the space provided is adequate. The Seller shall also identify if a smaller space is possible.**

20.5 Page 12, Section 2.2.1, Scrubber Vessel, 1st paragraph, 2nd sentence: The material for the roof, walls, and hopper shall be carbon steel (ASTM A36), except that the scrubber hopper (including hopper outlet flange) and the lower 8 feet of the scrubber cylindrical section shall be all stainless steel 316L hoppers ¼" thick. **This change shall be priced as an option.**

20.6 Page 14, Section 2.2.2, Scrubber Vessel Atomizer/Nozzle Enclosure, Platforms, and Stairways: A weather tight enclosure (penthouse) is not required since the APC system will be enclosed in a building.

20.7 Page 25, Section 2.2.4.9, Slurry Flushing/Chemical Cleaning System: The system shall not employ automatic supply and drain valves. Instead, manual valves shall be employed to flush all portions of the piping in the system.

20.8 Page 27, Section 2.3.1, Baghouse Structure, 1st paragraph, 6th sentence: The casing and roof shall be constructed of minimum ¼ carbon steel (ASTM A36) plate, except that the lower 6 feet of the casing (module walls) shall be ¼ inch stainless steel ASTM 316L. **This change shall be priced as an option.**

20.9 Page 30, Section 2.3.2, Bags/Cages: Seller shall provide pricing and design for the following options.

- a. 20 oz. fiberglass bags in lieu of 16 oz.
- b. Ryton (PPS) bags in lieu of fiberglass bags. The bags shall be 17 oz/yd² and shall be scrim-less (self-supporting). The Ryton bag design option shall be offered using 12 wire cages in lieu of 20 wire cages. The Ryton bags shall be offered in accordance with Attachment 21, PPS Bag/Cage Purchase Guidelines. Where conflicts exist between Attachment 21 and requirements in Sections 2.3.2.1, Pulse Jet Filter Bag Specification and 2.3.2.3, Pulse Jet Cage Specification, these requirements in Attachment 21 shall supercede requirements in those Sections.

20.10 Page 43, Section 2.5, Hoppers, 1st paragraph, 4th sentence: The hopper walls shall be constructed of minimum 1/4" stainless steel (ASTM 316L). **This change shall be priced as an option.**

20.11 Page 94, Section 4.2, Proposal Data and Drawings: The Hillsborough Expansion Project design will be based on 3-D PDS model. Contractor shall provide to Covanta an accurate 3-D

PDS model of the APC equipment and structure. The PDS model provided by the Contractor will be integrated with the rest of the plant model, and it will be utilized for layout of Covanta's piping and electrical work. The PDS model shall include scaled and accurate depiction of the equipment, support structure steel, all platforms, handrails, stairs, ladders, ductwork, and piping. Contractor shall periodically update and resubmit the model incorporating the changes.

ATTACHMENT 2

ECONOMIZER OUTLET OPERATING CONDITIONS (1)

		<u>Expected Continuous(2)</u>	<u>Design(3)</u>
Gas Quantity (wet)	lb/hr	<u>476,891</u>	<u>546,893</u>
Gas Quantity (dry)	lb/hr	<u>421,245</u>	<u>483,079</u>
Gas Volume (wet)	SCFM (@68°F)	<u>109,000</u>	<u>125,000</u>
Gas Temperature	°F	<u>430 - 505</u>	<u>430 - 505</u>
Gas Pressure	IWC	<u>approx. -1.5</u>	<u>approx. -3</u>
<u>Gas Composition (Wet)</u>			-
CO ₂	vol. %	<u>10.286</u>	<u>10.286</u>
O ₂	"	<u>6.237</u>	<u>6.237</u>
N ₂ + Ar	"	<u>65.215</u>	<u>65.215</u>
H ₂ O	"	<u>18.199</u>	<u>18.199</u>
SO ₂	"	<u>0.013</u>	<u>0.0491</u>
HCl	"	<u>0.050</u>	<u>0.0818</u>
HF	"	<u>-</u>	<u>0.0041</u>
Total		<u>100</u>	<u>100</u>
<u>Gas Composition (Dry)</u>			
CO ₂	vol. %	<u>12.574</u>	<u>12.574</u>
O ₂	"	<u>7.624</u>	<u>7.624</u>
N ₂ + Ar	"	<u>79.725</u>	<u>79.725</u>
SO ₂	"	<u>0.016</u>	<u>0.0600</u>
HCl	"	<u>0.061</u>	<u>0.1000</u>
HF	"	<u>-</u>	<u>0.0050</u>
Total		<u>100</u>	<u>100</u>

		<u>Expected Continuous (2)</u>	<u>Design(3)</u>
Mercury ug/NDM ³ @ 7%O ₂		<u>< 0.00115</u>	<u>< 0.00115</u>
<u>Acid Gases (Dry Gas)</u>			
SO ₂	Lbs/hr	<u>141</u>	<u>612</u>
SO ₂	PPMDV	<u>160</u>	<u>600</u>
HCl	Lbs/hr	<u>309</u>	<u>581</u>
HCl	PPMDV	<u>610</u>	<u>1000</u>
HF	Lbs/hr -	<u>-</u>	<u>16</u>
HF	PPMDV	<u>-</u>	<u>50</u>
H ₂ SO ₄	PPMDV at 7% O ₂ (4)	<u>14</u>	<u>45</u>
<u>Particulates (Wet Gas) (5,6)</u>			
gr/scf (68°F)		<u>2.2</u>	<u>2.5</u>
lbs/hr		<u>2,055</u>	<u>2,679</u>

NOTES

1. All data are for one (1) unit and are based on combustion calculations and not the "pitot tube" conditions. The Seller shall provide allowance for in-leakage (3% minimum); this shall be included in Seller's mass balances (assume in-leakage occurs at the economizer outlet connection). In addition, the boiler may be fired on Auxiliary fuel (see Attachment 1), refuse, or a combination of both.
2. Minimum operation will be at 70% of flow based on Expected Continuous operation. During initial start-up of the boiler, economizer outlet flue gas temperatures will be about 330°F. As the boiler fouls, the outlet temperature will increase to the temperature shown. This initial operation will last approximately 4 to 6 weeks. Similar, less severe, conditions may also occur after major boiler overhauls. The scrubber vessel and auxiliaries shall be designed such that acid gas scrubbing can begin at 330°F and 70% of "Expected Continuous" gas flow and flue gas can be passed through the

baghouse modules. Lime consumption and acid gas removal efficiency guarantees are not required for this operation. The Seller shall state the estimated acid gas removal efficiency at this operating point. The Seller shall also list any other system start-up limitations that would affect operation under the above conditions.

3. Seller shall provide mass balance for the Design Condition at the normal operating, high O₂ and high H₂O points shown in figure 1 of attachment 3. For the high O₂ and H₂O cases, the lbs/hr of flue gas and acid gases are the same as shown above. The gas compositions for the High O₂ and High H₂O cases are shown below. Seller shall also provide Mass Balance for the Design Condition based on the highest scrubber outlet temperature shown in note 2 of attachment 3 using the most stringent combination of O₂/H₂O (Ref. figure 1 of Attachment 3) with respect to consumption of lime.

Gas Composition (Vol. % Wet)

	<u>High O₂ Case</u>	<u>High H₂O Case</u>
CO ₂	<u>8.892</u>	<u>10.102</u>
O ₂	<u>8.237</u>	<u>6.125</u>
N ₂ & Ar	<u>67.083</u>	<u>64.050</u>
H ₂ O	<u>15.733</u>	<u>19.661</u>

4. H₂SO₄ concentrations are shown at an O₂ concentration of 7%. The APC system shall be designed to accommodate the range of O₂ concentrations shown in figure 1 of Attachment 3.
5. Minimum particulate loading is 0.25 gr/dscf.
6. Seller's design shall also include the additional particulate loading shown in Attachment 1.

ATTACHMENT 3

REQUIRED GUARANTEES

3.1 Emission Guarantees (1)

Particulates: 0.00874 gr/dscf corrected to 7% O₂.

PM-10 0.00874 gr/dscf corrected to 7% O₂.

Sulfur Dioxide: 80 % min. removal rate or 26 ppmv (dry)(max)
corrected to 7% O₂, whichever is less stringent.

Hydrogen Chlorides: 95 % min. removal rate or 25 ppmv
(dry)(max)corrected to 7% O₂, whichever is less stringent.

Hydrogen Fluoride: - % min. removal rate or 3.5 ppmv (dry) (max)
corrected to 7% O₂, whichever is less stringent.

Sulfuric Acid: - % min. removal rate or 15 ppmv (dry) (max)
corrected to 7% O₂, whichever is less stringent.

Opacity: less than 10 % under all operating conditions and based on
a 6-minute rolling average

Mercury (Required/Optional Price):
28 ug/dscfm corrected to 7% O₂
or 85 % minimum removal rate, whichever
is less stringent, based on a minimum inlet
value of 1.15 mg/dscfm.
 lb/hr.

NO_x: 110 ppmdv corrected to 7% O₂

NH₃: 10 ppmdv corrected to 7% O₂

Averaging Time: The above guarantees shall be verified by the test methods in Section 3.2.1.1
Acid gases that are monitored with CEMS analyzers and subject to averaging times will be
monitored for a 72 hour period to confirm that system response time is sufficient to maintain
compliance. Averaging times are as follows:

3.2 Overall System Static Pressure Drop (1)

Seller shall provide overall maximum and average APC system static pressure drop
guarantees based on the flows and temperatures at the Economizer outlet. The
Maximum pressure drop shall be with one baghouse compartment isolated at the start
of a cleaning cycle. The Average pressure drop shall be the average between the
baghouse cleaning and non-cleaning modes. Correction curves shall be provided as

specified in Section 3.1.1. These guarantees shall be provided for the following operating conditions:

- a. Expected Continuous Operation - Maximum and Average
- b. Design Condition - Maximum and Average
- c. 0.91 x flow at the Design Condition - Maximum only (for use in I.D. fan Test Block Pressure determination)

3.3 Total System Power Consumption

- a. Vendor to supply this data for Expected Continuous Operation and Design Conditions. Guarantee values shall be 24 hour average values and shall include all equipment (except the I.D. fan) supplied by Seller.
- b. Guaranteed maximum power demand.

3.4 Total System Water usage

Seller to supply this data for Expected Continuous Operation and Design Conditions.

3.5 Instrument/Pulse-Jet Air Consumption

3.6 a. Total Reagent Consumption (as 90% CaO) (1)

Vendor to supply this data for Expected Continuous Operation and Design Conditions and correction curves as specified in Section 3.1.1.

- b. Total Activated Carbon Consumption and maximum turn-down.

3.7 Bag Life - 2/3 years (minimum) for Pulse-Jet/Reverse Air Bags

3.8 In addition to the above, Seller shall guarantee that the APC system being furnished will meet all sections of the regulations of applicable regulatory agencies and permits that apply to acid gas removal and particulate removal requirements including test methods, reporting criteria, etc. Copies of which are attached hereto and form an integral part of this Specification (Attachment 9).

3.9 Gas Temperatures for Above Guarantees

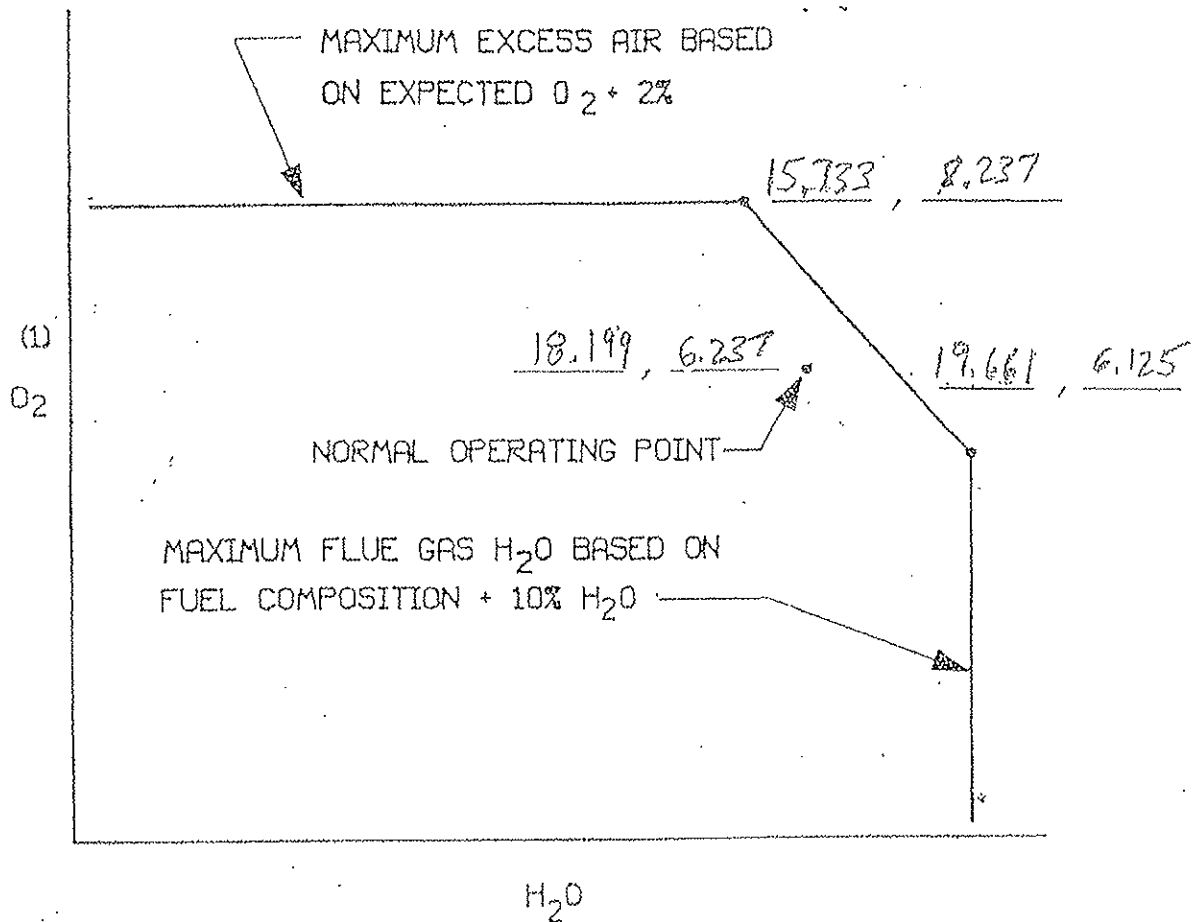
- a. Scrubber Exit (2): 285 °F
- b. Stack Inlet: maximum 10°F drop from Scrubber outlet

3.10 Scrubber Outlet Temperature Distribution

Seller shall demonstrate that the +/- 5 degrees F flue gas temperature distribution is met using the five (5) test port (4-inch) grid at 6-inch spacing increments.

NOTES:

1. These guarantees shall be met for each individual combustion train. The methods of Section 3.2.1.1 and compliance with averaging times as verified with facility CEMS equipment shall be used.
2. Emission guarantees shall also be met for scrubber outlet temperatures ranging from 270 °F to 325 °F.



(1) O_2 IS BASED ON HIGH EXCESS AIR OPERATION.
ADDITIONAL AIR FLOW SHALL BE CONSIDERED.

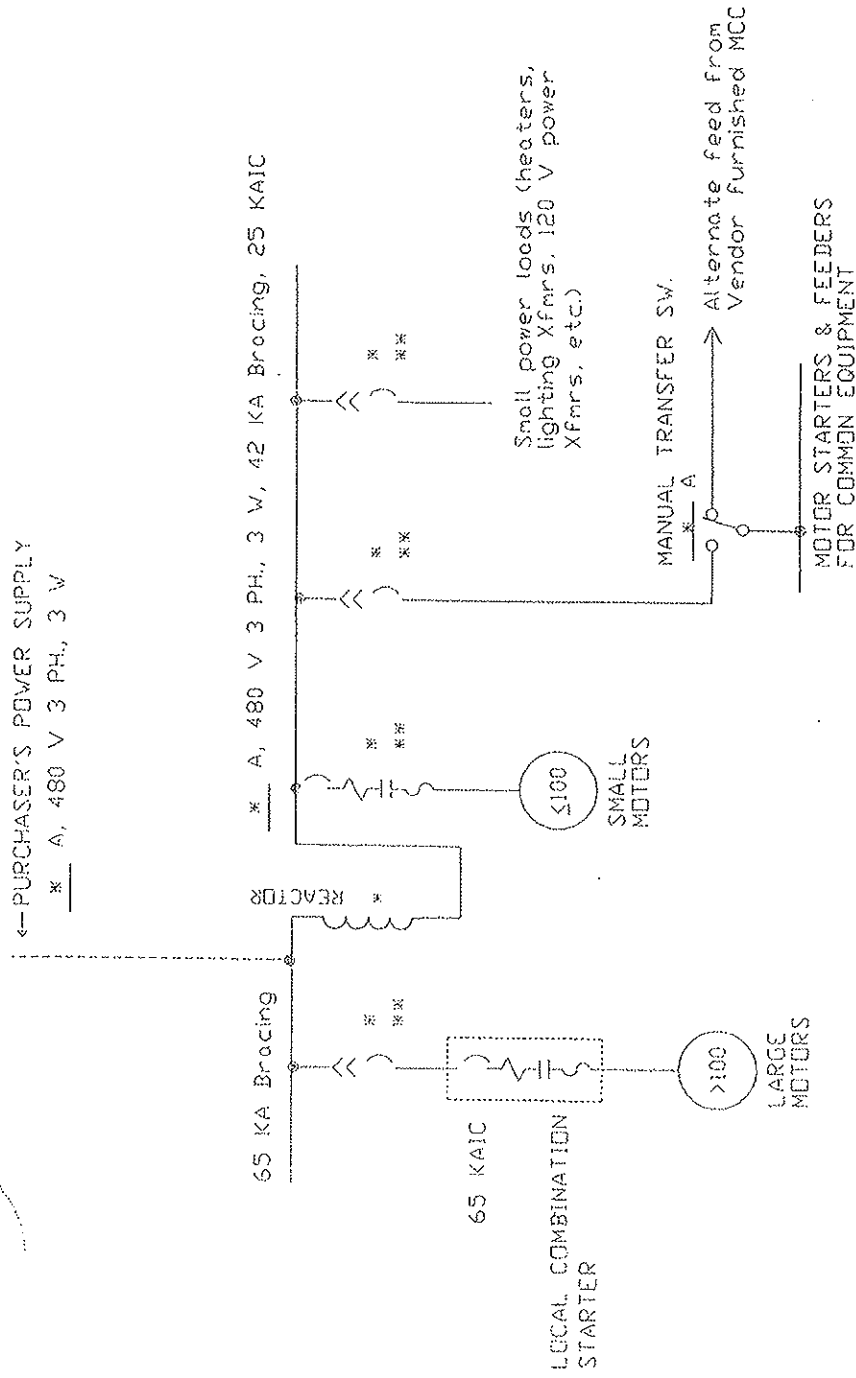
A3-38

	FIGURE 1 EMISSIONS GUARANTEE CURVE	APPROVED:	DATE
		OWS No. SM-105	REV.

ATTACHMENT 4

TYPICAL APC SYSTEM ONE LINE DIAGRAM

SM - 105 ATTACHMENT - 4
TYPICAL FLUE GAS CLEANING SYSTEM ONE LINE



* RATINGS TO BE DETERMINED BY VENDOR.
** QUANTITY TO BE DETERMINED BY VENDOR.

ATTACHMENT 5

SERVICE WATER ANALYSIS

Milligrams Per Liter
(Except Where Units Are Indicated)

	<u>Slaking Water</u>	<u>Scrubber/ Dilution Water</u>
Alkalinity (CaCO ₃)	<u>107</u>	<u>187</u>
Phenol Alkalinity (CaCO ₃)	<u></u>	<u></u>
Noncarbonate Hardness (CaCO ₃)	<u></u>	<u></u>
Total Hardness (CaCO ₃)	<u>188</u>	<u>241</u>
Calcium (Ca)	<u>168</u>	<u>170</u>
Magnesium (Mg)	<u>20</u>	<u>71</u>
Sodium (Na)	<u>31</u>	<u>127</u>
Chloride (Cl)	<u>26</u>	<u>154</u>
Fluoride (F)	<u></u>	<u></u>
Nitrate (NO ₃)	<u>0.6</u>	<u>2.5</u>
Total Phosphate (PO ₄)	<u>< 0.5</u>	<u>< 0.5</u>
Sulfate (SO ₄)	<u>108</u>	<u>160</u>
Total Cations (meq/l)	<u></u>	<u></u>
Total Anions (meq/l)	<u></u>	<u></u>
Total Dissolved Solids	<u>335</u>	<u>743</u>
Turbidity (NTU)	<u></u>	<u></u>
Silica (SiO ₂)	<u>7.2</u>	<u>26</u>
Color (Pt-Co Color Units)	<u></u>	<u></u>
Conductivity (umhos/cm)	<u>493</u>	<u>1093</u>
pH Value (pH Units)	<u>5.9</u>	<u>6.2</u>
Total THM's (ug/l)	<u></u>	<u></u>
Free Chlorine	<u></u>	<u></u>
Gpm available	<u>As Required</u>	<u>As Required</u>
Pressure/Temperature (psig/°F) (at supply point)	<u>As Required / 60</u>	<u>As Required / 60</u>

*Potable water is available at the supply point at / / GPM/psig/°F.

* Same as Slaking Water

ATTACHMENT 5 (Cont'd.)

TYPICAL SCRUBBER/DILUTION WATER ANALYSIS

<u>Component</u>	<u>Range in ppm as CaCO₃</u>	
Ca	100-1000	ppm as CaCO ₃
Mg	50-400	ppm as CaCO ₃
Na	1000-4000	ppm as CaCO ₃
SO ₄	2000	ppm as CaCO ₃
Cl	2500	ppm as CaCO ₃
NO ₃	25-100	ppm as CaCO ₃
HCO ₃	300	ppm as CaCO ₃
SiO ₂	200	mg/l
pH	6.5-8.5	
TDS	4000	
TSS	< 200	
Temperature	45-120	°F
Gpm available	_____	gpm
Pressure Available	_____	psig

Note: The above are based on using cooling tower blowdown from a zero discharge facility.

Appendix 14
Human Health and Ecological
Impact Analysis of the
Hillsborough County Resource
Recovery Facility Expansion



CHROSTOWSKI, PEARSALL & FOSTER

October 25, 2005

Jason Gorrie
Camp Dresser & McKee
1715 North Westshore Blvd., Suite 875
Tampa, FL 33607

**Re: Human Health and Ecological Impact Analysis of the
Hillsborough County Resource Recovery Facility Expansion
(Project No. 6033-44077)**

Dear Jason:

Please find enclosed a copy of the above-mentioned report for your records.

It has been our pleasure working with you on this project and we look forward to a successful application process.

Should you have any questions, or need additional information, please feel free to contact us.

Very Truly Yours,

A handwritten signature in dark ink, appearing to read 'Sarah Foster', is written over a light blue horizontal line.

Sarah Foster, Principal
CPF Associates, Inc.

Attachment

CPF ASSOCIATES, INC.

7708 Takoma Avenue ■ Takoma Park, MD 20912 ■ T: (301) 585-8062 ■ F: (301) 585-2117 ■ www.cpfassociates.com

**HUMAN HEALTH AND ECOLOGICAL IMPACT ANALYSIS OF THE
HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY EXPANSION**

**Prepared by
CPF Associates, Inc.
7708 Takoma Avenue
Takoma Park, Maryland**

**Prepared for
Hillsborough County, Florida
Solid Waste Management Department
601 E. Kennedy Blvd.
Tampa, Florida 33602**

October 2005

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION.....	2
1.1 The Proposed Expansion	2
1.2 Objectives Of This Analysis	2
1.3 Methods Of This Analysis	2
2.0 THE CONTEXT OF WASTE-TO-ENERGY	4
2.1 Federal Regulations and Policies	4
2.2 State Regulations and Policies	6
2.3 Non-governmental Organization Activity.....	7
2.4 Hillsborough County	7
3.0 HUMAN HEALTH AND ENVIRONMENTAL IMPACTS OF WASTE-TO-ENERGY	9
3.1 Environmental Studies at Waste-to-Energy Plants	9
3.2 Epidemiologic Studies	11
3.3 Recent Environmental Monitoring Studies.....	12
3.4 Risk Assessments	14
3.4.1 Montgomery County, Maryland	14
3.4.2 Spokane, Washington	15
3.4.3 Lee County, Florida	15
3.4.4 Lessons Drawn from Risk Assessments	17
4.0 SIGNIFICANT CHARACTERISTICS OF THE PROPOSED EXPANSION ..	19
4.1 Waste Feed Composition	19
4.2 Environmental Controls	20
4.3 Emissions	20
5.0 SITE-SPECIFIC CHARACTERISTICS OF THE FACILITY	23
5.1 Project Environment	23
5.2 Land Use	23
5.3 Human Receptors.....	23
5.4 Ecological Receptors	28
6.0 RISK ASSESSMENT	29
6.1 Multiple Pathway Human Health Risk Assessment	29
6.1.1 Hazard Identification.....	29
6.1.2 Exposure Assessment.....	29
6.1.3 Health Risk Assessment Results.....	35

TABLE OF CONTENTS (Continued)

6.2	Ecological Risk Evaluation.....	40
6.2.1	Habitats and Selected Receptors	40
6.2.2	Toxicity Assessment.....	42
6.2.3	Exposure Assessment.....	42
6.2.4	Ecological Risk Assessment Results.....	45
6.3	Discussion of Uncertainties	45
7.0	SUMMARY AND CONCLUSIONS	47
7.1	Introduction.....	47
7.2	Previous and Ongoing Studies	47
7.3	Regulatory and Operational Evaluation	47
7.4	Human Health Risk Assessment	48
7.5	Ecological Risk Assessment.....	49
7.6	Conclusions	49
8.0	REFERENCES.....	51

ATTACHMENT A: Biographies of CPF Associates, Inc. Scientists

ACRONYMS

ACI	activated carbon injection
APC	air pollution control
BACT	best available control technology
CAA	Clean Air Act
DEP	Florida Department of Environmental Protection
EPA	U.S. Environmental Protection Agency
FF	fabric filter
FIFRA	Federal Insecticide Fungicide and Rodenticide Act
LCA	life cycle analysis
MACT	Maximum Achievable Control Technology
MW	megawatts
MSW	municipal solid waste
MWC	municipal waste combustor
NOx	nitrogen oxides
PCBs	polychlorinated biphenyls
PCDD/PCDFs	polychlorinated dibenzo-p-dioxins and dibenzofurans
PPSA	Florida Electrical Power Plant Siting Act
PSD	Prevention of Significant Deterioration
RCRA	Resource Recovery and Conservation Act
RRF	resource recovery facility
RTF	Recycling Task Force
SDA	spray dryer absorber
SIP	State Implementation Plan
SNCR	selective non-catalytic reduction
SWMD	Hillsborough County Solid Waste Management Department
TECO	Tampa Electric Company
TEQs	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxic equivalents
TPD	tons per day
TSCA	Toxic Substance Control Act
USCOM	U.S. Conference of Mayors
WERT	Waste to Energy Research Council
W-T-E	waste to energy

HUMAN HEALTH AND ECOLOGICAL IMPACT ANALYSIS OF THE HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY EXPANSION

EXECUTIVE SUMMARY

Hillsborough County is proposing to expand the solid waste processing capacity of its existing Resource Recovery Facility from 1,200 to 1,800 tons per day. Hillsborough County requested CPF Associates, Inc., an independent scientific research and consulting organization, to evaluate the potential for negative human health or ecological impacts associated with the expansion. CPF's evaluation was conducted by: (a) researching the scientific and regulatory literature regarding waste-to-energy facilities, (b) analyzing site-specific information concerning the proposed expansion project, including the information presented in the County's Power Plant Siting Act permit application, and (c) performing standardized risk assessment calculations and analyses. The results of CPF's analysis show that the proposed expansion project is unlikely to have a negative impact on human health or the environment if constructed and operated as stated in the County's permit application.

1.0 INTRODUCTION

1.1 The Proposed Expansion

Hillsborough County owns a 1,200 ton per day (TPD) resource recovery facility (RRF), which is operated as part of the County's Integrated Solid Waste Management System. The RRF, comprised of three 400 TPD combustion units, incinerates municipal solid waste (MSW), produces steam, and converts the steam to electricity, which is sold to the Tampa Electric Company. Due to residential and commercial growth in the County since the RRF became operational in 1987, the 1,200 ton per day capacity of the existing plant has become inadequate. The County Commission has concluded that it should increase the RRF's capacity to 1,800 tons per day. The proposed RRF expansion project would involve the addition of a new 600 ton per day boiler and certain ancillary equipment.

1.2 Objectives Of This Analysis

The permit process for the proposed fourth unit at the RRF will require the submittal of a number of application documents. These include a Site Certification Application to comply with the Florida Electrical Power Plant Siting Act (PPSA), and an application for a permit under the Prevention of Significant Deterioration (PSD) program to comply with the Clean Air Act. PPSA approval to construct the fourth unit will be determined by the State of Florida's Siting Board (i.e., Governor and Cabinet). The PSD permit will be issued by the Florida Department of Environmental Protection (DEP).

The Human Health and Ecological Impact Analysis presented in this document was performed to address questions related to human and environmental health that may arise during the course of the permit processes. This analysis is not a formal requirement of the permit processes for the County's expansion project, but was conducted to ensure that issues of potential concern related to the proposed RRF expansion were evaluated.

This Human Health and Ecological Impact Analysis was performed by CPF Associates, Inc., a Washington, D.C.-based scientific and regulatory consulting firm. Appendix A provides biographies of the CPF scientists who participated in this effort.

1.3 Methods Of This Analysis

This analysis consists of several parts. First, information regarding the operation of Hillsborough County's Solid Waste Management System, including the existing RRF and the proposed RRF expansion, was obtained and reviewed. Second, information about the regulatory context of waste-to-energy facilities is

evaluated and the implications investigated for the proposed Hillsborough expansion. Following these activities, a scientific literature search and review was conducted to obtain information relevant to the analysis, including general information about analogous facilities and specific information about the west Florida environment. Hillsborough County's engineer, CDM, was requested to perform survey work to obtain site-specific information that was pertinent to the analysis. CDM also conducted air dispersion and deposition modeling to address the behavior of the RRF's stack emissions in the environment. The results of the modeling were used as inputs to a health risk assessment.

Risk assessment is an important tool that can be used to evaluate the probability of adverse effects from various types of activities or situations. This well-recognized method of analysis can assist in identifying the probability of adverse health effects occurring as a result of exposure to chemicals. It is also often used in a regulatory context, in which risk assessment results are compared to regulatory target risk levels. The U.S. Environmental Protection Agency (EPA), and numerous other regulatory and research organizations, including the National Academy of Sciences, have developed guidelines for the performance of risk assessments. These guidelines were followed in the assessment of the proposed expansion of the Hillsborough County RRF.

2.0 THE GENERAL CONTEXT OF WASTE-TO-ENERGY

In 2003, Americans generated 236.2 million tons of municipal solid waste (MSW) for a generation rate of 4.45 pounds per person per day (EPA 2005). Approximately 23.5% of this material was recycled and 7.1% was composted. The remaining 69.4% required disposal. The majority of the waste slated for disposal was landfilled (55.4%) and another 14% was combusted for energy recovery. This latter option is known as waste-to-energy, trash-to-energy, or resource recovery.

All methods of waste management involve some potential human health or environmental risks. In the United States, regulatory programs have been implemented to minimize the risks from MSW management activities. This section explores the use of waste-to-energy and places it in context at the federal, state, and county levels, with an emphasis on those regulatory factors relevant to the protection of human health and the environment.

2.1 Federal Regulations and Policies

At the national level, there are currently 89 waste-to-energy plants operating in 27 states (Norris 2005). They generate about 2,700 megawatts of electricity from the processing of 95,000 tons of MSW each day. The electricity generated meets the energy needs of about 2.3 million homes and may be viewed as a replacement for about 48 million barrels of oil each year.

At the federal level, the primary regulatory agency is the Environmental Protection Agency (EPA), which regulates both the management of MSW and the air emissions from waste-to-energy plants. The primary vehicles for regulation are the Resource Recovery and Conservation Act (RCRA) and the Clean Air Act (CAA).

RCRA defines solid and hazardous wastes and sets up an overall management strategy. Among other things, RCRA forbids the disposal of hazardous and medical wastes at MSW disposal sites. This ensures that hazardous and medical wastes will not be combusted at the Hillsborough RRF. RCRA also delegates specific regulatory programs for the management of MSW to the states. The federal role in this context is to establish minimum criteria that describe the best practicable environmental controls and monitoring requirements for solid waste disposal facilities. Other specific federal regulations that impact waste disposal in waste-to-energy plants include the Toxic Substance Control Act (TSCA), which bans the disposal of polychlorinated biphenyls (PCBs) with MSW, and the Federal Insecticide Fungicide and Rodenticide Act (FIFRA), which regulates the disposal of pesticides and pesticide containers. RCRA

regulates the ash that is generated during the MSW combustion process at a resource recovery facility.

The CAA is the other primary vehicle for the regulation of waste-to-energy plants at the federal level. There are several provisions of the CAA that apply to the Hillsborough RRF, such as those regulating the prevention of significant deterioration (PSD) of air quality. In this case, the provisions of the CAA that are most relevant to the protection of human health and the environment are the New Source Performance Standards (NSPS) for new large MSW combustors, such as the Hillsborough RRF, which are contained in Subpart Eb of 40 CFR Part 60 ("Standards of Performance" for Large Municipal Waste Combustors for which Construction is commenced after September 20, 1994) (EPA 1995).

The overall objective of the NSPS in Subpart Eb is to ensure that emissions from waste-to-energy plants do not occur at levels that could pose a public health threat. The NSPS requires the implementation of Maximum Achievable Control Technology (MACT) to limit the amount and number of pollutants that may be emitted from a large MSW combustor. In the CAA, MACT is defined as the maximum degree of reduction in emissions of designated air pollutants, taking into consideration various factors. In the case of MSW combustors, the designated pollutants subject to MACT include dioxins and furans, cadmium, lead, mercury, particulate matter, hydrogen chloride, sulfur dioxide, nitrogen oxides, and fugitive ash emissions. In addition to the MACT controls on these specific pollutants, the NSPS require the use of good combustion practices (combustion efficiency) and imposes requirements for facility siting, operator training and certification, compliance and performance testing, and reporting and recordkeeping. Under the CAA, the State of Florida has a federally-approved State Implementation Plan (SIP) and the State has been delegated the authority to issue a permit under the NSPS Subpart Eb.

EPA (2002) examined the reductions in pollutant emissions from large waste-to-energy facilities as a result of the implementation of the NSPS. The following table compares emissions in the year 2000 to the year 1990 (Table 2-1).

Table 2-1
Reduction in Emissions Associated with NSPS

Pollutant	Reduction in %
Dioxins/furans	99.7
Mercury	95.1
Cadmium	93.0
Lead	90.9
Hydrochloric acid	94.3
Sulfur dioxide	86.7
Particulate matter	89.8

Based on these data, EPA (2002) concluded that the "performance of the MACT retrofits has been outstanding." The Agency also noted that "since 1990 (pre-MACT conditions), dioxin/furan emissions have been reduced by more than 99 percent, and mercury emissions have been reduced by more than 95 percent." Since the potential for public health impacts usually is proportional to the amount of emissions, these significant reductions in WTE emissions should provide a positive impact on public health.

In 2003, EPA concluded that the use of MACT at WTE facilities allows municipal solid waste to be used "as a clean, reliable, renewable source of energy." Further, EPA noted that WTE plants in the U.S. "produce 2800 megawatts of electricity with less environmental impact than almost any other source of electricity." (EPA 2003).

2.2 State Regulations and Policies

Increases in Florida's population have resulted in large increases in MSW generation. In 2000, for example, a total of 25.7 million tons of MSW were collected in Florida (DEP 2002). This represents a substantial increase (32%) from 1991, when the corresponding amount was 19.5 million tons. The per capita generation rates have also increased 6%, from 8.3 pounds per person per day in 1991 to 8.8 pounds per person per day in 2000. Hillsborough County ranks fourth in the state in waste generation rates. The largest component of Florida's MSW stream is paper (newspapers, corrugated paper, other paper) at 24.8%, followed by construction and demolition debris (23.2%) and yard trash (14%). In 2000, 5.56 million tons of MSW were processed by incineration, 7.05 million tons by recycling, and 14.87 million tons by landfilling.

Waste to energy capacity in Florida has grown from one plant in 1982 to 13 operating plants in 2002 (DEP 2002) with a total capacity of 19,176 tons per day. These plants generate about 534 megawatts of electricity daily. The waste-to-energy capacity in Florida is greater than any other state in the US. The primary reasons for the success of waste-to-energy in Florida are the vulnerability of groundwater resources to potential leachate emissions from landfills and the lack of suitable landfill space. In addition, the energy crisis of the mid-1970s led to increased reliance on alternative energy technologies. Current shortages and high costs of fossil fuels underscore the desirability of waste-to-energy compared with oil or natural gas. The largest operating waste-to-energy plant in the state is the Pinellas County Resource Recovery Facility (3,150 tons per day), followed by the Miami-Dade County Resources Recovery Facility, and Broward County's two resource recovery facilities.

The State of Florida regulates waste-to-energy plants under Chapter 403 of the Florida Statutes and Florida Administrative Code Chapter 62, which provides for the implementation of the NSPS (Subpart Eb 40 CFR 60). Under Florida law, a WTE facility must seek approval under the PPSA if the Facility will generate 75

MW or more electricity. A WTE facility that generates less than 75 MW may seek approval under the PPSA or seek individual permits. In either case, a WTE facility is subject to comprehensive and detailed review procedures to determine whether the facility will comply with all applicable local, state, and federal environmental regulations.

2.3 Non-governmental Organization Activity

Several non-governmental organizations have addressed questions regarding the utility of waste-to-energy facilities. In 2005, the U.S. Conference of Mayors (USCOM) adopted a resolution that supported the use of waste-to-energy as a component of a comprehensive solid waste disposal management strategy. The USCOM cited waste-to-energy as safe, environmentally sound, and efficient and noted significant benefits with respect to energy diversity and security in addition to the environmental benefits.

The Waste to Energy Research Council¹ (WERT) has sponsored a significant amount of research regarding the environmental, energy, and policy implications of waste-to-energy. WERT-sponsored research (published by Themelis & Millrath (2004)) reviewed the available information and concluded that waste-to-energy should be considered as a component of a renewable energy portfolio. The benefits of waste-to-energy cited by these researchers include low emissions, diversion of waste from landfilling, no impact on recycling rates, and energy generation.

2.4 Hillsborough County

Hillsborough County is located on the central west coast of Florida. The 2004 population was 1,115,960. About 2/3 of the population lives in unincorporated areas and the remainder in the incorporated cities of Tampa, Temple Terrace, and Plant City. The Hillsborough County Solid Waste Management Department (SWMD) is responsible for the operation of an Integrated Solid Waste Management System that provides for the collection, transportation, and disposition of solid waste within the County². The SWMD service area consists of the unincorporated area of the County, but various services also are provided to Tampa and Temple Terrace. Facilities under the SWMD include (a) the current 1,200 ton per day waste-to-energy plant, (b) a Class I landfill, (c) two solid waste transfer stations, (d) solid waste collection, yard waste processing and community collection centers, (e) a household hazardous waste collection program, and (f) a waste tire processing program. In addition, the County operates several recycling programs, including drop-off recycling centers and programs for used oil recycling, scrap metal recycling, lead acid battery recycling, and waste reduction.

¹ www.columbia.edu/cu/wtert

² www.hillsboroughcounty.org/solidwaste/disposition/home.cfm

The current waste-to-energy plant, known as the Hillsborough County Resource Recovery Facility (RRF), has been in operation since October 1987. The facility has 39 MW of electrical generating capacity and has a daily power output of about 29 MW (equivalent to the amount of electricity generated with 1,200 barrels of oil). Air pollution control equipment currently used at the plant consists of (a) a spray dryer absorber (SDA) to remove large particles, sulfur dioxide and acid gases, (b) a fabric filter (FF) to remove small particles, (c) an activated carbon injection (ACI) system to remove mercury, and a selective non-catalytic reduction (SNCR) system to reduce nitrogen oxide (NOx) emissions. Continuous monitors installed at the outlet of the boilers and inlet to the FFs are used to ensure proper combustion conditions and operation of emission controls.

The proposed RRF expansion project will increase the MSW processing capacity to 1,800 tons per day and the electrical generation capacity to 47 MW. Air pollution control equipment for the proposed fourth MWC unit will be similar to that used in the existing 3 MWC units: SDA, FF, ACI, and SNCR, in conjunction with continuous emission monitors. One notable exception is that the proposed fourth unit will use an "enhanced" SNCR system that will be capable of controlling NOx to lower levels than the existing three units. Section 3 of the PPSA application and the County's PSD application discuss these devices in greater detail and demonstrate that these systems reflect best available control technologies (BACT). Section 6 of the PPSA application demonstrates that the new MWC unit, as well as the proposed four-unit facility, will comply with the emissions requirements of the NSPS. Given these facts, it is anticipated that the facility will be able to meet EPA's environmental and public health goals with respect to pollutant emissions.

3.0 HUMAN HEALTH AND ENVIRONMENTAL IMPACTS OF WASTE-TO-ENERGY

A number of health studies and risk assessments have been conducted for waste combustion facilities. Arguably, the most important of these studies was the National Academy of Sciences/National Research Council's report on waste incineration and public health (NAS/NRC 2000) which reviewed all of the information then available on potential associations between incinerator emissions and public health³. Other studies, including numerous human health and environmental risk assessments have been conducted on specific facilities. These studies indicate that stack emissions from a modern MSW waste-to-energy plant regulated under the NSPS will not cause adverse health effects if it is designed and operated in accordance with current state and federal regulations. This section presents information from the scientific literature regarding potential environmental and health impacts associated with waste-to-energy plants and other waste combustion facilities.

3.1 Environmental Studies at Waste-to-Energy Plants

Monitoring studies have been conducted around numerous waste-to-energy plants and these have shown that emissions from a modern facility do not produce measurable changes in environmental chemical concentrations or the levels of chemicals in animal tissues. Samples have been collected from ambient air, soil, cow's milk, vegetation, and human blood and milk.

The EPA conducted an intensive study of ambient air quality in the area of a 240 ton per day waste-to-energy plant in Rutland, Vermont (EPA 1991). Ambient air monitoring locations for dioxins and particulate matter were selected based on wind patterns in the facility area and air dispersion modeling. The EPA concluded from the monitoring results that the facility was not the primary source of dioxins in ambient air in the vicinity of the facility. The study also found no correlation between the amount of waste combusted and ambient air particle concentrations.

Soil sampling for dioxins was conducted by scientists from the Ontario Ministry of Environment in the vicinity of a municipal solid-waste combustor in Hamilton, Ontario (McLaughlin et al. 1989). The soil sampling, conducted after 10 years of facility operation, was initiated due to airborne dioxin emissions in excess of Provincial guidelines. The 14 soil samples included 3 control sites and the predicted point of maximum impact. The authors concluded that there was no measurable change in surface soils in the plant vicinity as a result of stack emissions.

³ This report dealt with hazardous waste and medical waste incineration in addition to MSW combustion.

Scientists from Cornell University and the Horticultural Research Institute of Ontario analyzed vegetation around a municipal solid waste combustor for metals and PCBs (Bache et al. 1991). The incinerator had been in operation for approximately 7 years prior to sample collection. Statistical analyses of the sampling results indicated that PCBs and 5 of the 6 metals evaluated, including mercury, were not significantly higher than background concentrations.

The Connecticut Agricultural Experiment Station analyzed cow's milk samples for chlorinated dibenzodioxins and furans near a new waste-to-energy plant before and 1 year after the facility went into operation (Eitzer 1995). The data showed no statistically significant differences between pre-operational and post-operational concentrations.

The State of Massachusetts conducted a study of metal concentrations in soil around the SEAMASS waste-to-energy plant in Rochester after the facility had been operating for several years (MDEP 1996). The combustor's emissions had no detectable effect on mercury concentrations in either air or soil around the facility.

Scientists from the Institute of Toxicology in Germany collected samples of blood and human milk from persons living 8 or more years in the vicinity of a municipal solid waste combustor that had been in operation for 13 years (Deml et al. 1996). The authors concluded that living in the vicinity of the incinerator did not result in a higher body burden for dioxins and furans.

The topic of global climate change has emerged as an important environmental issue of the 21st Century. In essence, scientists believe that increased emissions of greenhouse gases associated with human activity may result in changes in the earth's climate. The most discussed consequence of this is the phenomenon of global warming – i.e., the temperature of the atmosphere will increase to the extent that there could be impacts to both the human and natural environments. Human impacts could range from a rise in coastal waters to a shift in the ability of various regions to produce crops. The potential impact of waste to energy on greenhouse gas emissions relative to other waste management activities such as landfilling has been evaluated by several scientists (Batchelor et al. 2002, Eschenroeder 2001, Thorneloe et al 2002). These studies show that waste-to-energy is associated with a reduced environmental impact compared to landfilling when potential effects on the global climate are concerned. There are several reasons for this result, however, the most significant reasons are the fact that waste-to-energy plants emit carbon dioxide, which has less of an impact on global climate than the methane emitted from landfills, and that waste-to-energy displaces the need to generate electricity from fossil fuels.

An alternative mode of evaluating health and environmental impacts is through life cycle analysis (LCA). LCA looks at the entire life cycle of a product or

process. For example, it could be used to compare recycling, waste-to-energy, and landfilling for the management of different components of MSW such as paper, various plastics and other materials. Although full scale LCAs have not been performed for MSW, the available data (Dewuld & van Langenhove 2002) suggest that waste-to-energy is similar to recycling with respect to the energy impacts of the life cycle of combustible materials.

3.2 Epidemiologic Studies

Researchers at the University of North Carolina studied whether living near waste combustion plants increases the occurrence of respiratory health effects (Shy et al. 1995). The study focused on people living near a biomedical waste incinerator, a waste-to-energy plant, and an industrial furnace fueled by liquid waste. The authors concluded that there was no difference in acute or chronic respiratory symptoms or lung function between the communities living near the waste combustors and the comparison communities. The also concluded that particle and acid gas emissions from the three waste combustors contributed trivial amounts to air concentrations in adjacent neighborhoods. In a follow-up study (Hu et al. 2001), the authors again found no significant associations between exposures for any of the waste combustion facilities and lung function tests. One result for the waste-to-energy facility did show a statistically significant relationship for lung function but this result was only observed for one of the three years of the study and when using only one of the four different types of exposure estimation methods.

The National Academy of Sciences (NAS/NRC 2000) evaluated available epidemiological data regarding waste incineration and health effects in surrounding communities and concluded that waste combustion facilities that are in compliance with EPA's Maximum Achievable Control Technology (MACT) requirements pose minimal or negligible risks to surrounding communities. NAS also noted that for modern, well-controlled waste combustors, risk assessments show that potential cancer effects even for the most highly exposed persons in the surrounding areas are generally small to negligible.

Two recent health studies have been published in Europe. Although European standards for waste-to-energy plants are similar to those in the United States, there are differences with respect to the implementation dates, methods of calculating the emissions, and the emission levels themselves. Thus, the European studies should be used only in a supporting or confirmatory sense to the U.S. studies. Rabl and Spadaro (2002) reviewed the potential for human health and environmental impact assuming all MSW was incinerated under the new European regulations that were promulgated in December 2000. These authors looked at several different indicators of environmental performance including:

- Increase in chemical concentration compared to background,

-
- Increase in chemical concentration compared to health guidelines,
 - Health risks of various pollutants compared to each other,
 - Increased damage cost (monetary value of health impacts) compared to the cost of incineration itself,
 - Difference in emissions compared to other emission sources, and
 - Difference in years of life lost due to MWCs compared to other risks of everyday life.

They concluded that the health impacts of MSW incinerators were insignificant using any of these comparisons as long as the European standards were met.

Enviros/University of Birmingham (2004) undertook a systematic review of epidemiological studies of the public health effects of waste incinerators. Specifically, these investigators looked at evidence for ill-health in people who might possibly be affected by emissions from MSW processes. They concluded that health effects in people living near waste management facilities were either generally not apparent or the evidence was not consistent or convincing.

3.3 Recent Environmental Monitoring Studies

Detailed environmental monitoring studies have been undertaken at two Covanta waste-to-energy facilities – the Montgomery County facility in Dickerson, Maryland, and the Union County facility in Rahway, New Jersey. Since Covanta operates the Hillsborough County RRF, the information gained from these studies can yield useful insights about Covanta's operations and the Hillsborough County facility.

The Montgomery County facility consists of three 600 TPD combustion units. The air pollution control equipment and electrical generating capacity of the Montgomery County facility are similar to those at the Hillsborough County facility. Each unit has a separate flue and is equipped with a dry scrubber and fabric filter baghouse, direct lime injection into the furnace, ammonia injection at the top of the furnace, and activated carbon injection at the scrubber inlet (Rao et al. 2003). The Montgomery County facility has been operating since 1995. Although the population of Montgomery County is approximately 800,000 people, the land use around this facility is semi-rural, and includes residential units, agricultural (including dairy) operations, and fishery resources. Roy F. Weston, Inc. was contracted by Montgomery County to conduct an ambient air monitoring study (Weston 1998) and a non-air monitoring study (Weston 2000).

Weston (1998) evaluated both air toxics and meteorologic data before the facility went into operation (pre-operation) and after the facility had been operating for approximately two years (post-operational). Air toxics monitoring included dioxins/furans, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, formaldehyde, arsenic, cadmium, chromium, lead, mercury, and nickel. Particulate matter was also monitored. Numerous long-term and short-term

measurements were obtained. The number of post-operational measurements ranged from 20 for PCBs to 79 for dioxins and furans. The primary monitoring site was situated near the maximum point of annual ground-level air and dry deposition concentrations, as predicted by air dispersion/deposition modeling. Weston concluded that no major differences in air quality were observed at any operating sites when pre-operational and post-operational measurements were compared. Additionally, Weston concluded that the facility did not have a significant impact on air quality in the surrounding region.

The non-air media report (Weston 2000) evaluated chemical concentrations in soil, earthworms, cow's milk, forage/hay, vegetables, surface water and sediment, and fish tissue. The monitoring locations were selected based on local meteorology, air modeling, and the results of a human health risk assessment. Pre-operational sampling was conducted in 1994 and post-operational sampling was conducted in 1996 and 1998. The samples were analyzed for dioxins/furans, PAHs, PCBs, arsenic, beryllium, cadmium, chromium, lead, mercury, and nickel. The results showed that there were no statistically significant or consistent patterns detected between the pre-operational and post-operational phases of the study. Many of the environmental media sampled during the post-operational phase had concentrations approximately equivalent to or less than the pre-operational conditions. In some media, the concentrations increased; however, the investigators felt that this change was a reflection of scientific uncertainty rather than an actual impact. The study concluded that the operation of the facility had not caused unacceptable increases in target compound concentrations.

The Union County, New Jersey facility is a 1,440 TPD resource recovery facility that has been operating since 1994 in Rahway. The land use around the facility is highly industrial, dominated by heavy industry and transportation uses. The Union County Utilities Authority contracted with Paulus, Sokolowski and Sartor, Inc. (PSS) and HDR Environmental Engineering, Inc. (HDR) to conduct on-going monitoring studies in the air and other media around this facility (PSS 1993, PSS 1997, HDR 1998). As with the Montgomery County facility, these studies consisted of both pre- and post-operational monitoring. The chemicals of potential concern included PCBs, dioxin (2,3,7,8-TCDD), arsenic, beryllium, cadmium, chromium, lead, mercury, and nickel. In addition to ambient air, soil, sediment, surface water, food crops (lettuce, radishes, tomatoes) and fish have been evaluated periodically, both pre- and post-operationally. The post-operational data show that the chemicals of potential concern are present at levels consistent with those anticipated for an urban industrial environment. Additionally, the reports suggest that the post-operational samples are consistent with the pre-operational samples. This program is continuing.

The results of these two recent studies, based on operating Covanta facilities similar to the Hillsborough County RRF, show that the RRF facilities do not cause any discernable impact on the local environment with respect to the chemicals

that are considered to be the most significant trace components of waste-to-energy emissions. These results are consistent with the results that are reported elsewhere in the literature. They suggest that similar results would likely be obtained in Hillsborough County.

3.4 Risk Assessments

Risk assessments are formal scientific evaluations of information regarding the potentially hazardous effects of exposure to chemicals in the environment. Risk assessments of waste-to-energy facilities are often used to determine if these facilities are capable of meeting regulatory or statutory goals with respect to protection of human health and the environment. Although risk assessments of waste-to-energy plants have been performed for several decades, they have become standardized since the early 1990s (Hattermer-Frey & Travis 1991, CARB 1990). This standardization allows risks associated with different regulatory schemes and air pollution control technologies to be extrapolated from plant to plant. Most recently, risk assessors have further standardized the process by relying on EPA guidelines for performing hazardous waste incinerator risk assessments (EPA 1998a). These assessments are based on a highly standardized approach that allows regulators to readily use their results to make environmental health decisions.

The results of recent comprehensive risk assessments conducted for the waste-to-energy facilities in Montgomery County, Maryland, the City of Spokane, Washington, and Lee County, Florida, also provide insight into the potential risks associated with the Hillsborough County facility (Rao et al. 2003, Pioneer 2001, Clement 1992, CPF 2002). These risk assessments are pertinent because these facilities are state-of-the-art plants operated in accordance with the NSPS, as is the Hillsborough County facility.

3.4.1 Montgomery County, Maryland

The Montgomery County facility risk assessment relied on measured stack emission rates since 1995 and on-site meteorological data to calculate potential risks through multiple exposure pathways for 19 selected chemicals of potential concern, including PCDD/PCDFs and mercury. As noted above, this facility is operated by Covanta and it has similar electrical generating capacity and equipment as the Hillsborough facility. Risks for the Montgomery County facility were calculated for a typical resident at two maximum impact locations, as well for a subsistence farmer, a subsistence fisherman, and a pond fishing scenario. The excess lifetime cancer risks were calculated to range from 14 to more than 400 times less than the one in 100,000 ($1E-5$) target cancer risk level. The predominant compounds contributing to the cancer risks were PCDDs/PCDFs. The non-cancer hazard index values were calculated to be equivalent to or below a target hazard index value of 1, with mercury accounting for the majority of the risk results. Based on the risk assessment, it was concluded that no adverse

non-cancer health effects are expected, and that cancer risks are lower than 1 in one million, as a result of exposure to facility-related emissions (Rao et al. 2003).

3.4.2 Spokane, Washington

The Spokane, Washington facility is comprised of two MWC units, each capable of managing roughly 800 TPD of municipal solid waste. The air pollution controls on each unit consist of lime slurry spray dryer absorbers followed by fabric filter baghouses. A carbon injection system also is used. An anhydrous ammonia, thermal DeNox, selective non-catalytic system is also used for nitrogen oxides control.

The risk assessment utilized 10 years of measured emissions data to calculate potential risks through multiple exposure pathways at a maximum off-site impact point. Risks were evaluated at this point for a typical resident, a subsistence farmer, a subsistence fisher and infants. The results were determined to be below Washington state target risk levels (i.e., a non-cancer hazard index below 1 and an excess lifetime cancer risk below one in one hundred thousand). The predominant chemicals contributing to the non-cancer risk results were hydrogen chloride via inhalation and methyl mercury via ingestion of fish. The predominant compounds contributing to the cancer risks were PCDDs/PCDFs due to ingestion of animal products.

3.4.3 Lee County, Florida

The risk assessment performed for the Lee County Solid Waste Energy Recovery Facility (ERF) is particularly relevant to the proposed Hillsborough RRF expansion for a number of reasons. There are similarities between these two facilities in waste stream composition, emission controls, land use, climate, and state regulatory programs. In addition, the Lee ERF project involved a 600 TPD expansion of an existing facility, unlike the Montgomery County or Spokane projects, which were newly constructed. In addition, the Lee County and Hillsborough County combustion facilities are both operated by Covanta. These similarities mean that the Lee County risk assessment, which will be presented in the remainder of this section, is uniquely applicable to the Hillsborough County project and can indicate the likelihood of potential risks associated with the Hillsborough County proposal.

Municipal solid waste from Lee County and Hendry County is processed at the Lee County Solid Waste Energy Recovery Facility, which began operation in 1994. Lee County proposed to add a third combustion unit to the ERF to accommodate excess municipal solid waste that is being generated. A series of studies over more than a 10 year period were used in the Lee County ERF risk assessment process.

Two studies conducted in 1992 evaluated the potential human health and

ecological impacts of the currently operating Lee County ERF. These studies concluded that construction and operation of the facility would not adversely affect humans or threatened or endangered species. Lee County also initiated a biological monitoring program in 1993 to determine if operation of the facility was correlated with mercury levels in aquatic life. The program results suggest that mercury concentrations in aquatic life in the area are generally similar to the levels typical of South Florida and not associated with operation of the ERF.

The risk assessment for the expanded facility relied on air dispersion and particle deposition modeling conducted to calculate air concentrations and deposition rates associated with the proposed ERF (i.e., operation of the two existing units plus the proposed third unit). This information was then used in EPA environmental fate and transport models to calculate chemical concentrations in soil, produce, surface water, beef and fish. Air concentrations were calculated for all of the chemicals regulated under the facility's air permit. Mercury and polychlorinated dibenzodioxin and dibenzofuran (PCDD/PCDF) concentrations were calculated for the other environmental media. The model inputs included a substantial amount of local site-specific data. Overall, the models and input assumptions are expected to provide conservative (i.e., health protective) calculations of potential environmental concentrations.

The calculated environmental concentrations associated with stack emissions from the proposed three-unit Lee County ERF were compared with typical environmental levels. These comparisons showed that the environmental concentrations associated with the proposed three-unit ERF are consistent with or below typical environmental concentrations, thus the proposed expansion will not measurably increase the typical concentrations of chemicals in the environment.

The human health risk assessment was conducted following current EPA guidance and is summarized below:

- Potential human health risks were evaluated in two types of risk assessments. An inhalation risk assessment was performed for all chemicals currently regulated under the facility's air permit using permit limit-based emission rates. A more refined multiple pathway risk assessment was also performed for mercury and PCDDs/PCDFs using emission rates based on long-term stack gas measurements.
- In the inhalation risk assessment, inhalation exposures were calculated for two hypothetical groups of people, an adult resident and a child resident. In the multiple pathway risk assessment, exposures were calculated for 12 different hypothetical groups of people, including adults, children and infants. The exposure pathways considered in the multiple pathway assessment were inhalation, soil ingestion, ingestion of produce, beef and fish, and ingestion of breast-milk.

-
- A variety of evaluations were performed in the human health risk assessment. Chronic long-term excess lifetime cancer risks were found to be at least 10 times lower than EPA's combustion risk assessment target risk level of 1×10^{-5} (one in 100,000) and did not exceed Florida's common target risk level of 1×10^{-6} (one in 1,000,000). Chronic long-term noncancer effects were predicted not to occur, with a large margin of safety (i.e., calculated exposures were at least 10 times lower than the common regulatory noncancer target exposure levels). An analysis of short-term acute inhalation adverse effects showed that these effects will not occur with a large margin of safety (i.e., calculated short-term air concentrations were at least 100 times lower than health-based reference air concentrations).

An ecological risk assessment was also conducted in accordance with EPA guidelines and is summarized below.

- The ecological assessment focused on mercury and PCDDs/PCDFs which, among the compounds present in MSW combustion facility emissions, are expected to be of greatest potential concern to aquatic and terrestrial wildlife of the area.
- The ecological risk assessment evaluated potential impacts to wildlife species that were considered to be at greatest risk based on habitat use, exposure potential and population status. The species selected for evaluation consisted of aquatic life, the wood stork, the snail kite, the white pelican, and the river otter.
- Adverse impacts to aquatic and terrestrial wildlife were predicted not to occur, with a large margin of safety (i.e., exposures to ecological receptors were at least 10 times lower than comparison toxicity reference values).

In conclusion, the risk assessment showed that potential risks from stack emissions from the expansion of the Lee County ERF, in its proposed configuration with three combustion units, were below regulatory and other target risk levels for both human health and ecological receptors. Additionally, the environmental concentrations in air, soil, surface water, beef and fish associated with emissions from the proposed three-unit ERF facility were calculated to be consistent with or below typical environmental levels and would not measurably increase the typical concentrations of chemicals in the environment.

3.4.4 Lessons Drawn from Risk Assessments

Although there are site-specific differences among these three facilities, there are many common threads both from risk assessment and regulatory points of view. First and foremost, all three of these facilities were designed to comply with the

NSPS. All contain state-of-the art emission controls that are designed to fit the criteria for maximum achievable control technology. Since EPA's overall objective in promulgating the NSPS was protection of human health and the environment, it should be anticipated that facilities compliant with the NSPS would have a negligible environmental health impact. Second, the risk assessments show that the risks associated with operating these facilities are below risks of concern to regulatory and public health agencies. Third, the results of the risk assessments show that, although the risks are low, they are dominated by exposure to dioxins and furans as potential human carcinogens and mercury as a neurotoxin. Last, the risk assessments also show that indirect exposure pathways, such as the consumption of fish, are the most significant sources of exposure, regardless of the absolute value of the risks.

4.0 SIGNIFICANT CHARACTERISTICS OF THE PROPOSED EXPANSION

4.1 Waste Composition

Hillsborough County has a very aggressive recycling program and solid waste management program that reduces the introduction of unwanted materials in the solid waste at the RRF, thereby helping to reduce unwanted emissions.

The waste composition is controlled in part through programs designed to prevent unwanted materials from reaching the RRF. For example, the RRF does not accept for combustion a wide variety of wastes, including: lead acid batteries, hazardous waste, nuclear waste, radioactive waste, sewage sludge, explosives, beryllium-containing wastes, untreated biomedical waste, segregated loads of biological waste, mercury containing devices, and materials prohibited by state or federal law. The County's successful lead acid battery recycling program promotes drop-off of batteries at community collection centers in the area, and has resulted in the recycling of roughly 5,000 batteries per year. The household chemical collection program also encourages delivery of household chemicals (paints, fertilizers, etc.) at household community collection centers. Items received at the household chemical collection sites are either managed as a hazardous waste or recycled. Virtually all of the tires received in the County's waste disposal system are shredded in a waste tire processing facility and do not enter the RRF. The County's used oil recycling program consists of seven drop-off locations for use by residents, and recycles approximately 26,000 gallons of used oil per year. Roughly 1,849 tons of scrap metal are recycled per year in the County. Moreover, the County sponsors a waste reduction program through the Hillsborough County Cooperative Extension Service. The County's solid waste profile program further ensures that unacceptable waste will not enter the RRF by requiring potential customers to submit information on waste to be delivered.

At the RRF facility, waste deliveries are monitored in several ways. Access at the scale house is controlled through initial screening of solid waste deliveries, including notation of the customer and type of waste. On the tipping floor of the RRF, a County employee (spotter) inspects waste loads as they are dumped to ensure that no unacceptable items are present.

Hillsborough County manages an extensive program that collects and recycles a variety of materials, including newspaper, glass, aluminum cans, plastic bottles, steel cans, yard trash, tires, and white goods (e.g., refrigerators, dishwashers). Annually, the County recycles over 500,000 tons of solid waste. The County achieved a 32% recycling rate in 2002. The County also provides support to the not-for-profit Recycling Task Force (RTF), which coordinates county-wide recycling activities. The RTF includes representatives from the County, the cities of Tampa, Plant City and Temple Terrace, the School Board, the Cooperative Extension Service, local commercial recyclers and haulers, local businesses, environmental and civic groups, and interested citizens. Recycling not only

reduces the amount of waste requiring disposal, but also can increase the heating value of waste fed into the RRF by removing low-Btu materials from the waste stream (e.g., glass and metal).

4.2 Environmental Controls

The environmental controls in use at the Hillsborough RRF, and proposed for the County's fourth unit, are essentially identical to those in place at the Lee County RRF. These controls consist of a combination of air pollution control equipment and operating practices that reflect best available control technologies and minimize potential emissions of concern. The pollution controls at the Hillsborough and Lee County facilities include the following: spray dryer absorbers with fabric filters to remove particles, sulfur dioxide and acid gases; activated carbon injection to remove mercury; and selective non-catalytic reduction to reduce NOx emissions. The APC combination of spray dryer absorber, fabric filter and activated carbon injection have also been shown to reduce emissions of dioxins and furans.

4.3 Emissions

Emission limits have been proposed for the expanded Hillsborough RRF, as described in the County's PSD and PPSA permit applications, based on consideration of the air pollution control equipment to be used (as determined through a Best Available Control Technology (BACT) evaluation), the NSPS, experience with the existing Hillsborough combustion units, and emission limits that have been most recently specified for new municipal waste combustor units in the U.S. The MSW combustion units most recently permitted in the U.S. consist of the Camden County, New Jersey RRF (a 350 TPD unit), the Harrisonburg, Virginia RRF (a 100 TPD unit) and the Lee County, Florida RRF (a 600 TPD unit). Among these three, the new unit recently permitted at the Lee County RRF is most similar to the unit being proposed for Hillsborough and, in fact, is essentially identical with respect to operation, equipment, and general location in the U.S.

The protectiveness of the emission limits proposed for the Hillsborough facility can best be evaluated by comparison with the NSPS and the Lee County facility, which is most similar to the Hillsborough unit and the most recently permitted MSW combustion unit in the U.S. Table 4-1 presents the existing and proposed emission limits for the Lee County RRF and the Hillsborough County RRF, along with the NSPS for new MWC combustion units. As can be seen from this table, the emission limits proposed for the new MWC unit at Hillsborough are equivalent to or

**Table 4-1
Comparison of Emissions Limits**

Facility Name:	Lee County Waste-to-Energy Facility, FL		Hillsborough County Resource Recovery Facility, FL		NSPS Subpart Eb (40 CFR 60)	NSPS Subpart Cb (40 CFR 60.33)
Combustion Unit Type:	New 3rd Unit (291.5 MMBtu/hr)	Existing two units (275 MMBtu/hr)	New 4th Unit (250 MMBtu/hr)	Existing three units (150 MMBtu/hr)		
MSW Throughput:	600 TPD	600 TPD	600 TPD	400 TPD		
Compound	Emission Limit (c)	Emission Limit Per Unit (d)	Emission Limit (a)	Emission Limit Per Unit (b)	Emission Limit (a)	Emission Limit (e)
Particulate Matter	20.6 mg/dscm ¹ (for both PM and PM10)	24 mg/dscm (0.01 gr/dscf) (for both PM and PM10) ¹	20.6 mg/dscm (0.009 gr/dscf) (for both PM and PM10) ¹	27 mg/dscm (0.012 gr/dscf) ¹	24 mg/dscm (0.01 gr/dscf) ¹	27 mg/dscm (0.011 gr/dscf) ¹
Nitrogen Oxides	110 ppmdv (12-mo rolling average) ¹ ; 150 ppmdv (24-hr average) ¹	180 ppmdv (24-hr average) ¹ 30 ppmdv (24-hr average) or 80% control ¹	110 ppmdv subsequent years 150 ppmdv (24-hour average) ¹	205 ppmdv ¹	180 ppmdv 1st year; 150 ppmdv subsequent years ¹	
Sulfur Dioxide	26 ppmdv or 80% control ¹	20 ppmdv or 80% control ¹	20 ppmdv or 80% control ¹	29 ppmdv or 75% control ¹	30 ppmdv or 80% control ¹	31 ppmdv or 75% control ¹
Carbon Monoxide	80 ppmdv (30-day rolling avg.); 100 ppmdv (4-hr avg.) ¹	100 ppmdv (4-hr average) ¹	80 ppmdv (12-mo rolling average) 100 ppmdv (4-hr average) ¹	100 ppmdv ¹	100 ppmdv (4-hr average) ¹	
Cadmium	--		0.02 mg/dscm	0.04 mg/dscm ¹	0.02 mg/dscm ¹	0.04 mg/dscm ¹
Mercury	0.028 mg/dscm or 85% control ¹	0.07 mg/dscm or 85% control ¹ ; 0.0379 lb/hr	0.028 mg/dscm or 85% control ¹	0.07 mg/dscm or 85% control ¹	0.08 mg/dscm or 85% control ¹ Florida limit 0.07 mg/dscm	0.08 mg/dscm or 85% control ¹
Lead	0.2 mg/dscm ¹	0.165 lb/hr (0.66 tons/yr)	0.2 mg/dscm ¹ (0.243 tons/yr)	0.44 mg/dscm ¹	0.2 mg/dscm ¹	0.44 mg/dscm ¹
Arsenic	--	0.0025 lb/hr (0.01 tons/yr)				
Beryllium	--	3.7E-5 lb/hr (1.47E-4 tons/yr)	1.73E-4 tons/yr			
Hydrogen Chloride	25 ppmdv ¹ or 95% control	25 ppmdv or 95% control ¹	25 ppmdv or 95% control ¹	29 ppmdv or 95% control ¹	25 ppmdv or 95% control ¹	
H ₂ SO ₄	15 ppmdv ¹	9.85 lb/hr (39.3 tons/yr)	15 ppmdv ² (74.4 tons/yr)	0.072 gr/dscf ² or 0.2 lb/ton	--	
Hydrogen Fluoride	3.5 ppmdv ¹	5 ppmdv ¹	3.5 ppmdv ¹	6.74 ppmdv ¹	--	
PCDD/PCDF	13 ng/dscm (total) ¹	30 ng/dscm (total) ¹	13 ng/dscm (total) ¹	30 ng/dscm (total) ¹	13 ng/dscm (total) ¹	30 ng/dscm (total) ¹
Volatile Organic Compounds		37 ppmdv ¹ (5.8 lb/hr, 23 tons/yr)	0.1 lb/ton, 12 tons/yr	0.2 lb/ton (or 0.01 gr/dscf ²)		
Visible Emissions						
Fugitive PM (ash)						
Metals	20.6 mg/dscm ¹					
Ammonia	50 ppmdv ¹	50 ppmdv ¹	50 ppmdv ¹	--	--	

(a) Data in this column obtained from Table 2-2, Table 2-3 and Table 3-3 of Air Permit Volume III in Hillsborough County Expansion Permit Application

(b) Data in this column obtained from Table 3-3 of Air Permit Volume III in Hillsborough County Expansion Permit Application

(c) Data in this column obtained from Table 3-1 of Air Permit Volume III in Hillsborough County Expansion Permit Application and Lee County Solid Waste Energy Recovery Facility permit (dated 10/8/2003)

(d) Data in this column obtained from Lee County Solid Waste Energy Recovery Facility permit (dated 10/8/2003)

(e) The NSPS in Subpart Cb apply to large MWC units that were constructed before December 19, 1995.

¹ Limits shown are corrected to 7% oxygen.

² Limits shown are corrected to 12% CO₂.

-- = no limit.

more stringent than both the NSPS and permit limits in place for the additional Lee County unit. All of the proposed emission limits for the fourth unit at Hillsborough are more stringent than the comparable limits for the existing three units at the facility.

Stack test measurements collected over recent years at the existing Hillsborough facility demonstrate that emissions of the two classes of compounds of most concern to human health and the environment, dioxins/furans (PCDD/PCDFs) and mercury, are and will continue to be maintained below the facility's proposed permit limits.⁴

⁴ After the retrofit of the facility in 1999, all of the stack tests for dioxin demonstrated compliance with the MACT standard. After the retrofit, the MACT emission limit for mercury was exceeded once (July 21, 1999) in Unit 3, but this event appears to be an anomaly. All of the subsequent stack tests for mercury emissions from Unit 3, including tests conducted on July 29-30, 1999, demonstrated compliance with the MACT standard. All of the stack tests for mercury emissions from the facility's other MWC units also demonstrated compliance with the MACT standard.

5.0

SITE-SPECIFIC CHARACTERISTICS OF THE FACILITY

5.1 Project Environment

The Hillsborough County RRF is located in southwest Florida, several miles east of Tampa, at 350 N. Falkenburg Road (see Figure 5-1). The area is characterized by low and level terrain and a mild and often humid climate.

5.2 Land Use

The RRF is located on a 50.4 acre site within a 353 acre tract of land (hereafter referred to as the "property") that is owned by Hillsborough County. The property includes the existing RRF and a water treatment facility, and is zoned for "Planned Development" (PD-1) to accommodate multi-use public developments, such as the RRF and the water treatment plant. The property is located within an Urban Service Area (USA) identified in the County's future comprehensive land use plan as a location where the County plans a substantial amount of urban infrastructure.

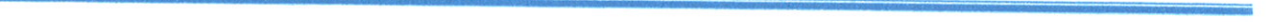
On its immediate borders, the property is surrounded to the north and west by land owned by Hillsborough County and Tampa Bay Water. To the north, on Hillsborough County property, is the Falkenburg Jail, County Animal Services and the District 2 Sheriff's office. The Seaboard System railroad borders the property to the south, a Tampa Electric Company (TECO) electrical transmission line easement borders on the west, and Falkenburg Road borders the property to the east (see Figures 5-2 and 5-3).

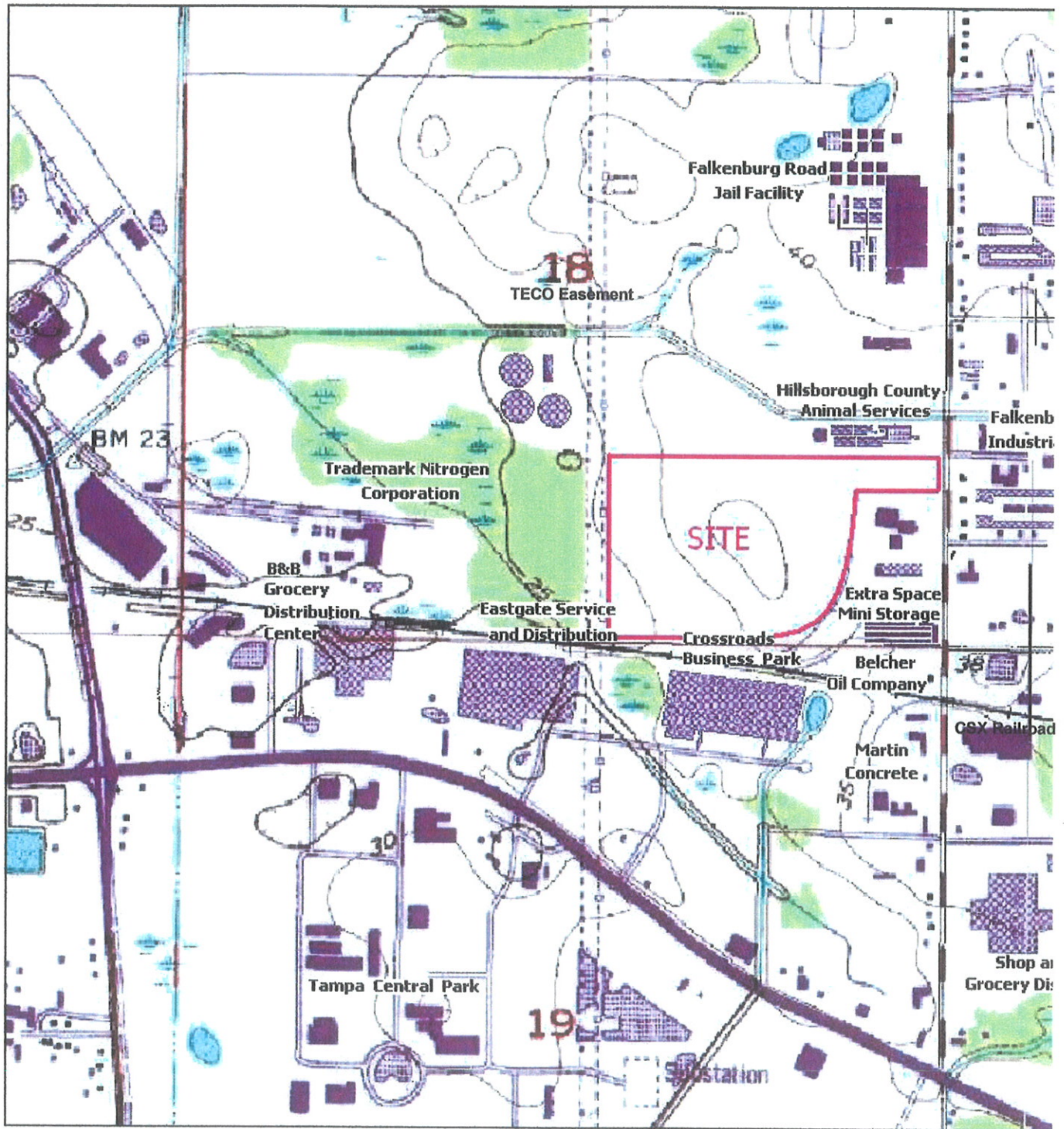
Almost all the land within 1 mile (1.6 kilometers) of the property is zoned or currently used for commercial and industrial purposes. The nearest residential area is located east of Falkenburg Road in Woodberry Estates, about ½ mile away (about 0.8 km) from the property boundary and about 0.8 miles (about 1.3 km) from the RRF. Residential development is more prevalent beyond 2 miles from the facility.

5.3 Human Receptors

The population of Hillsborough County has grown over the past decade in similar fashion to other parts of the state. The County-wide population was estimated by the U.S. census to grow by about 1% from 2000 (population 998,948) to 2004 (population 1,101,261). Based on 2000 census data, the population in census tracts partially or wholly within 5 miles of the RRF was 157,572 (about 16% of the County population). The dominant types of employment in the County include professional and business services, other services, and healthcare and social

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Hillsborough County
Energy Recovery Project



Figure 5-2
Facility Location



Hillsborough County Energy
Recovery Project

Scale
0 1500'

Figure 5-3
Aerial Photograph of Site

Aerial Taken (11/2003)

assistance, accounting for about 23%, 23% and 9%, of the workforce, respectively. Roughly 2% of the labor force is employed in agriculture, natural resources and mining.

As noted above, most of the land in the facility vicinity is zoned, or used, for commercial and industrial activities. Residential areas do not occur within about 0.8 miles from the RRF and are limited in extent within 2 miles. In addition to residential, commercial and industrial land uses, County land is used for agricultural purposes. According to the Florida Agricultural Statistics Service, there were about 2,900 farms in Hillsborough County in 2002, down 19% from the number present in 1997. The highest market value agricultural commodities in the County in 2002 were fruits/berries. The top livestock type was cattle and the top crop item was oranges, a predominance that also applies to Lee County, Florida. A driving/windshield survey was conducted within an 8-mile radius of the Hillsborough RRF to determine the specific types of agricultural and livestock land uses in this part of the County. The windshield survey identified a variety of agricultural and livestock land uses, consisting of cattle grazing at 17 locations, two dairy farms, 23 orange groves, nine strawberry farms and one tomato farm. Cattle grazing was observed in various locations to the south, northwest and north of the facility at least 4 miles away. The orange groves and strawberry farms were only to the north and northeast of the facility and at least 4 miles away. The two dairy farms were further from the facility than the cattle grazing areas, located 5.7 miles to the south-southwest and 5.3 miles to the north. The tomato farm was located about 8 miles to the northeast of the facility. Home gardens may also be maintained by residents in the County.

Fishing is a popular activity in Florida, including Hillsborough County. In general, fishing may occur in rivers, canals, lakes and ponds. The water bodies closest to the RRF that may be used for fishing include the Hillsborough River, Palm River, Six Mile Creek (which flows into Palm River), the Alafia River, a variety of lakes including Woodbury, Gornto, Chapman, and Tenmile, and ponds scattered throughout the facility area. Fishing is prohibited in the Tampa Bypass Canal, which flows into Six Mile Creek.

Groundwater is used for domestic, industrial, irrigation and public water supply purposes in the County. Roughly two dozen municipal supply wells draw groundwater from areas within 5 miles of the facility; the nearest of these wells is about 1.5 miles east of the RRF facility. The majority of the wells draw from the deep Floridan aquifer with a much smaller percentage using water from the surficial aquifer. In most areas of the County, including the RRF facility vicinity, the surficial aquifer is underlain by a clay layer that separates the surficial aquifer from the Floridan aquifer.

5.4 Ecological Receptors

A detailed description of the ecology and vegetation in the RRF facility area is provided in Volume I of the PPSA application. The following paragraphs provide a brief summary of the information in the PPSA application.

There are no federally-designated wildlife refuges or critical habitats within 5 miles of the RRF site. While portions of the site appear to be within the habitat range of federally-listed species, including the Florida golden aster and wood stork (endangered), and the bald eagle, eastern indigo snake and Florida scrub jay (threatened), critical habitats have not been defined within the facility area for any of these species. Appendices to the PPSA application list wildlife species in various habitats in the general facility area. Species discussed in some detail in the PPSA application that are common to Hillsborough County and southwest Florida include the bald eagle, the burrowing owl, the Florida sandhill crane, the Southeastern American kestrel, a variety of wading birds, American alligators, gopher tortoises, Sherman's fox squirrel, the Florida scrub jay and the black bear. The PPSA application indicates that the proposed project would not create conflicts with any species listed by the U.S. Fish and Wildlife Service and the Florida Game and Fresh Water Fish Commission, nor would it have any effects on area ecology. The impact assessment in the PPSA application also concludes that the RRF expansion project will not have impacts on existing non-aquatic species populations, relative abundance, species composition, distribution or dominance, or gradient distribution.

A detailed description of vegetation and land uses in the facility area is provided in Volume I of the PPSA application. As noted in that document, there are no natural wetlands located within the facility site, although there are two conveyance ditches along the northern and eastern boundary. These ditches are highly disturbed and contain predominantly nuisance species, but they do meet the regulatory definitions for wetlands. The conveyance ditches connect on-site retention ponds with outflow ditches off-site.

6.0 RISK ASSESSMENT

This section presents a description of the methods used for, and results of, a risk assessment of the proposed Hillsborough RRF. The risk assessment was composed of two parts, a multiple pathway human health risk assessment and an ecological evaluation of the potential impacts of facility emissions. The risk assessment evaluated the potential impacts of the RRF with all four MWC units in operation on a continuous basis (8760 hours per year).

6.1 Multiple Pathway Human Health Risk Assessment

A multiple pathway risk assessment was conducted for the proposed expansion of the Hillsborough RRF, focusing on mercury and PCDDs/PCDFs, the compounds that, as discussed earlier in this report, have been shown to dominate the results of other solid waste combustion facility risk assessments. This assessment for Hillsborough County RRF was conducted according to guidance recommended by EPA (1998a) and it followed the same multiple pathway risk assessment methodology applied in the Lee County RRF risk assessment (CPF 2002).

6.1.1 Hazard Identification

The risk assessment evaluated the potential for long-term chronic risks, both excess lifetime cancer risks and the potential for noncancer effects. Toxicological criteria for both cancer and chronic noncancer effects were compiled for mercury and PCDDs/PCDFs from EPA's Integrated Risk Information System (IRIS) and other sources cited in EPA's guidance for risk assessments of hazardous waste combustors (EPA 1998a). These criteria are presented Table 6-1.

6.1.2 Exposure Assessment

Based on a review of local land use information, discussed above, and regulatory guidance, a set of hypothetical exposure pathways was identified for evaluation in the risk assessment. The matrix of pathways is shown in Table 6-2. It addresses several general receptors (adults, children, and infants), different categories of behavior (typical resident, beef farmer, and fisher), and a number of routes of exposure (inhalation, soil ingestion, produce ingestion, fish ingestion). Each adult or child receptor was hypothesized to be simultaneously exposed through multiple pathways (e.g., the child resident was exposed via inhalation, soil ingestion, and ingestion of locally-grown produce). Each adult receptor was also assumed to be the mother of a breast-fed infant.

The information needed to calculate exposures through each of these pathways includes environmental concentrations in ambient air, soil, produce, beef and

Table 6-1
Chronic Toxicity Criteria for the Hillsborough County Facility Project

Chronic Oral and Inhalation Toxicity Criteria

Chemical	Non-Cancer Toxicity Criteria					Cancer Toxicity Criteria				
	Chronic Oral Reference Dose (mg/kg/day)	Chronic Inhalation Reference Concentration (mg/m ³)	Safety Factor (oral/ inhalation) (a)	Toxicological Endpoint (oral/ inhalation)	Reference Dose/ Concentration Source	Oral Cancer Slope Factor (mg/kg/day) ⁻¹	Inhalation Cancer Unit Risk Factor (ug/m3) ⁻¹	Tumor Type or Target Tissue (oral/ inhalation)	USEPA Weight of Evidence (b)	Slope Factor and Unit Risk Source
Mercury										
Divalent (c)	3.0E-04	3.0E-04	1000 / 30	immunological / neurological	IRIS	NA	NA	NA	C	IRIS
Elemental	--	3.0E-04	-- / 30	-- / neurological	IRIS	NA	NA	NA	D	IRIS
Methyl	1.0E-04	--	10 / --	neurological & developmental / --	IRIS	NA	NA	NA	C	IRIS
PCDDs/PCDFs (as 2,3,7,8-TCDD)	NA	NA	--	--	--	1.5E+05	3.3E+01	liver	B2	EPA 1998/ EPA 1999

Notes:

NA = Not applicable

-- = No data available

IRIS = Integrated Risk Information System (10/2002)

EPA 1998 = U.S. Environmental Protection Agency. 1998. Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Peer Review Draft. Solid Waste and Emergency Response. EPA 530-D-98-001A. July 1998.

EPA 1999 = U.S. Environmental Protection Agency. 1999. Errata to the 1998 Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Memorandum from B. Johnson, Economics, Methods and Risk Analysis Division. August 2, 1999.

(a) Safety factors are the products of uncertainty factors and modifying factors. Uncertainty factors used to develop reference doses generally consist of multiples of 10, with each factor representing a specific area of uncertainty in the data available. The standard uncertainty factors include the following:

A 10-fold factor to account for the variation in sensitivity among the members of the human population; a 10-fold factor to account for the uncertainty in extrapolating animal data to humans; a 10-fold factor to account for uncertainty in extrapolating from less than chronic NOAELs to chronic NOAELs; and a 10-fold factor to account for the uncertainty in extrapolating from LOAELs to NOAELs. Modifying factors are applied at the discretion of the reviewer to cover other uncertainties in the data.

(b) USEPA Weight of evidence classification scheme for carcinogens:

A--Human Carcinogen, sufficient evidence from human epidemiological studies; B1--Probable Human Carcinogen, limited evidence from epidemiological studies;

B2--Probable Human Carcinogen, inadequate or no evidence from epidemiological studies and adequate evidence from animal studies;

C--Possible Human Carcinogen, limited evidence in animals in the absence of human data; D--Not Classified as to human carcinogenicity; and E--Evidence of Noncarcinogenicity.

(c) The inhalation RfC for elemental mercury was used for divalent mercury per USEPA 1998 guidance (which recommends this practice due to lack of available toxicity data).

Table 6-2
Exposure Pathways and Receptors
Considered in the Hillsborough Multiple Pathway Risk Assessment

Exposure Pathway	Receptor				
	Adult and Child Resident	Adult and Child River Fisher	Adult and Child Pond Fisher	Adult and Child Beef Farmer	Breast-Fed Infant (a)
Inhalation	✓	✓	✓	✓	
Incidental Soil Ingestion	✓	✓	✓	✓	
Ingestion of Locally-Grown Produce	✓	✓	✓	✓	
Ingestion of Fish from Palm River		✓			
Ingestion of Fish from Typical Pond			✓		
Ingestion of Locally-Raised Beef				✓	
Ingestion of Breast-milk					✓

(a) A breast-fed infant exposure to PCDD/PCDFs was evaluated for each adult receptor consistent with EPA (1998a) guidance.

fish. The methods used to calculate these concentrations were based on EPA fate and transport models and were the same as those used for the Lee County RRF risk assessment (CPF 2002). In general, these methods involve combining air dispersion and deposition modeling results and emission rates with EPA fate and transport algorithms. The fate and transport algorithms used to calculate concentrations of mercury and PCDDs/PCDFs in air, soil, produce, and beef were obtained from EPA (1998a) guidance for combustion risk assessments. The algorithms used to calculate PCDD/PCDF concentrations in fish were also from EPA (1998a) guidance. However, the algorithms used to calculate mercury concentrations in fish were obtained from EPA's refined mercury model (IEM-2M). IEM-2M models individual chemical species of mercury and, unlike the default approaches in EPA (1998a), includes specific transformation rates affecting mercury compounds in soil, water and sediments. The IEM-2M model was developed by EPA, applied in EPA's Mercury Report to Congress, and used by the Agency in developing the MACT rule for waste combustors (EPA 1997, 1999a, Lyon et al. 1998). The IEM-2M model has also been used for numerous waste combustion facility risk assessments in the United States.

Air dispersion and deposition modeling provides the information necessary to calculate ambient air concentrations and deposition rates for the selected chemicals of concern, which are in turn used in the fate and transport modeling. Dispersion and deposition modeling for the Hillsborough RRF was performed by CDM for the proposed four-unit facility. CDM performed the modeling using EPA's Industrial Source Complex Short-Term (ISCST) model. The model was applied across a 20 km-by-20 km modeling domain with the facility stack at its center. The ISCST modeling was conducted using a unitized emission rate of 1 g/sec, which produced two types of unitized results - air concentrations in $\mu\text{g}/\text{m}^3$ per 1 g/sec and deposition rates in $\text{g}/\text{m}^2\text{-sec}$ per 1 g/sec. The unitized modeling results used in the risk assessment for each exposure pathway are presented in Table 6-3. A more detailed description of CDM's modeling is provided in the PPSA and PSD applications.

Chemical-specific ambient air concentrations and deposition rates were then calculated by multiplying the unitized ISCST modeling results by the chemical-specific emission rates. CDM developed emission rates for mercury and PCDDs/PCDFs for the proposed four-unit facility based on stack gas concentrations measured in 2000-2002 from the existing facility (see Table 6-4). Emission rates were based on average stack gas concentrations, instead of permit limits, to more accurately reflect long-term operating conditions and thus allow a more refined estimate of potential long-term risks.

Table 6-3
Unitized Long-Term Average Air Concentrations and Deposition Rates Modeled
for the Hillsborough County Energy Recovery Facility Risk Assessment
(Combined Impacts of Existing and Proposed Units)

Receptor and Location	Input Modeling Data for Multiple Pathway Risk Assessment (a)						Modeling Area or Location
	Vapor Phase Air Concentration [[$\mu\text{g}/\text{m}^3$]/ (1 g/sec)] (Cyv or Cywv)	Particle Phase Air Concentration [[$\mu\text{g}/\text{m}^3$]/ (1 g/sec)] (Cyp)	Wet Deposition from Vapor [[$\text{g}/\text{m}^2\text{-yr}$]/ (1 g/sec)] (Dyvw or Dywvv)	Dry Deposition from Particle - Surface Area weighted (e) [[$\text{g}/\text{m}^2\text{-yr}$]/ (1 g/sec)] (Dydp)	Wet Deposition from Particle - Surface Area weighted (e) [[$\text{g}/\text{m}^2\text{-yr}$]/ (1 g/sec)] (Dywp)	Combined Wet and Dry Deposition from Particle - Surface Area weighted (e) [[$\text{g}/\text{m}^2\text{-yr}$]/ (1 g/sec)] (Dytwp)	
Surface Water Locations							
Pond Watershed Area	0.0048	0.0051	0.0035	0.000048	0.00196	0.0020	Average calculated across several km area surrounding the stack within the modeling domain and beyond the property boundary. (b)
Palm River Watershed Area	0.0055	0.0058	0.0050	0.000051	0.0026	0.0026	Average calculated across Palm River watershed area within the modeling domain and beyond the property boundary.
Maximum Impact Point							
Maximum deposition impact point - assumed farm & residence	0.000005	0.000005	0.13	0.000005	0.057	0.057	Maximum model results were identified within the modeling domain, beyond the property boundary and excluding nearby industrial and commercial zoned areas, at 0.3 km (0.2 miles) north of the stack. Note that there is no farm or residential use currently at this location. (c)
Cattle Grazing Location							
Beef cattle grazing area	0.0031	0.0034	0.0013	0.00003	0.00092	0.00094	Average calculated by CDM across a nearby area used for cattle grazing, and also located within the modeling domain and beyond the property boundary. (d)

(a) The dispersion and deposition modeling was performed and analyzed by CDM. The results reflect the combined impact of the County's three existing municipal solid waste combustion units in addition to the proposed fourth combustion unit. The listed model results are annual averages based on 1988 meteorological data because maximum total deposition rates (which have a greater impact on potential risks than air concentrations) occurred for 1988 data, out of the five years that were modeled (1986-1990), for receptors beyond the property boundary and excluding nearby commercial and industrial zoned areas. Meteorological data used in the modeling was obtained from Tampa International Airport (National Weather Service Station #12842).

(b) The pond area includes a range of typical ponds in the facility area.

(c) The listed values are based on the maximum impact point for total deposition rates, which occurs roughly 0.3 km (0.2 miles) to the north of the stack. Maximum values for air concentrations and dry deposition occur at a different location than these values, at roughly 2.5 km (1.3 miles) west of the stack.

(d) The grazing area is located roughly 7 km (4.3 miles) north-north-west of the facility and was identified based on a drive-through land use survey performed by CDM. Modeling results for 1988 (the maximum total deposition rate year) were lower for other areas used for grazing that were also identified during the land use survey.

(e) Surface area weighted means that the particle size distribution used in the ISCST modeling was weighted based on particle surface area. This treatment of particle size data in ISCST modeling is recommended for mercury and PCDDs/PCDFs by USEPA (1998).

Table 6-4
Chemical Emission Rates Used in the Multiple Pathway
Risk Assessment for the Hillsborough County Facility
(Emission Rates Based on Stack Test Measurements)

Chemical	Chemical Emission Rate (Existing and Proposed Units Combined) (g/sec) (a)
Mercury	
Total mercury	8.63E-04
Total mercury: locally available (b)	2.16E-04
Divalent (vapor phase): locally available (c)	1.76E-04
Divalent (particulate phase): locally available (c)	3.11E-05
Elemental: locally available (c)	5.18E-06
PCDDs/PCDFs (d)	
2,3,7,8-TCDD	3.72E-10
1,2,3,7,8-PeCDD	1.45E-09
1,2,3,4,7,8-HxCDD	1.79E-09
1,2,3,6,7,8-HxCDD	6.11E-09
1,2,3,7,8,9-HxCDD	4.20E-09
1,2,3,4,6,7,8-HpCDD	6.20E-08
OCDD	1.54E-07
2,3,7,8-TCDF	3.09E-09
1,2,3,7,8-PeCDF	4.97E-09
2,3,4,7,8-PeCDF	6.08E-09
1,2,3,4,7,8-HxCDF	5.52E-09
1,2,3,6,7,8-HxCDF	6.11E-09
2,3,4,6,7,8-HxCDF	7.39E-09
1,2,3,7,8,9-HxCDF	1.73E-09
1,2,3,4,6,7,8-HpCDF	1.65E-08
1,2,3,4,7,8,9-HpCDF	3.03E-09
OCDF	7.11E-09
Total for 2,3,7,8-PCDDs/PCDFs	2.91E-07
Total for all PCDDs/PCDFs (e)	7.50E-07

(a) The emission rates for the new and 3 existing MWC units are based on 2000-2002 average stack test results for the existing Hillsborough County RRF MWC Units 1-3. For the new unit, the average emission rates were also multiplied by a factor of 1.5 (660 tpd/440 tpd) to account for the increased capacity of the new Unit 4.

(b) The portion of total mercury emitted that was assumed to remain locally available for the risk analysis was calculated based on the assumed speciation of mercury in the stack gas plus EPA guidance on the portion of each species expected to remain locally available. CDM assumed that total mercury emissions would be comprised of 60% elemental mercury, 30% divalent vapor phase mercury and 10% divalent particle phase mercury, based on data for large municipal waste combustors in U.S. EPA's Mercury Report to Congress. Additionally, the fraction of each species not expected to enter the global Hg cycle and thus be available for local impacts was identified, per U.S. EPA 1998 Combustion Risk Assessment Guidance (Section 2 and Figure 2-4), as 0.01 for elemental Hg, 0.68 for divalent vapor phase Hg, and 0.36 for divalent particle phase mercury. Accordingly, the fraction of total mercury expected to remain locally available was calculated as: $[(0.68 \times 30\%) + (0.36 \times 10\%) + (0.01 \times 60\%)] / 100\% = 0.25$

(c) The total mercury emission rate (6.84E-3 lb/hr = 8.63E-4 g/sec) was divided by CDM between the mercury species as follows: 60% elemental mercury, 30% divalent vapor phase mercury and 10% divalent particle phase mercury. The emission rates were also adjusted to for the fraction of each species expected to not enter the global Hg cycle and thus be available for local impacts (i.e., 0.01 for elemental Hg; 0.68 for divalent vapor phase Hg; and 0.36 for divalent particle phase mercury based on U.S. EPA 1998 Guidance, Section 2 and Figure 2-4). For example, the divalent vapor phase emission rate = $8.63\text{E-}04 \text{ g/sec} \times 0.3 \times 0.68 = 1.76\text{E-}04 \text{ g/sec}$.

(d) The PCDD/PCDF emission rates were calculated from a total PCDD/PCDF emission rate of 1.71E-05 lb/hr and a fractional distribution of congeners based on two years of stack test measurements (Ogden Energy Group, Report No. 2554, 9/8/00 and Covanta, Report No. 2686, 8/29/01).

(e) Includes all congeners (i.e., non-2,3,7,8-congeners as well as 2,3,7,8-congeners).

A variety of site-specific information was used in the fate and transport algorithms, as shown in Table 6-5. The site-specific information was compiled by CDM based on review of local information and contacts with local officials. With the exception of site-specific data shown in Table 6-5, all other parameters used to calculate environmental concentrations were EPA default values either presented in the Agency's combustion risk assessment guidance (EPA 1998a) or provided in the Agency's documentation for the IEM-2M mercury model (EPA 1997, EPA 1999a, Lyon et al. 1998).

Potential human exposures were calculated from the environmental concentrations in each environmental medium and exposure assumptions describing the rates of exposure for each pathway (e.g., vegetable ingestion rates, soil ingestion rates, beef ingestion rates), and data on body weight, exposure frequency (i.e., days/year exposed) and exposure duration (i.e., total years exposed). All of the exposure assumptions were defaults obtained from EPA (1998a) for each of the hypothetical receptor types evaluated in this assessment - adults, children and infants. These parameter values were intentionally derived by EPA to produce a conservative (i.e., health protective) estimate of exposure. For example, an important EPA default value assumes that beef farmers obtain 100% of the beef they ingest from their own locally raised beef cattle, which have, in turn, obtained 100% of their food from locally-grown feed crops. This assumption is not supported by local official information, but was evaluated to ensure that the health risk assessment conservatively addressed potential risks.

6.1.3 Health Risk Assessment Results

Potential long-term risks associated with exposure to mercury and PCDDs/PCDFs through the multiple pathways were calculated by combining calculated exposures with toxicity values for cancer and noncancer effects.

Excess Lifetime Cancer Risks and Potential for Noncancer Effects

Table 6-6 presents the excess lifetime cancer risks for oral and inhalation exposure pathways separately and combined for each receptor. The specific exposure pathways included for each hypothetical receptor are also presented.

All of the excess lifetime cancer risks were at least 10 times below EPA's target cancer risk level of 1×10^{-5} and did not exceed Florida's target risk level of 1×10^{-6} . The total excess lifetime cancer risks ranged from 8×10^{-8} for the hypothetical child resident or child of a beef farmer to 1×10^{-6} for the hypothetical adult pond fisher scenario.

Table 6-5
Site-specific Input Parameters for
Hillsborough County Facility Risk Assessment

Parameter Name	Value	Units	Source
Input Parameters Used to Calculate Soil Concentrations			
Ambient air temperature	295	K	Identified by CDM for the Tampa International Airport from Gale Research, Climate of the States, 3rd Ed., 1951-1980 period of record (72°F)
Average annual recharge	5.1	cm/yr	The recharge rates in the modelling area varies from 0-2 inches/year. Recharge rate data were provided by Southwest Florida Water Management District.
Average annual runoff from pervious areas	20	cm/yr	Value calculated by CDM based on stormwater modeling using site-specific precipitation data.
Time period over which deposition occurs	30	yr	Assumed facility lifetime
USLE rainfall (or erosivity) factor (Used to calculate Unit Soil Loss using Universal Soil Loss Equation)	500	yr ⁻¹	Site-specific data provided in Hillsborough County Soil Survey, USDA May 1989 and TMDL USLE Software Program US EPA 2001
USLE erodibility factor (Used to calculate Unit Soil Loss using Universal Soil Loss Equation)	0.12	ton/acre	Site-specific data provided Hillsborough County Soil Survey, USDA May 1989 and TMDL USLE Software Program US EPA 2001
USLE length-slope factor (Used to calculate Unit Soil Loss using Universal Soil Loss Equation)	0.18	none	Site-specific data provided Hillsborough County Soil Survey, USDA May 1989 and TMDL USLE Software Program US EPA 2001
USLE cover management factor (Used to calculate Unit Soil Loss using Universal Soil Loss Equation)	0.08	none	Site-specific data provided Hillsborough County Soil Survey, USDA May 1989 and TMDL USLE Software Program US EPA 2001
USLE supporting practice factor (Used to calculate Unit Soil Loss using Universal Soil Loss Equation)	1	none	Site-specific data provided Hillsborough County Soil Survey, USDA May 1989 and TMDL USLE Software Program US EPA 2001
Palm River Input Parameters			
River: Total watershed area receiving deposition	2.66E+07	m ²	Watershed area was calculated by CDM using data from USGS topographic maps and County GIS data (10.3 square miles)

Table 6-5
Site-specific Input Parameters for
Hillsborough County Facility Risk Assessment

Parameter Name	Value	Units	Source
River: Impervious watershed area receiving deposition	1.70E+06	m ²	Calculated by CDM based on an analysis of land use categories (e.g residential, rural) and the percentage of impervious area within each category for the watershed area
River: Waterbody surface area	1.0E+06	m ²	GIS analysis performed by CDM was used to determine the Palm river surface area within the modeling domain and beyond the facility boundary
River: Waterbody temperature	298	K	Average value calculated based on data collected by the Southwest Florida Water Management District
River: Average volumetric flow rate through water body	1.80E+08	m ³ /yr	Annual average flow rate was estimated by CDM based on the data collected by USGS for the Palm river flowing into the McKay Bay
River: Current velocity	0.02	m/s	An average value calculated based on data provided by CDM on: 1) the velocity at the Palm River monitoring data station S-160 (0.015 m/sec based on 5 years of data) and 2) The estimated velocity at the Palm River bridge (0.02 m/sec) based on the calculated river flow rate (1.8E+08 m ³ /yr) and cross sectional area (274.2 m ²) at the bridge.
River: Depth of water column	3.9	m	Value based on analysis of typical Palm River water depth and rainfall data by CDM
River: Total suspended solids (annual average)	4.6	mg/L	Annual average value calculated by CDM based on the USGS Water Resources Data and SWFWMD data from a river gauging station on the Palm River and also within the modeling domain (20 km by 20 km box with stack at center of box)
Pond Input Parameters			
Pond: Total watershed area receiving deposition	3.8E+05	m ²	Watershed area was calculated by CDM using data from USGS topographic maps, County GIS data, and the Watershed Atlas (0.15 square miles)
Pond: Impervious watershed area receiving deposition	8.9E+04	m ²	Calculated by CDM based on an analysis of land use in the watershed area of a typical lake and the percentage of impervious area within each category for the watershed area

Table 6-5
Site-specific Input Parameters for
Hillsborough County Facility Risk Assessment

Parameter Name	Value	Units	Source
Pond: Waterbody surface area	4.11E+04	m ²	Average value calculated by CDM to be representative of lakes in vicinity of facility and within modeling domain, based on analysis of lakes shown on USGS topographical maps, watershed atlas and GIS analysis.
Pond: Waterbody temperature	296	K	Average value calculated based on data collected by the Southwest Florida Water Management District.
Pond: Average volumetric flow rate through water body	6.10E+04	m ³ /yr	Flow rate was estimated by CDM based on the annual volume of water in the typical lake removed by either surface water flow or ground water flow.
Pond: Current velocity	4.7E-08	m/s	Velocity was calculated based on data provided by CDM on the typical pond flow rate (1.4E+5 m ³ /yr) and cross-sectional area of a typical pond bottom (5.4E+04 m ²).
Pond: Depth of water column	1.2	m	Value based on analysis of typical lake water depth and rainfall data by CDM
Average annual wind speed	3.8	m/s	Identified by CDM for the Tampa International Airport from Gale Research, Climate of the States, 3rd Ed., 1951-1980 period of record (8.6 mph)
Pond: Total suspended solids	22.8	mg/L	Estimated by CDM based on analysis of data from Watershed Atlas and SWFMWD for the representative pond and surrounding ponds in the area
Beef Pathway Parameters			
Quantity of plant eaten by the animal each day - forage	8.6	kg plant tissue DW/day	Site-specific information based on input from interviews with local USDA officials by CDM.
Quantity of plant eaten by the animal each day - silage	0	kg plant tissue DW/day	Negligible intake of silage. Site-specific information based on input from interviews with local USDA officials by CDM.
Quantity of plant eaten by the animal each day - grain	0.44	kg plant tissue DW/day	Site-specific information based on input from interviews with local USDA officials by CDM.

Table 6-6
Summary of Excess Lifetime Cancer Risks
Hillsborough County - Human Health Risk Assessment:
Existing and Proposed Units Combined

Receptor	Total Excess Lifetime Cancer Risk (a)			Exposure Pathways Included	Evaluated Chemicals
	Oral	Inhalation	Total		
Adult Receptors					
Resident	1E-07	8E-13	1E-07	Soil ingestion, produce ingestion, inhalation	PCDDs/PCDFs
Beef Farmer	1E-07	8E-13	1E-07	Soil ingestion, produce ingestion, beef ingestion, inhalation	PCDDs/PCDFs
Fisher - Palm River	7E-07	8E-13	7E-07	Soil ingestion, produce ingestion, fish ingestion, inhalation	PCDDs/PCDFs
Fisher - Nearby Pond	1E-06	8E-13	1E-06	Soil ingestion, produce ingestion, fish ingestion, inhalation	PCDDs/PCDFs
Child Receptors					
Resident	8E-08	3E-13	8E-08	Soil ingestion, produce ingestion, inhalation	PCDDs/PCDFs
Beef Farmer	8E-08	3E-13	8E-08	Soil ingestion, produce ingestion, beef ingestion, inhalation	PCDDs/PCDFs
Fisher - Palm River (c)	1E-07	3E-13	1E-07	Soil ingestion, produce ingestion, fish ingestion, inhalation	PCDDs/PCDFs
Fisher - Nearby Pond	2E-07	3E-13	2E-07	Soil ingestion, produce ingestion, fish ingestion, inhalation	PCDDs/PCDFs

(a) A risk of 1E-6, for example, is equivalent to 1×10^6 and equals a 1 in 1,000,000 excess lifetime cancer risk.

Table 6-7 presents the results of the chronic noncancer risk evaluation. The total hazard index is provided for oral and inhalation pathways separately and then combined for each evaluated receptor. All of the hazard index values were at least 20 times below the target hazard index of 1.0. The highest hazard index result was 0.05 for the adult pond fisher scenario.

Dioxin Exposure Evaluation

Maximum PCDD/PCDF average daily doses calculated for hypothetical child and adult receptors in this risk assessment were compared to typical background levels. The PCDD/PCDF doses were expressed as 2,3,7,8-TCDD toxic equivalents (TEQs), consistent with standard risk assessment practice. The maximum average daily doses predicted in this risk assessment were 0.02 pg TEQs/kg-day for both an adult and a child, both based on the hypothetical pond fisher scenario. This dose level is 50 times below EPA's current estimate of background PCDD/PCDF exposure of 1 pg TEQs/kg-day. As a result, TEQ exposures to people due to emissions from the proposed four-unit RRF will not cause a measurable change in typical background exposures.

Hypothetical infant exposures to PCDDs/PCDFs due to breast-milk ingestion were also calculated, and were found to range from 0.05 to 0.5 pg TEQs/kg-day, more than 100 times below the target exposure level of 60 pg TEQs/kg-day identified by EPA (1998a). These results show that infant TEQ exposures due to emissions from the proposed four-unit RRF facility will not cause a measurable change in typical breast-fed infant TEQ exposure levels.

6.2 Ecological Risk Evaluation

An ecological risk assessment was conducted to evaluate the potential impact of facility emissions on ecological receptors in the area. This assessment focused on mercury and PCDDs/PCDFs, the most important compounds from an ecological perspective associated with MSW combustion facility emissions. This assessment generally followed the same methodology applied in the Lee County RRF risk assessment (CPF 2002) and EPA guidance (EPA 1998b, 1999b).

6.2.1 Habitats and Selected Receptors

As described in the PPSA application, there are no federally-designated wildlife refuges or critical habitats within 5 miles of the site. The facility area, however, is within the habitat range of several federally-listed species. A detailed discussion of endangered, threatened, rare or special concern species in Hillsborough County is provided in Appendix 12 to the PPSA application. Based on information presented in the PPSA application, the detailed evaluation provided in the Lee County RRF risk assessment

Table 6-7
Summary of Potential for Noncancer Health Risks
Hillsborough County - Human Health Risk Assessment:
Existing and Proposed Units Combined

Receptor/ Health Endpoint	Total Hazard Index (a)			Exposure Pathways Included	Evaluated Chemicals
	Oral	Inhalation	Total		
Adult Receptors					
Resident	Soil ingestion, produce ingestion, inhalation				
Developmental	3.1E-05	--	3.E-05		methyl Hg
Neurological	3.1E-05	2.5E-09	3.E-05		methyl Hg, Hg0
Kidney	3.1E-04	2.5E-09	3.E-04		divalent Hg
Immune system	3.1E-04	2.5E-09	3.E-04		divalent Hg
Beef Farmer	Soil ingestion, produce ingestion, beef ingestion, inhalation				
Developmental	3.1E-05	--	3.E-05		methyl Hg
Neurological	3.1E-05	2.5E-09	3.E-05		methyl Hg, Hg0
Kidney	3.1E-04	2.5E-09	3.E-04		divalent Hg
Immune system	3.1E-04	2.5E-09	3.E-04		divalent Hg
Fisher - Palm River	Soil ingestion, produce ingestion, fish ingestion, inhalation				
Developmental	4.7E-02	--	5.E-02		methyl Hg
Neurological	4.7E-02	2.5E-09	5.E-02		methyl Hg, Hg0
Kidney	3.1E-04	2.5E-09	3.E-04		divalent Hg
Immune system	3.1E-04	2.5E-09	3.E-04		divalent Hg
Fisher - Pond	Soil ingestion, produce ingestion, fish ingestion, inhalation				
Developmental	4.6E-02	--	5.E-02		methyl Hg
Neurological	4.6E-02	2.5E-09	5.E-02		methyl Hg, Hg0
Kidney	3.1E-04	2.5E-09	3.E-04		divalent Hg
Immune system	3.1E-04	2.5E-09	3.E-04		divalent Hg
Child Receptors					
Resident	Soil ingestion, produce ingestion, inhalation				
Developmental	3.6E-05	--	4.E-05		methyl Hg
Neurological	3.6E-05	5.7E-09	4.E-05		methyl Hg, Hg0
Kidney	5.7E-04	5.5E-09	6.E-04		divalent Hg
Immune system	5.7E-04	5.5E-09	6.E-04		divalent Hg
Beef Farmer	Soil ingestion, produce ingestion, beef ingestion, inhalation				
Developmental	3.6E-05	--	4.E-05		methyl Hg
Neurological	3.6E-05	5.7E-09	4.E-05		methyl Hg, Hg0
Kidney	5.7E-04	5.5E-09	6.E-04		divalent Hg
Immune system	5.7E-04	5.5E-09	6.E-04		divalent Hg
Fisher - Palm River	Soil ingestion, produce ingestion, fish ingestion, inhalation				
Developmental	2.9E-02	--	3.E-02		methyl Hg
Neurological	2.9E-02	5.7E-09	3.E-02		methyl Hg, Hg0
Kidney	2.7E-03	5.5E-09	3.E-03		divalent Hg
Immune system	2.7E-03	5.5E-09	3.E-03		divalent Hg
Fisher - Pond	Soil ingestion, produce ingestion, fish ingestion, inhalation				
Developmental	2.9E-02	--	3.E-02		methyl Hg
Neurological	2.9E-02	5.7E-09	3.E-02		methyl Hg, Hg0
Kidney	2.7E-03	5.5E-09	3.E-03		divalent Hg
Immune system	2.7E-03	5.5E-09	3.E-03		divalent Hg

-- = Not applicable.

(a) In this table, for a given chemical, the oral and inhalation hazard quotients were conservatively added even if the target organ/endpoint was different for the two routes of exposure.

(CPF 2002), and consideration of several key criteria as they apply specifically to the Hillsborough County RRF area, receptors were selected for evaluation in this assessment. The criteria that were considered included habitat selectivity (if species could inhabit or use habitat in the facility area), foraging guild (preferential selection of species that are aquatic carnivores), trophic position (preferential selection of species at higher positions in the food web), population status (preferential selection of species that are endangered or threatened), and toxicity and data availability (preference for species with available toxicity and exposure characterization information).

Based on these considerations, three receptors were selected for evaluation: aquatic life, wood stork, and river otter. Aquatic life inhabiting rivers, ponds and wetlands in the area could be exposed to mercury and PCDDs/PCDFs emitted from the RRF. Benthic dwelling aquatic organisms were evaluated in this assessment because mercury and PCDDs/PCDFs tend to partition to sediments and thus benthic dwelling organisms are likely to be at greatest risk. The wood stork is a federally endangered species that has been observed in the general facility vicinity. The wood stork feeds almost exclusively on small fish from shallow water bodies and thus could be exposed to chemicals that have accumulated in fish. This species was selected as an indicator for all piscivorous birds (e.g., cormorant, tern). The river otter is an aquatic mammal with a diet that consists primarily of fish. Otter and other mustelids have a demonstrated sensitivity to a range of environmental pollutants, including mercury, and due to their dietary reliance on fish, may be exposed to bioaccumulative compounds such as mercury and PCDDs/PCDFs. This species was selected as an indicator for piscivorous mammals (e.g., weasel).

6.2.2 Toxicity Assessment

Toxicity reference values (TRVs) were derived for aquatic life, birds, and mammals to support the risk evaluation. The TRVs used in this assessment were obtained from published reviews and criteria documents developed by or on behalf of (in order of preference) the State of Florida, the U.S. EPA (EPA 1997, EPA 1999b), and the National Oceanic and Atmospheric Administration (NOAA). Table 6-8 lists the TRVs used for aquatic and terrestrial wildlife in this assessment. These values represent the maximum concentration or dose to which an organism could be exposed without adverse toxicological effects.

6.2.3 Exposure Assessment

Ecological exposures were evaluated using calculated concentrations of mercury and PCDDs/PCDFs in the environment. The environmental concentrations were calculated, as described above, using EPA (1998a) fate and transport models, and site-specific input parameters for a typical pond and the Palm River, where available.

Table 6-8
Toxicity Reference Values (TRVs) for Ecological Receptors

Receptor	Mercury (a)				2,3,7,8-TCDD (a)			
	Value	Units	Basis	Source	Value	Units	Basis	Source
Aquatic Life								
Sediment	0.13	mg/kg dw in sediment	toxic effect level	MacDonald 1994	0.000035	mg/kg dw in sediment	Pond and river - upper effects threshold based on bioassays with <i>Hyalella azteca</i> ; value calculated for pond assuming an foc of 0.04 (EPA 1998 default value)	NOAA 1999
Terrestrial Wildlife								
Birds	0.026	mg/kg body weight	alteration of reproduction and behavior in mallard duck exposed for 3-generations; uncertainty factor of 3 applied to low-effect level	USEPA 1997	0.00001	mg/kg body weight	no-effect level in ring-necked pheasants subchronically exposed	USEPA 1999
Mammal	0.018	mg/kg body weight	histopathological lesions in nerve tissue of mink following subchronic exposure; uncertainty factor of 3 applied to no-effect level	USEPA 1997	0.000001	mg/kg body weight	reproduction no-effect level for chronic exposure in rat	USEPA 1999

(a) Aquatic TRVs based on total mercury; terrestrial TRVs for methyl mercury. The TRV for PCDDs/PCDFs is expressed in terms of 2,3,7,8-TCDD, because this is the congener for which the greatest amount of toxicity data is available, and it is the congener believed to be most toxic to fish and wildlife.

Sources:

MacDonald, D.D. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters. November 1994. Prepared for FDEP – Office of Water Policy by MacDonald Environmental Services Ltd., Ladysmith, British Columbia.

NOAA. 1999. Screening Quick Reference Tables (SQUIRTs). NOAA-reported value 0.0088 ug/kg was the lowest reliable value reported among Upper Effects Thresholds (UET) tests, and was calculated on a 1% TOC basis. Site-specific values calculated here using foc for pond and river.

USEPA. 1997. Mercury Report to Congress. Volume VI. An Ecological Assessment for Anthropogenic Mercury Emissions in the United States. EPA 452/R-97-008.

USEPA. 1999. Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA 530-D-99-001C.

Aquatic life exposures were evaluated using chemical concentrations in the sediment of the Palm River and a typical pond. Mercury sediment concentrations were expressed as total mercury and were calculated using EPA's combustion fate and transport algorithms (EPA 1998a) in conjunction with EPA's IEM-2M model (EPA 1997, 1999a), as noted above. PCDD/PCDF concentrations in sediment were calculated using EPA (1998a) fate and transport algorithms and expressed as 2,3,7,8-TCDD toxic equivalents (TEQs) using toxic equivalency factors for fish developed by the World Health Organization.

Wood stork exposures were evaluated using several very conservative assumptions that will overestimate risk results. First, exposures were calculated assuming that 100% of the bird's diet consisted of fish at the top of the food web (trophic level IV fish), although actual dietary intake includes a combination of prey at lower trophic levels characterized by lower potential tissue concentrations due to less bioaccumulation. This screening-level approach is, however, useful for using the wood stork as an indicator of piscivorous birds. In addition, this assessment assumed that all food was obtained from the water bodies in the facility area that were evaluated (i.e., Palm River and a typical pond). Piscivorous birds, however, are known to forage over very large areas, meaning that actual exposures related to facility emissions would be lower than calculated in this analysis. Fish tissue concentrations used to calculate wood stork exposures were calculated using TEQs for birds developed by the World Health Organization. The exposure assumptions used for the wood stork were based on input from the Fish and Wildlife Service's South Florida Ecological Services Office and were identical to those used in the Lee County RRF risk assessment (i.e., fish ingestion rate of 0.41 kg fresh weight/day and body weight of 2.38 kg).

River otter exposures were evaluated assuming that 100% of the mammal's diet consisted of fish at the top of the food web (trophic level IV fish), although actual dietary intake includes a substantial amount of prey at lower trophic levels. In addition, this assessment assumed that all food was obtained from the water bodies in the facility area that were evaluated (i.e., Palm River and a typical pond). Fish tissue concentrations used to calculate river otter exposures were calculated using TEQs for mammals developed by the World Health Organization. The exposure assumptions used for the river otter were based on EPA (1997) and were identical to those used in the Lee County RRF risk assessment (i.e., fish ingestion rate of 1.2 kg fresh weight/day and body weight of 7.4 kg).

6.2.4 Ecological Risk Assessment Results

Aquatic and terrestrial wildlife risks were evaluated using a hazard quotient approach, in which quotients less than 1 indicate that adverse effects from chemical-specific exposures are unlikely to occur, whereas quotients greater than 1 indicate that adverse effects are possible.

Tables 6-9 and 6-10 present the calculated hazard quotients for aquatic life, the wood stork and the river otter. As can be seen, the results are at least 25 times lower than the threshold level of 1, indicating that aquatic and terrestrial wildlife are not predicted to be at risk from adverse effects due to operation of a four-unit Hillsborough County RRF.

6.3 Discussion of Uncertainties

All risk assessments involve the use of assumptions, judgment and incomplete data to varying degrees. As a result, the results of any risk assessment inherently reflect uncertainty. This risk assessment, for example, involved the integration of many steps, each of which is characterized by some uncertainty. These steps include:

- the calculation of chemical emission rates,
- the modeling of potential air concentrations and deposition rates associated with chemical emissions,
- the calculation of chemical concentrations in the environment (e.g., soil, beef, fish and produce) using mathematical models in conjunction with many chemical/physical properties and assumed or site-specific information about the environment in the facility area,
- the calculation of potential exposures to humans, aquatic life and wildlife using a combination of standard and site-specific exposure parameters, and
- the calculation of potential risks using toxicity information derived using health-protective assumptions from experimental studies.

The human health and ecological risk assessment results presented above reflect the combination of these potential sources of uncertainty. Collectively, however, the assumptions used in this risk assessment are considered more likely to overestimate potential risks than underestimate them. For example, many conservative (i.e., health protective) assumptions, including reliance on default values and mathematical models specified in EPA guidance, were used in this risk assessment in an effort to ensure that potential risks would not be underestimated.

Table 6-9
Hazard Quotients for Aquatic Life in the Palm River and Pond

Chemical	TRV (mg/kg)		Sediment Concentration (mg/kg)		Hazard Quotient	
	River	Pond	Palm River	Pond	Palm River	Pond
mercury (total)	0.13	0.13	3.3E-03	3.1E-03	3.E-02	2.E-02
PCDDs/PCDFs (as TEQs)	3.5E-05	3.5E-05	5.0E-08	1.0E-07	1.E-03	3.E-03

TEQ = 2,3,7,8-TCDD toxic equivalents.

Table 6-10
Hazard Quotients for Terrestrial Wildlife Feeding in the Palm River and Pond

Wood stork (piscivorous bird)

Chemical	Fish Concentration (mg/kg fw)		Intake (mg/kg bw - day)		TRV (mg/kg bw)	Hazard Quotient	
	Palm River	Pond	Palm River	Pond		Palm River	Pond
PCDDs/PCDFs (as TEQs)	1.2E-08	2.5E-08	2.0E-09	4.3E-09	0.00001	2.E-04	4.E-04
Mercury (methyl)	4.1E-03	4.1E-03	7.2E-04	7.1E-04	0.026	3.E-02	3.E-02

River Otter (piscivorous mammal)

Chemical	Fish Concentration (mg/kg fw)		Intake (mg/kg bw - day)		TRV (mg/kg bw)	Hazard Quotient	
	Palm River	Pond	Palm River	Pond		Palm River	Pond
PCDDs/PCDFs (as TEQs)	6.1E-09	1.3E-08	1.0E-09	2.1E-09	0.000001	1.E-03	2.E-03
Mercury (methyl)	4.1E-03	4.1E-03	6.7E-04	6.6E-04	0.018	4.E-02	4.E-02

TEQ = 2,3,7,8-TCDD toxic equivalents

fw = fresh weight; bw = body weight

TRV = toxicity reference value

7.0 SUMMARY AND CONCLUSIONS

7.1 Introduction

This document presents a Human Health and Ecological Impact Analysis that was performed to address questions related to human and environmental health that may arise during the course of the permit process for the proposed fourth municipal solid waste combustion unit at Hillsborough County's RRF. This study is not a formal requirement of the permit process for the fourth MWC unit, but was conducted to ensure that issues of potential concern related to the proposed unit were evaluated.

This study was performed by CPF Associates, Inc., a Washington, D.C.-based scientific and regulatory consulting firm with over 20 years experience in evaluating the potential impacts of municipal solid waste management technologies.

7.2 Previous and Ongoing Studies

Studies of the potential human health and ecological impacts of the waste-to-energy facilities have been widely conducted and were reviewed in this report. These studies indicate that stack emissions from a modern municipal solid waste (MSW) waste-to-energy plant will not cause adverse health effects if it is designed and operated in accordance with current state and federal regulations.

7.3 Regulatory and Operational Evaluation

The combination of regulatory and operational requirements in place for W-T-E facilities at the Federal and State levels collectively ensures that that a modern W-T-E facility, including the Hillsborough County RRF, will operate in a manner protective of human health and the environment. The safety of the Hillsborough Facility is, in particular, enhanced as a result of EPA's New Source Performance Standards (NSPS) and associated emission limits in conjunction with requirements from the State of Florida, including a more stringent emission limit for mercury. In addition, Hillsborough County has a very aggressive recycling program and solid waste management program that reduces the introduction of unwanted materials in the solid waste to better control emissions.

The Hillsborough Facility is, and will be, equipped with Best Available Control Technologies, the same technologies that are in place at the Lee County W-T-E facility. These technologies include spray dryer absorbers with fabric filters to remove particles, sulfur dioxide and acid gases; activated carbon injection to remove mercury; and selective non-catalytic reduction to reduce NOx emissions. The air pollution control equipment combination of spray dryer absorber, fabric

filter and activated carbon injection has also been shown to reduce emissions of dioxins and furans.

7.4 Human Health Risk Assessment

The human health risk assessment presented in this report evaluated potential risks associated with operation of four waste combustion units at the Hillsborough County RRF (three existing units and the proposed fourth unit). The risk assessment was performed following EPA guidance, including but not limited to EPA's 1998 *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities*. Where possible, the risk assessment also incorporated site-specific information.

Potential human health risks were evaluated in a refined multiple pathway risk assessment for mercury and PCDDs/PCDFs, the compounds that have been shown to dominate risk assessment results for WTE facility emissions. The multiple pathway risk assessment relied on emission rates based on stack gas measurements. The multiple pathway risk assessment calculated exposures for 12 different hypothetical receptors: four adult receptors, four child receptors and four breast-fed infant receptors. For example, the four hypothetical child receptors were: child resident, child of an adult beef farmer, child of an adult who fishes in the Palm River, and child of an adult who fishes in a typical pond. Each adult or child receptor was hypothesized to be simultaneously exposed through multiple pathways (e.g., the child resident was exposed via inhalation, soil ingestion, and ingestion of locally-grown produce). Each adult receptor was also assumed to be the mother of a breast-fed infant.

The risk evaluations that were performed in the risk assessment included chronic long-term excess lifetime cancer risks, the potential for chronic non-cancer health effects, a margin of exposure approach that compares calculated doses of PCDDs/PCDFs to typical background U.S. exposure levels, and a comparison of PCDD/PCDF infant exposures to a background infant intake level. The findings of the risk assessment were as follows:

- All of the excess lifetime cancer risks were at least 10 times below EPA's target cancer risk level of 1×10^{-5} and did not exceed Florida's target risk level of 1×10^{-6} . The total excess lifetime cancer risks ranged from 8×10^{-8} for the hypothetical child resident or child of a beef farmer to 1×10^{-6} for the hypothetical adult pond fisher scenario.
- All of the noncancer hazard index values were at least 20 times below the target hazard index of 1.0. The highest hazard index result was 0.05 for the adult pond fisher scenario.
- The maximum average daily doses to PCDDs/PCDFs were 50 times below EPA's current estimate of background PCDD/PCDF exposure of 1

pg TEQs/kg-day. As a result, TEQ exposures to people due to emissions from the proposed four-unit RRF will not cause a measurable change in typical background exposures.

- Hypothetical infant exposures to PCDDs/PCDFs due to breast-milk ingestion were more than 100 times below the target exposure level of 60 pg TEQs/kg-day identified by EPA. These results show that infant TEQ exposures due to emissions from the proposed four-unit facility will not cause a measurable change in typical breast-fed infant TEQ exposure levels.

7.5 Ecological Risk Assessment

The ecological risk assessment evaluated potential effects of modeled emissions on ecological receptors within the RRF area. The ecological risk assessment followed EPA guidelines for ecological risk assessment and combustion facility ecological assessment, including but not limited to EPA's 1999 *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities* and incorporated regional-specific information on wildlife habitats and species use to identify species and habitats of concern. The ecological assessment focused on mercury and PCDDs/PCDFs as these compounds have been shown to dominate W-T-E facility risk assessment results.

The ecological risk assessment focused on potential impacts on the natural communities of the Palm River and freshwater ponds. The assessment focused on three indicator species, aquatic life, the wood stork, and the river otter, that were considered to be at greatest risk based on habitat use, exposure potential and population status and were considered to represent three broad classes of wildlife (aquatic life, piscivorous birds and piscivorous mammals).

Potential risks were evaluated by calculating hazard quotients which reflect the ratio of a predicted exposure level to a toxicity reference value (TRV) derived for the protection of fish or wildlife species. The ecological risk assessment showed that the hazard quotients for aquatic life and the selected terrestrial species were all less than the target level of 1.0 by at least a factor of 25. These results indicate that aquatic and terrestrial wildlife are not predicted to be at risk from adverse effects of exposures to chemicals released during the operation of the Hillsborough County ERF.

7.6 Conclusions

The Human Health and Ecological Impact Analysis presented in this document showed that potential risks from emissions from the Hillsborough County RRF, in its proposed configuration with four combustion units, were below regulatory and other target risk levels for both human health and ecological receptors. These conclusions are consistent with previous studies performed for other waste-to-

energy combustion facilities in the U.S. and are considered to be a reflection of implementation of regulations, and strict operational and emission controls that are used for this type of facility. Based on this analysis, the proposed modification to the RRF is not anticipated to have an adverse impact on human health or the environment.

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ATTACHMENT A

BIOGRAPHIES OF CPF ASSOCIATES, INC. SCIENTISTS

PAUL C. CHROSTOWSKI, Ph.D., QEP

EDUCATION

Ph.D. Environmental Engineering and Science, Drexel University, Philadelphia, PA (1981).

M.S. Environmental Science, Drexel University, Philadelphia, PA (Environmental Chemistry and Health Specializations, USPHS Traineeship) (1979).

B.S. Chemistry, University of California, Berkeley, California (American Chemical Society Certified, Honors) (1976).

PROFESSIONAL CERTIFICATION

Dr. Chrostowski is a Qualified Environmental Professional (QEP) (#02970014) and a Fellow of the Royal Society of Health (FRSH).

EXPERIENCE

Dr. Chrostowski is a founding member of CPF Associates, Inc. He is an environmental health scientist with over 30 years experience in environmental science and engineering work on behalf of both government and private clients. Previously, he was Director of Environment, Health & Safety programs at The Weinberg Group, Vice President and Senior Science Advisor at ICF/Clement, Senior Scientist at EA Engineering, Science & Technology, Assistant Professor at Vassar College, a consultant in private practice and a pollution control/industrial hygiene technician in industry. He has specialized experience in the scientific and technical aspects of federal, state, and international regulatory programs including the CAA, CERCLA/SARA, RCRA, TSCA, FIFRA, OSHA, waste management technologies and ecological assessment. In addition to EPA and OSHA programs, Dr. Chrostowski has developed substantial expertise in indoor air quality, odor analysis, microbiological risk assessment, the risk analysis of hazardous material transportation, and the risk analysis of FDA-regulated products. Dr. Chrostowski has conducted research into environmentally-friendly new product development and has directed registration and approval petition processes for the environmental and occupational aspects of new products, pesticides, and pharmaceuticals. Dr. Chrostowski's research interests include the behavior of complex mixtures, pharmacokinetics, application of quantitative management tools to environmental strategy development and evaluation, biomonitoring, use of epidemiology in risk assessment, mass transfer phenomena, applied statistics, and mathematical modeling for risk management decision making. Dr. Chrostowski is active in numerous professional societies and expert panels and has authored or co-authored over 100 publications or presentations in the environmental field. In addition to his technical work, Dr. Chrostowski has taught university-level environmental sciences and has presented expert testimony in litigation cases, regulatory, and permitting hearings and public meetings and has conducted technical negotiations on behalf of private and governmental clients. Dr. Chrostowski was a member of the National Research Council's committee on Health Effects of Waste Incineration and assisted the presidential/Congressional Commission on Risk Assessment and Risk Management regarding risk assessment of municipal waste combustors.

SARAH A. FOSTER

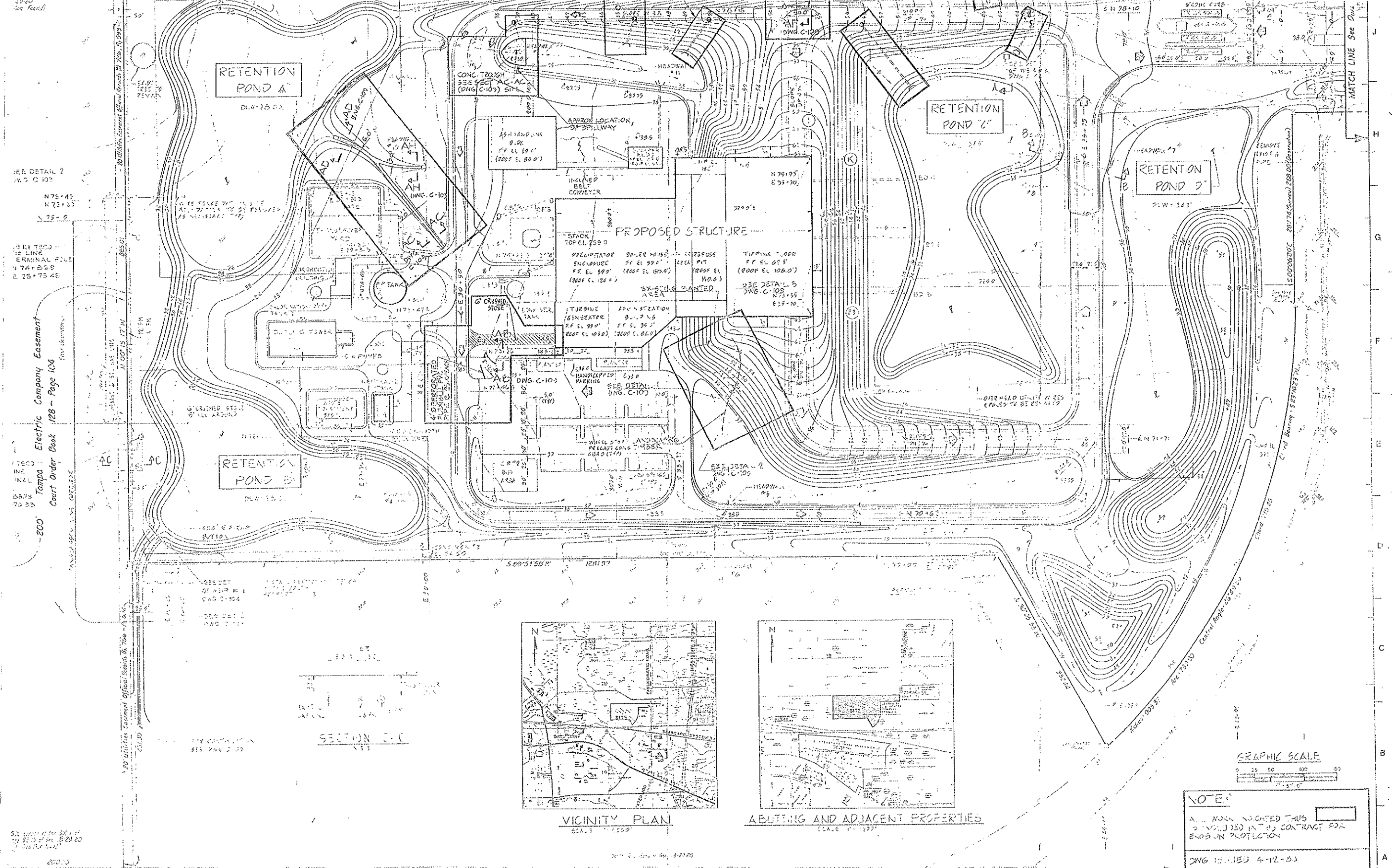
EDUCATION

M.S., Environmental Health Sciences, Air Pollution Control Program Harvard University School of Public Health, Cambridge, MA (1985).

B.A., Political Science (Environmental Law/Energy Policy), Williams College, Williamstown, MA (1981).

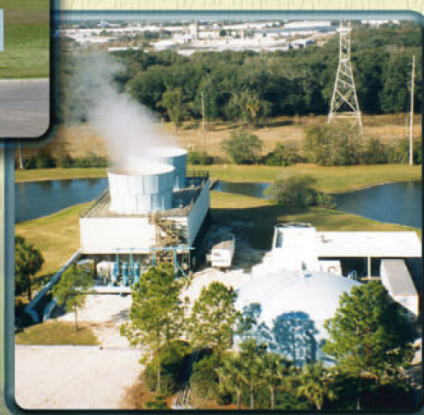
EXPERIENCE

Ms. Foster is a founding member of CPF Associates, Inc. She has over 20 years of consulting experience in environmental health sciences, with expertise in developing strategies for and conducting exposure and risk analyses related to environmental issues and commercial and consumer products. Previously, Ms. Foster was a Senior Consultant with The Weinberg Group, a Project Manager at the Clement Division of ICF/Kaiser, an Environmental Analyst with the U.S. Environmental Protection Agency's Office of Policy Analysis, and a researcher for the Harvard Public Health School's Six City Study. Her areas of specialty include the application of quantitative methods for evaluating potential risks, including multiple chemical, multiple exposure pathway risk assessments for waste management technologies, air toxics sources and waste sites, Monte Carlo simulation, environmental epidemiology, and good risk assessment practice principles. She has managed and performed over 100 comprehensive risk assessment projects for combustion sources, waste sites and consumer and commercial products, with specialized knowledge in the conduct of risk assessments for municipal solid waste combustors, hazardous waste incinerators, landfills and emissions reported under SARA Title III. She has developed and applied a wide variety of environmental fate and transport models, and critically analyzed and compiled a broad array of human activity pattern data, in exposure assessment projects involving multiple inhalation, ingestion and dermal pathways as well as the use of household tap water. She has also developed and applied innovative risk assessment methods to assess risks from combustion sources, indoor water use, waste sites, and pesticides and anti-microbial materials that include geostatistical kriging and stochastic simulation. Ms. Foster has analyzed issues regarding contaminated site remedy selection, cleanup goals, cost and liability allocation evaluations under CERCLA, RCRA and state regulatory programs, and the historical state-of-knowledge of toxicological and environmental health sciences. Ms. Foster has also evaluated global environmental issues associated with pharmaceuticals and medical devices. In conjunction with many of her risk assessment and regulatory toxicology projects, Ms. Foster has provided risk communication and technical support for public, regulatory and permit hearings, and for litigation. Ms. Foster has numerous publications focusing on risk assessment, air toxics and emissions from industrial sources and is a member of several professional societies. She also has considerable experience in developing and conducting risk assessment training courses.



Appendix 5-1 Pre-Development Site Conditions

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Application for Power Plant Site Certification

Hillsborough County Resource Recovery Facility Expansion

Volume III



Hillsborough County
Florida

Contents

Volume I - Application

Executive Summary

ES.1	Introduction.....	ES-1
ES.2	Background	ES-1
ES.3	Need for Facility Expansion.....	ES-2
ES.4	Site and Associated Facilities	ES-2
ES.5	Existing and Proposed Facility	ES-2
ES.6	Effects on Facility Construction and Operation	ES-3

Section 1 **Need for Power and the Proposed Facility**

Section 2 **Site and Vicinity Characterization**

2.1	Site and Associated Facilities Delineation.....	2-1
2.1.1	Site Delineation and Ownership	2-1
2.1.2	Existing and Proposed Site Uses	2-3
2.2	Sociopolitical Environment	2-10
2.2.1	Governmental Jurisdictions	2-10
2.2.2	Zoning and Land Use Plans.....	2-15
2.2.2.1	Land Use Plans	2-16
2.2.2.2	Consistency with the Comprehensive Plan	2-17
2.2.2.3	Zoning Regulations	2-19
2.2.3	Demography and Ongoing Land Use	2-22
2.2.3.1	Existing Populations	2-22
2.2.3.2	Existing Land Use.....	2-22
2.2.4	Easements, Title, Agency Works	2-26
2.2.5	Regional, Scenic, Cultural, and Natural Landmarks.....	2-26
2.2.6	Archaeological and Historic Sites	2-27
2.2.7	Socioeconomics and Public Service	2-28
2.2.7.1	Social and Economic Characteristics	2-28
2.2.7.2	Area Public Service and Utilities	2-36
2.3	Biophysical Environment	2-40
2.3.1	Geohydrology	2-40
2.3.1.1	Geologic Description of the Site-Area	2-40
2.3.1.2	Detailed Site Lithologic Description	2-48
2.3.1.3	Geologic Maps	2-50
2.3.1.4	Bearing Strength	2-53
2.3.2	Subsurface Hydrology	2-54
2.3.2.1	Subsurface Hydrologic Data for the Site.....	2-54
2.3.2.2	Karst Hydrogeology.....	2-63
2.3.3	Site Water Budget and Area Users.....	2-63

2.3.4	Surficial Hydrology	2-67
2.3.4.1	Hydrologic Characterization	2-67
2.3.4.2	Measurement Programs	2-69
2.3.5	Vegetation/Land Use	2-70
2.3.5.1	Pre-Existing Stresses	2-80
2.3.5.2	Measurement Programs	2-80
2.3.6	Noise	2-80

Section 3 The Plant and Directly Associated Facilities

3.1	Background	3-1
3.1.1	Purpose	3-1
3.1.2	History	3-1
3.1.3	Current Conditions	3-3
3.1.4	Expansion	3-4
3.2	Site Layout	3-4
3.2.1	Layout	3-4
3.2.2	External Appearance	3-5
3.3	Fuel	3-7
3.4	Air Emissions and Controls	3-8
3.4.1	Air Emissions Types and Sources	3-8
3.4.2	Air Emission Controls	3-8
3.4.3	Best Available Control Technology	3-8
3.4.4	Design Data for Control Equipment	3-10
3.4.5	Design Approach	3-10
3.5	Plant Water Use	3-11
3.5.1	Heat Dissipation System	3-12
3.5.1.1	System Design	3-12
3.5.1.2	Source of Cooling Water	3-13
3.5.1.3	Dilution System	3-13
3.5.1.4	Blowdown	3-13
3.5.1.5	Injection Wells	3-13
3.5.2	Domestic/Sanitary Wastewater	3-13
3.5.3	Potable Water Systems	3-14
3.5.4	Process Water Systems	3-14
3.6	Chemical and Biocide Waste	3-15
3.7	Solid and Hazardous Wastes	3-15
3.7.1	Wastes (Including Ash)	3-15
3.7.2	Hazardous Wastes	3-15
3.8	On-Site Drainage System	3-16
3.8.1	Pre-Development Site Conditions	3-17
3.8.2	Post-Development Site Conditions	3-21
3.8.3	Basin Design	3-25
3.9	Materials Handling	3-27

Section 4	Effects of Site Preparation and Plant and Associated Facilities Construction	
4.1	Land Impact	4-1
	4.1.1 General Construction Impacts	4-1
	4.1.2 Roads	4-2
	4.1.3 Flood Zones	4-2
	4.1.4 Topography and Soils	4-2
4.2	Impact on Surface Water Bodies and Uses	4-3
	4.2.1 Impact Assessment	4-3
	4.2.2 Measuring and Monitoring Programs	4-3
4.3	Groundwater Impacts	4-3
	4.3.1 Impact Assessment	4-3
4.4	Ecological Impacts	4-3
	4.4.1 Impact Assessment	4-3
4.5	Impact on Human Populations	4-4
	4.5.1 Sensitive Receptors	4-4
	4.5.2 Workforce	4-5
	4.5.3 Traffic Associated with Construction	4-7
4.6	Impact on Landmarks and Sensitive Areas	4-9
4.7	Impact on Archaeological and Historic Sites	4-9
4.8	Special Features	4-10
4.9	Summary of Impacts and Benefits from Construction	4-10
4.10	Variances	4-11
Section 5	Effects of Plant Operation	
5.1	Effects of the Operation on the Heat Dissipation System	5-1
	5.1.1 Temperature Effects on Receiving Body of Water	5-1
	5.1.2 Effects on Aquatic Life	5-1
	5.1.3 Biological Effects of Modified Circulation	5-1
	5.1.4 Effects of Offstream Cooling	5-1
	5.1.5 Measurement Program	5-2
5.2	Effects of Chemical and Biocide Discharges	5-2
	5.2.1 Industrial Wastewater Discharges	5-2
	5.2.1.1 Impact of Blowdown and Waste Discharges to WWTP	5-2
	5.2.1.2 Impact of WWTP Effluent on Facility and Other Reuse	5-3
	5.2.2 Cooling Tower Blowdown	5-4
	5.2.3 Measurement Program	5-4
5.3	Impacts on Water Supplies	5-4
	5.3.1 Surface Water	5-4
	5.3.2 Groundwater	5-4
	5.3.3 Drinking Water	5-5
	5.3.4 Leachate and Runoff	5-5
	5.3.5 Measurement Program	5-6

5.4	Solid/Hazardous Waste Disposal Impacts.....	5-6
5.4.1	Solid Waste.....	5-6
5.4.2	Hazardous Waste	5-6
5.4.3	Ash Testing.....	5-7
5.5	Sanitary and Other Waste Discharges	5-7
5.6	Air Quality Impacts.....	5-7
5.6.1	Impact Assessment.....	5-7
5.6.2	Monitoring Program	5-7
5.7	Noise.....	5-8
5.8	Changes in Non-Aquatic Species Populations	5-8
5.8.1	Impacts.....	5-8
5.8.2	Monitoring.....	5-8
5.9	Other Plant Operation Effects.....	5-8
5.10	Archaeological Sites	5-8
5.11	Resources Committed	5-9
5.12	Variances.....	5-9
Section 6	Transmission Lines and Other Linear Facilities	
6.1	Transmission Lines.....	6-1
6.1.1	Electromagnetic Effects.....	6-2
6.2	Associated Linear Facilities.....	6-3
Section 7	Economic and Social Effects of Plant Construction and Operation	
7.1	Socio-Economic Benefits.....	7-1
7.2	Socio-Economic Costs	7-3
Section 8	Site and Plant Design Alternatives	
8.1	Alternative Sites.....	8-1
8.2	Proposed Site Design Alternatives.....	8-1

Tables

Table 2-1	Existing and Proposed Site Uses.....	2-10
Table 2-2	Hillsborough County Population 1980-2003.....	2-22
Table 2-3	Population within a Five-Mile Radius	2-28
Table 2-4	Labor Force Trends Hillsborough County 1984-2002.....	2-31
Table 2-5	Employment by Industry Hillsborough County	2-33
Table 2-6	Employment Projection Hillsborough County	2-34
Table 2-7	Population Counts by Income Range for Census Tracts Within a 5 Mile Radius	2-34
Table 2-8	Average Wages in Industry	2-35
Table 2-9	Building Permit Activity for Residential and Non-Residential.....	2-36
Table 2-10	Geohydrologic Framework of Floridan Aquifer System.....	2-41
Table 2-11	Site Boring Data from Williams and Associates Report (1983).....	2-51
Table 2-12	Site Boring Data from Test Lab, Inc. (1984)	2-52
Table 2-13	Reported Values for Aquifer Characteristics	2-59
Table 2-14	Results of Selected Water Quality Parameters for Wells Near the Facility	2-62
Table 2-15	Hydrologic Data Representative for the Site Area	2-66
Table 2-16	Water Quality of Surface Waters in Vicinity of Site	2-69
Table 2-17	Wildlife Sighting Results.....	2-77
Table 2-18	Noise Baseline Data Summary	2-83
Table 3-1	Proposed Permit Limits for the Expanded Facility	3-9
Table 3-2	Water and Wastewater Usage for Current and Future Conditions	3-12
Table 3-3	Falkenburg Wastewater Treatment Plant Effluent Water Quality.....	3-14
Table 3-4	Drainage Areas and Retention Basins Sizes	3-1
Table 3-5	Pre-Development Drainage Areas.....	3-18
Table 3-6	Time of Concentration for Predevelopment Site Conditions.....	3-19
Table 3-7	Pre-Development Peak Discharge	3-20
Table 3-8	Runoff for Pre-Development Site Conditions	3-21
Table 3-9	Post-Development Drainage Areas	3-22
Table 3-10	Post-Development Peak Discharge	3-24
Table 3-11	Runoff for Post-Development Site Conditions	3-25
Table 3-12	Limiting Discharge Values for Each Drainage Area	3-26
Table 3-13	Basin Storage Volume Requirements	3-26
Table 5-1	Facility Wastewater Discharge Limits.....	5-3

Figures

Figure 2.1	Site Boundaries.....	2-5
Figure 2.2	Boundary Survey and Legal Description	2-6
Figure 2.3	Abutting and Adjacent Properties	2-7
Figure 2.4	Aerial Photograph of Site.....	2-8
Figure 2.5	Facility Layout.....	2-9
Figure 2.6	Flood Hazard Areas.....	2-12
Figure 2.7a	Governmental Jurisdictions Map.....	2-13
Figure 2.7b	Governmental Jurisdictions Map.....	2-14
Figure 2.8	Land Use Plan – 5-Mile Area.....	2-18
Figure 2.9	Generalized Zoning – 5-Mile Area	2-21
Figure 2.10	Existing Land Use – 5-Mile Area	2-24
Figure 2.11	Major Industrial and Commercial Activities Near the Site.....	2-25
Figure 2.12	2000 Census Tracts in Hillsborough County.....	2-29
Figure 2.13	2000 Census Tracts near the Site	2-30
Figure 2.14	Solid Waste Management Facilities in Hillsborough County.....	2-39
Figure 2.15	Soil Survey Data	2-42
Figure 2.16	Generalized Geologic Column	2-44
Figure 2.17	Locations of Soil Borings and Geologic Cross-Sections.....	2-45
Figure 2.18	Geologic Cross-Sections A-A'	2-46
Figure 2.19	Geologic Cross Sections B-B'	2-47
Figure 2.20	Potentiometric Surface of the Floridan Aquifer.....	2-56
Figure 2.21	Groundwater Levels in the Surficial Aquifer, May 1980.....	2-57
Figure 2.22	Areas of Inventory of Public and Private Water Wells.....	2-61
Figure 2.23	Sinkhole and Wellfield Distribution.....	2-65
Figure 2.24	Vegetation and Land Use Map.....	2-82
Figure 2.25	Noise Monitoring Locations	2-84
Figure 3.1	Rendering of Current Facility.....	3-6
Figure 3.2	Rendering of Expanded Facility.....	3-6
Figure 3.3	Post-Development Site Conditions.....	3-23
Figure 4.1	Estimated Work Force Requirements.....	4-6
Figure 4.2	Construction Related Traffic.....	4-7
Figure 5.1	Projected Waste Tonnages	5-6

Volume II – Appendices

<i>Appendix 1</i>	Site and Adjacent Area Property Ownership
1-1	Deed for Property and Survey of 353 Acre Tract
1-2	List of Adjacent Property Owners
<i>Appendix 2</i>	Zoning and Land Use Plan
2-1	Standard Zoning Districts
2-2	Land Use Element and Solid Waste Use Element
2-3	Siting Board's Final Order
<i>Appendix 3</i>	Materials Separation Plan
<i>Appendix 4</i>	Requirements for New Waste-to-Energy Facility Capacity
<i>Appendix 5</i>	State Permit Applications and Approvals
5-1	Revised Stormwater Calculations
5-2	Title V Air Operation Permit
<i>Appendix 6</i>	Correspondence Related to Governmental Jurisdictions
<i>Appendix 7</i>	Groundwater Well Inventory
<i>Appendix 8</i>	Historic and Archeological Report
8-1	Correspondence with Florida Department of State Division of Archives, History, and Records Management
8-2	National Register Entries from Hillsborough County
8-3	Archaeological and Historical Survey of the Site by J. Raymond Williams, Et Al
<i>Appendix 9</i>	Surface and Groundwater Related Information
9-1	Well Construction Inventory
9-2	Consumptive Use Permits Inventory
9-3	Surface Water Quality Sampling Lab Analysis
<i>Appendix 10</i>	Soils and Related Geotechnical Information
10-1	Summary of Important Soil Characteristics
10-2	Estimated Soil Properties for Engineering
10-3	Test Lab, Inc. Report
10-4	Williams and Associates Inc. Report
<i>Appendix 11</i>	Miscellaneous Reports
11-1	Noise Technical Analysis
11-2	Traffic Impact Analysis
11-3	Ash Management Plan
<i>Appendix 12</i>	Other Supplemental Information
12-1	Ecology
12-2	Growth Management Strategy Information
12-3	Nitrogen Deposition to Tampa Bay
<i>Appendix 13</i>	APC Technical Specifications (Attachments 1-5)
<i>Appendix 14</i>	Human Health and Ecological Impact Analysis of the Hillsborough County Resource Recovery Facility Expansion

Volume III – Prevention of Significant Deterioration Air Permit Application

Section 1 Introduction and Overview

Section 2 Regulatory Review

2.1	Applicable Regulations.....	2-1
2.2	PSD Provisions.....	2-1
2.2.1	Source Applicability	2-3
2.2.2	Pollutant Applicability	2-3
2.3	Ambient Air Quality Standards	2-5
2.4	New Source Performance Standards	2-5
2.4.1	New Source Performance Standards for Large Municipal Solid Waste Combustors (Subpart Eb).....	2-6
2.4.2	Incinerator NSPS (Subpart E)	2-11
2.4.3	Industrial-Commercial-Institutional Steam Generating Unit NSPS (Subpart Db).....	2-11
2.4.4	Other NSPS Subparts.....	2-12
2.5	National Emission Standards for Hazardous Air Pollutants	2-12
2.5.1	Beryllium NESHAP	2-13
2.5.2	Mercury NESHAP.....	2-13
2.6	Maximum Achievable Control Technology (MACT) Requirements	2-13
2.7	Compliance Assurance Monitoring (CAM) Rule.....	2-13
2.8	Federal Aviation Administration Requirements for Objects Affecting Navigable Airspace Airspace	2-14
2.9	Florida Air Regulations	2-15
2.10	Florida Mercury Rule.....	2-18
2.11	Permits Requirements.....	2-18
2.11.1	Existing Permits.....	2-18
2.11.2	Proposed Permit Conditions	2-19
2.12	Conclusions	2-20

Section 3 Best Available Control Technology Evaluation (BACT)

3.1	Introduction.....	3-1
3.2	Description of BACT Review	3-2
3.3	Proposed Control Technologies	3-6
3.4	Materials Separation.....	3-6
3.5	BACT Review for Sulfur Dioxide, MWC Acid Gases, Fluorides and Sulfuric Acid Mist.....	3-9
3.5.1	Emission of Gaseous Sulfur Compounds and Acid Gases.....	3-9
3.5.2	Available Control Technologies.....	3-10
3.5.2.1	Wet Scrubbing Systems	3-10
3.5.2.2	Dry Scrubbers.....	3-13

	3.5.2.3	Dry Sorbent Injection (DSI)	3-15
	3.5.2.4	Innovative Acid Gas Control Processes	3-19
	3.5.3	Selection of BACT	3-19
3.6		BACT Review for Particulate Matter (PM ₁₀) and MWC Metals.....	3-20
	3.6.1	Emission of Particulate Matter	3-21
	3.6.2	Available Control Technologies.....	3-22
	3.6.3	Selection of BACT	3-23
3.7		BACT Review for Nitrogen Oxides Emissions.....	3-23
	3.7.1	Emission of Nitrogen Oxides.....	3-24
	3.7.2	Available Control Technologies.....	3-25
	3.7.2.1	Combustion Modifications.....	3-25
	3.7.2.2	Flue Gas Controls	3-31
	3.7.3	Ranking of Alternative Control Technologies	3-39
	3.7.4	Environmental Impact.....	3-40
	3.7.5	Economic Impact.....	3-41
	3.7.6	Energy Impact.....	3-45
	3.7.7	Selection of BACT	3-46
3.8		BACT Review for Carbon Monoxide.....	3-46
	3.8.1	Emission of Carbon Monoxide.....	3-49
	3.8.2	Selection of BACT	3-49
3.9		BACT Review for MWC Organics	3-50
	3.9.1	Emission of MWC Organics	3-50
	3.9.2	Selection of BACT	3-50
3.10		BACT Review for Mercury Emissions	3-51
	3.10.1	Emission of Mercury.....	3-51
	3.10.2	Available Control Technologies.....	3-51
	3.10.2.1	Activated Carbon Injection	3-51
	3.10.2.2	Web Scrubber Systems.....	3-52
	3.10.2.3	Carbon Filter Beds	3-53
	3.10.3	Ranking of Alternative Control Technologies	3-53
	3.10.4	Selection of BACT	3-54
3.11		Summary of BACT Determinations.....	3-54
Section 4		Emissions Estimates	
4.1		Introduction.....	4-1
4.2		Pollutant Emission Estimates – New Municipal Waste Combustor Unit	4-1
	4.2.1	Particulate Matter and PM ₁₀	4-2
	4.2.2	Municipal Waste Combustor Acid Gases.....	4-4
	4.2.2.1	Sulfur Dioxide.....	4-5
	4.2.2.2	Sulfuric Acid Mist	4-5
	4.2.3	Carbon Monoxide	4-6
	4.2.4	Nitrogen Oxides	4-7
	4.2.5	Municipal Waste Combustor Metals.....	4-7

4.2.6	Municipal Waste Combustor Organics.....	4-9
4.2.7	Volatile Organic Compounds.....	4-9
4.2.8	Ammonia.....	4-10
4.3	Pollutant Emission Estimates – Miscellaneous Sources	4-10
4.3.1	Lime Storage Silo.....	4-10
4.3.2	Activated Carbon Storage Silo	4-10
4.3.3	Cooling Tower Cell	4-11
4.3.4	Auxiliary Burners.....	4-11
Section 5	Ambient Conditions	
5.1	Terrain Description	5-1
5.2	Meteorology and Climate	5-1
5.3	Ambient Air Quality Standards/ Attainment Status	5-1
5.4	Existing Air Quality	5-5
Section 6	Air Quality Modeling Analyses	
6.1	Overview	6-1
6.2	Model Selection and Options.....	6-1
6.2.1	Screening Analysis.....	6-2
6.2.2	Refined Air Quality Analyses.....	6-2
6.2.3	Class I Impact Analysis	6-3
6.2.4	Chemical Transformations.....	6-4
6.2.5	Averaging Periods	6-4
6.3	Facility Layout and Surrounding Terrain	6-5
6.4	Source Data.....	6-9
6.4.1	Good Engineering Practice (GEP) Stack Height Analysis and Building Downwash.....	6-12
6.5	Receptor Network	6-16
6.6	Meteorological Data	6-17
6.7	Screening Modeling Results.....	6-17
6.8	Refined and Class I Area Modeling Results	6-18
6.8.1	Significant Impact Levels and De Minimis Monitoring Levels	6-27
6.8.2	PSD Increment Analysis Results.....	6-29
6.8.3	National Ambient Air Quality Standards.....	6-30
6.8.4	Ambient Reference Concentrations	6-32
Section 7	Additional Impact Analysis	
7.1	Visibility	7-1
7.2	Minor Source Growth	7-4
7.2.1	Employment.....	7-5
7.3	Vegetation and Soils.....	7-5
7.3.1	Total Sulfur Deposition	7-8
7.3.2	Total Nitrogen Deposition	7-8

Section 8 References

Appendices

Appendix A Emission Calculation Tables

Appendix B Best Available Control Technology Analysis Supporting Documentation

Appendix C DEP Forms

Tables

2-1	Thresholds for Major Modifications to PSD Major Sources.....	2-2
2-2	PSD Pollutant Applicability HCRRF Unit 4.....	2-4
2-3	40 CFR 60 Subpart Eb Air Pollutant Emissions Standards for Unit 4	2-7
3-1	Comparison of Most Recent Municipal Waste Combustor Emission Limits and Control Technologies EPA RACT/BACT/LAER Clearinghouse	3-5
3-2	Summary of Hillsborough County Resource Recovery Facility New MWC Unit Best Available Control Technology Determination	3-7
3-3	Control Efficiencies of Sulfur Dioxide and Acid Gas Control Technologies.....	3-10
3-4	Alternative Control Methods for Nitrogen Oxides.....	3-27
3-5	Sample List of European Municipal Waste Combustion Facilities Utilizing SCR and Their Air Pollution Control Equipment Configuration	3-33
3-6	European Municipal Waste Combustion Facility with SCR Emissions Information Received During the BACT Preparation Process	3-34
3-7	Existing MWC Units NO _x Permit Limits and Equivalent Annual Average Emission Rates.....	3-36
3-8	SCR with FGR System for 600 TPD Municipal Waste Combustor – Capital and O&M Costs.....	3-47
3-9	SNCR with FGR for 600 TPD Municipal Waste Combustor – Capital and O&M Costs.....	3-48
3-10	Pollutants Applicable to PSD Review and Proposed Control Technology	3-54
4-1	Proposed Emissions Limits and Air Dispersion Modeling Emissions Rates	4-3
5-1	National and Florida Ambient Air Quality Standards	5-3
5-2	Attainment Status ¹ for Areas Including the Hillsborough County Solid Waste Recovery Facility	5-4
5-3	Locations of Ambient Pollutant Monitors and Relative Distance to Stack Location at the Hillsborough County Resource Recovery Facility	5-7
5-4	Pollutants Monitored at Hillsborough County Ambient Monitors (2002-2004) ..	5-8
5-5	Ambient Monitored Concentrations at the Nearest Stations to the Hillsborough County Resource Recovery Facility	5-9
6-1	Municipal Waste Combustor Unit 4 Operating Windows and Stack Parameters	6-9
6-2	Municipal Waste Combustor Existing Units’ Stack Parameters	6-12
6-3	BPIP Building Tiers and Heights	6-16
6-4	Municipal Waste Combustor Screening Modeling Results	6-19
6-5	Existing and New Sources Parameters	6-20
6-6	Unit 4 and Facility Normalized Modeled Concentrations	6-20
6-7	Existing Facility and Unit 4 Modeling Emissions Rates	6-27
6-8	Unit 4 Only Comparison of Unit 4 Only Maximum Impacts to SILs	6-28
6-9	Comparison of Unit 4 Maximum Impacts to De Minimis Monitoring Levels ...	6-29

6-10	Comparison of Unit 4 and Facility Maximum Impacts to PSD Class II Increments.....	6-30
6-11	Comparison of Maximum Class I Impacts to Significant Impact Levels and PSD Increments	6-31
6-12	Comparison of Unit 4 and Combined Facility Maximum Impacts to NAAQS.....	6-32
6-13	Comparison of Unit 4 and Facility Maximum Impacts to Ambient Reference Concentrations ¹	6-33
7-1	Class I Visibility Modeling Results.....	7-3
7-2	Class II Visibility Modeling Results	7-3
7-3	Population Change for Hillsborough County, 1980 to 2004	7-4
7-4	Comparison of Unit 4 and Hillsborough County Air Pollutant Emission Rates.....	7-5
7-5	Total Sulfur Deposition Results Class I – Chassahowitzka Wildlife Refuge, Annual Average S Deposition (kg/ha*yr)	7-9
7-6	Total Nitrogen Deposition Results Class I – Chassahowitzka Wildlife Refuge, Annual Average N Deposition (kg/ha*yr)	7-10

Figures

6-1	Locus Map	6-6
6-2	Site Plan Map	6-7
6-3	3-km Land Use Area	6-8
6-4	Hillsborough County Resource Recovery Facility Unit 4 Stoker Capacity Diagram	6-11
6-5	GEP Stack Height Analysis Building Layout	6-14
6-6	GEP Stack Height Analysis 3-D Building Layout.....	6-15
6-7	Unit 4 Maximum Annual Normalized Impacts	6-22
6-8	Unit 4 24-Hour High 2 nd High Normalized Impacts.....	6-23
6-9	Unit 4 8-Hour High 2 nd High Normalized Impacts.....	6-24
6-10	Unit 4 3-Hour High 2 nd High Normalized Impacts.....	6-25
6-11	1-Hour High 2 nd High Normalized Impacts.....	6-26
7-1	Hillsborough County Air Pollution Trends	7-7

Section 1

Introduction and Overview

The Hillsborough County Waste Energy Recovery Facility (Facility) is proposing to construct and operate a new 600-ton-per-day (tpd) boiler, which would be the Facility's new Unit 4. The Facility currently has three mass-burn combustion units with nominal nameplate capacities of 400 tpd each. The new Unit 4 would increase the solid waste processing capacity of the Facility from 1200 tpd to 1800 tpd. The proposed new Unit 4 would also increase the Facility's steam electrical generating capacity from 39 MW to 47 MW.

Hillsborough County (County) has prepared this Application to satisfy the requirements set forth in the Florida Electrical Power Plant Siting Act (PPSA), Sections 403.501-518, Florida Statutes, and the PPSA rules adopted by the Florida Department of Environmental Protection (FDEP) in Chapter 62-17, F.A.C. This Volume III contains the Air Permit application portions of the Application. With this Volume, the County seeks to modify the air emission provisions of its Power Plant Site Certification (PA 83-19), Prevention of Significant Deterioration (PSD) Air Permit (PSD-FL-121(B)), and Title V Air Operation Permit (No. 0570261-005-AV), for the addition of the new Unit 4. This Volume provides the information required by Chapter 62-212.400, F.A.C., for a PSD application. Section 2 describes the applicable air quality regulatory requirements for the new Unit 4. Section 3 contains the Best Available Control Technology Analyses Evaluation. Section 4 presents the air pollutant emission rate estimates for the new Unit 4. Section 5 describes ambient air quality conditions in the project area. Section 6 presents the dispersion modeling analyses, and Section 7 presents the Additional Impact Analyses (impacts to visibility, growth, and vegetation and soils) required by the Rule. **Appendix A** contains the emission factor calculations. **Appendix B** contains the supporting documentation for Best Available Control Technology. **Appendix C** contains all the relevant DEP forms for the PSD Application.

Best Available Control Technology for the proposed Unit 4 would consist of a spray dryer absorber (SDA), a fabric filter (FF), an activated carbon injection (ACI) system, and an enhanced selective non-catalytic reduction (SNCR) system. With this control technology, the modeling analyses show that:

- Unit 4 would consume less than 2% of the PSD Class II Increment, and the Facility as a whole (including Unit 4), less than 12% of the Increment.
- Unit 4 and the Facility as a whole would have maximum predicted concentrations well under the Florida and National Ambient Air Quality Standards. Unit 4's highest concentration would be less than 1% of any Standard; and the Facility as a whole (with background concentrations and Unit 4 added) would have concentrations less than 75% of any Standard.

- Unit 4's air emissions would have an insignificant effect on the nearest Class I (pristine) Area, the Chassahowitzka National Wildlife Refuge. The maximum predicted concentration would be less than 44% of the Class I Significant Impact Level (SIL), and consume less than 1% of the Class I PSD Increment.
- Unit 4 would have non-criteria air pollutant maximum predicted concentrations that would be about 80% or less of any guideline Ambient Reference Concentration.
- Unit 4 would have negligible effects on regional growth, visibility in Class I Areas, and vegetation and soils in the project area.

Section 2

Regulatory Review

2.1 Applicable Regulations

Air quality regulations promulgated by the United States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) define ambient air quality standards and regulate the sources of air contaminants in order to achieve and maintain these ambient standards. The proposed expansion of the Hillsborough County Resource Recovery Facility has been evaluated to verify compliance with the following rules and regulations:

- Prevention of Significant Deterioration (PSD)
- Non-Attainment New Source Review (NSR)
- Ambient Air Quality Standards (AAQS)
- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- Florida Administrative Code Requirements (F.A.C.)
- Federal Aviation Administration (FAA) regulations governing stack height
- Florida Electrical Power Plant Siting Act (PPSA)

The FDEP operates a PSD program that has been “approved” by the USEPA. In many cases, the FDEP’s rules are the same as those of the USEPA. However, for those instances where the Florida rules are more restrictive than those of the USEPA, the Florida regulation has been applied.

2.2 PSD Provisions

The federal PSD air permit program was established in 1974 to prevent degradation of air quality in regions of the country that were currently in attainment with the AAQS. The PSD program requires that major sources in attainment areas obtain permits, and that emissions from these sources cannot cause degradation of ambient air quality beyond certain increments – and in no case, beyond the AAQS.

The PSD permit program is applicable to major sources of regulated air pollutants in attainment areas. Major sources are defined by their annual emission rate and the industrial category of the Facility. For example, a Facility is major if its emissions of any regulated pollutant exceed 100 tons per year and it is in one of 28 specified industrial source categories. The Facility is classified as major because it is a municipal incinerator capable of charging more than 50 tons per day of MSW and it

has the potential to emit more than 100 tons per year of at least one regulated pollutant.

A physical modification to an existing PSD major source is subject to additional regulation if it results in a *significant* increase in emissions of any regulated pollutant. A *significant* emissions increase is an increase greater than or equal to the levels listed in **Table 2-1**.

Table 2-1 Thresholds for Major Modifications to PSD Major Sources	
Pollutant	Emissions (tons/year)
Carbon monoxide	100
Nitrogen oxides	40
Sulfur dioxide	40
Ozone (as VOCs)	40
Particulate matter	25
PM10	15
Total Reduced Sulfur (including H ₂ S)	10
Sulfuric acid mist	7
Fluorides	3
Lead	0.6
Mercury	0.1
MWC organics	3.5 x 10 ⁻⁶
MWC metals	15
MWC acid gases	40

Source: 62-212.400, Table 212.400-2, F.A.C.

In general, a PSD permit application must contain the following components:

- A complete description of the nature and operation of the source
- A Best Available Control Technology (BACT) determination
- An analysis of existing ambient air quality

- An impact assessment demonstrating that emissions from the new source will not cause a violation of ambient air quality standards or PSD increments
- An assessment of the source's impact on air quality related values including soils, vegetation, visibility and general commercial, residential, and industrial growth.

If the proposed source or modification is within 100 km of a designated Class I area, concurrence with the Federal Land Manager (FLM) for the Class I area must also be established before a PSD permit can be issued, however EPA has the authority to overrule the FLM. Class I areas are those pristine areas of the United States, such as national parks and wilderness areas. The Chassahowitzka Wilderness Area is located less than 100 km from the Facility. Section 7 of this report addresses Additional Impact Analyses and contains the Class I impact analysis for the proposed modification.

2.2.1 Source Applicability

Construction of the fourth unit at the Facility constitutes a major modification to an existing major source because the Facility combusts more than 50 tons per day of municipal solid waste. Also, the new Unit 4 will exceed the PSD significance levels in Table 2-1 for at least one of the PSD regulated pollutants. PSD requirements apply to major modifications located in areas that have been designated as attainment or unclassifiable for the AAQS. As outlined in Section 5, the proposed project is located in an area that is classified as attainment or is unclassifiable for all criteria pollutants. For the purposes of source applicability, this project is defined as the addition of Unit 4 to the existing Facility. Units 1, 2, and 3 will not be modified by this project; therefore, Units 1, 2 and 3 are not subject to further PSD review at this time.

2.2.2 Pollutant Applicability

In accordance with Rule 62-212, F.A.C., a BACT analysis and air quality models are required for each PSD pollutant that is emitted at greater than the significance levels specified in Table 2-1. Estimates of anticipated emission rates have been developed. They are discussed in detail in Section 4. **Table 2-2** compares estimated emissions from Unit 4 with the PSD significance level. The maximum annual emission rates estimated in Table 2-2 are based on the assumption that the new unit would operate continuously, 24 hours per day, 365 days per year, at 110% of load. This is conservative because typical boiler availability rates for the industry are between 85 and 95 percent.

Table 2-2 PSD Pollutant Applicability for Unit 4			
PSD Pollutant	PSD Significant Emission Rate ^a (tons/yr)	Proposed Unit 4 Emission Rate (tons/yr)	PSD Applicable
Carbon monoxide	100	113.4	Yes
Nitrogen oxides	40	256.1	Yes
Sulfur dioxide	40	84.3	Yes
Ozone (VOC)	40	12.0	No
Particulate Matter (Total)	25	25.1	Yes
PM ₁₀	15	25.1	Yes
Total Reduced Sulfur (including H ₂ S)	10	Negligible	No
Hydrogen Sulfide	10	Negligible	No
Sulfuric Acid Mist	7	74.4	Yes
Fluorides	3	3.5	Yes
Lead	0.6	0.243	No
Mercury	0.1	1.63 x 10 ⁻¹	Yes
Vinyl Chloride	1	Negligible	No
MWC Organics (Total Dioxins and Furans) ^b	3.5 x 10 ⁻⁶	1.58 x 10 ⁻⁵	Yes
MWC Metals (as PM)	15	25.1	Yes
MWC Acid Gases (as SO ₂ and HCl)	40	195.4	Yes

Notes:

^a Source: Rule 62-212.400, F.A.C. Table 212.400-2, and 40 CFR 52.21.

^b Measured as total tetra- through octa- chlorinated dibenzo-p-dioxins and dibenzo furans.

2.3 Ambient Air Quality Standards

The current federal and state AAQS are enumerated in the baseline air quality discussion in Section 5. As discussed in Section 5, ambient air quality in the project's vicinity is currently better than the AAQS for all pollutants. The Facility Unit 4's compliance with AAQS after the proposed expansion is demonstrated in the air quality modeling analysis in Section 6.

The EPA promulgated new National Ambient Air Quality Standards (NAAQS) in July 1997 for PM less than 2.5 microns in diameter (PM_{2.5}) and a more stringent 8-hour-average ozone standard of 0.08 parts per million (ppm) to replace the current 1-hour-average standard of 0.12 ppm. The American Trucking Association challenged these new standards in court. On May 14, 1999, the United States Court of Appeals (D.C. Circuit) issued an opinion that the process for setting these standards was unconstitutional and that the standards were unenforceable. As a result, the new standards were held in abeyance. The EPA appealed this decision to the United States Supreme Court. On February 27, 2001, the United States Supreme Court overturned the D.C. Circuit Court ruling and found that:

- EPA has the right to establish health-based standards;
- EPA need not consider cost when setting standards; and
- EPA must revise its implementation policy for the new 8-hour ozone standard

The EPA designated attainment areas for the 8-hour ozone NAAQS and issued a Phase 1 implementation rule on June 15, 2004. (A rule containing reconsideration of some aspects of the implementation rule was promulgated on May 20, 2005.) The 1-hour ozone standard is being phased out and was replaced by the 8-hour standard on June 15, 2005. The EPA designated attainment areas for the PM_{2.5} standard on December 17, 2004, but has not yet issued implementation rules for this standard. The EPA will retain both PM₁₀ and PM_{2.5} as NAAQS.

Because procedures for implementing the new PM_{2.5} and 8-hour ozone NAAQS are still being developed by the EPA, this PSD Permit modification application does not contain a compliance demonstration for these two standards.

2.4 New Source Performance Standards

Applicability of the USEPA New Source Performance Standards (NSPS) in Title 40, Part 60 of the Code of Federal Regulations (40 CFR 60) to the Facility is summarized below. These federal NSPS are adopted in the state of Florida's regulations by reference in FAC 62-204.800(8)(b).

2.4.1 New Source Performance Standards for Large Municipal Solid Waste Combustors (Subpart Eb)

On August 27, 1997, USEPA promulgated the NSPS for large municipal waste combustors (MWC) newly constructed after September 20, 1994, or modified after June 19, 1996. The Subpart Eb NSPS were developed under Sections 111(d) and 129 of the CAA. Under Section 129 of the CAA, the NSPS were developed to reflect Maximum Achievable Control Technology (MACT) and to specify emission levels for additional pollutants. The NSPS set emission limits for MWC metals [particulate matter (PM), opacity, cadmium (Cd), lead (Pb), and mercury (Hg)], MWC acid gases [sulfur dioxide (SO₂), and hydrogen chloride (HCl)], MWC organics (dioxins/furans), nitrogen oxides (NO_x), and carbon monoxide (CO). The emission limits are based on the utilization of Good Combustion Practices (GCP) and Air Pollution Control (APC) systems consisting of Spray Dryer Absorber (SDA)/Fabric Filter (FF), Selective Non-Catalytic Reduction (SNCR), and Activated Carbon Injection (ACI) systems or SDA/electrostatic precipitator (ESP), SNCR, and ACI systems. The proposed Facility Unit 4 would include the use of GCP, SNCR, and SDA/FF/ACI systems designed to meet the NSPS, which are discussed below.

The NSPS apply to “large” MWC units, defined as any MWC unit capable of combusting more than 250 tons per day of municipal solid waste (40 CFR 60.50b(a)). Under 40 CFR 60.58b(j), MWC capacity for continuous feed combustors is calculated “based on 24 hours of operation at the maximum charging rate.” For MWC units “that are designed based on heat capacity, the maximum charging rate shall be the maximum design charging rate.” The maximum design charging rate is calculated “based on the maximum design heat input capacity,” and a heating value of 10,500 kilojoules per kilogram or approximately 4,500 British thermal units per pound (Btu/lb) of MSW. The nominal design heat input capacity of the proposed Unit 4 is 250 MMBtu/hr, which is equivalent to approximately 660 tons per day of MSW at 4,500 Btu/lb. Therefore, the proposed Unit 4 is a “large” MWC unit, and subject to the emissions limitations in 40 CFR 60 Subpart Eb.

Florida adopted the Subpart Eb regulations by reference in FAC 62-204.800(8)(b)7. FDEP’s mercury requirements in FAC 62-296.416 for MWCs have a more stringent numerical limit than the NSPS, but the NSPS have a more stringent mercury removal requirement. This is discussed in more detail in Section 2.9, below.

Table 2-3 summarizes the Subpart Eb limits, and compares them with the emissions limits proposed for Unit 4. In all cases, the emissions limits proposed for Unit 4 are the same as or lower than the emissions limits established by Subpart Eb.

Particulate Matter (PM) and MWC Metals

Subpart Eb requires large new MWC units to control PM to a level of 24 milligrams per dry standard cubic meter (mg/dscm) [0.010 grains/dry standard cubic foot (gr/dscf)] corrected to 7 percent O₂.

Table 2-3 40 CFR 60 Subpart Eb Air Pollutant Emissions Standards for Unit 4		
Pollutant	40 CFR 60 Subpart Eb Limit^{1,4}	Unit 4 Proposed Emission Limit^{2,4}
Particulate Matter (PM)	24 mg/dscm (0.01 gr/dscf)	0.009 gr/dscf
PM ₁₀	N/A	0.009 gr/dscf
Cadmium (Cd)	0.020 mg/dscm	0.020 mg/dscm
Lead (Pb)	0.20 mg/dscm	0.20 mg/dscm
Mercury (Hg)	80 ug/dscm or 85% Control ³	70 ug/dscm or 85% Control ³
Sulfur Dioxide (SO ₂)	30 ppmdv or 80% Control ³ (24-hour geometric mean)	26 ppmdv or 80% Control ³ (24-hour geometric mean)
Sulfuric Acid Mist (SAM)	N/A	15 ppmdv
Hydrogen Chloride (HCl)	25 ppmdv or 95% Control ³	25 ppmdv or 95% Control ³
Hydrogen Fluoride (HF)	N/A	3.5 ppmdv
Nitrogen Oxides (NO _x)	180 ppmdv 1st year; 150 ppmdv thereafter (24-hour arithmetic mean)	110 ppmdv (24-hour arithmetic mean)
Municipal Waste Combustor Organics (Total PCDD/PCDF)	13.0 ng/dscm (avg. of three 4-hour test runs)	13.0 ng/dscm (avg. of three 4-hour test runs)
Carbon Monoxide (CO)	100 ppmdv (4-hour block arithmetic mean)	80 ppmdv (4-hour block arithmetic mean)
Ammonia (NH ₃)	N/A	50 ppmdv

Notes:

¹ All limits shown are corrected to 7% oxygen.

² Basis for the proposed emissions limits is described in Section 3.

³ Whichever is less restrictive.

⁴ Compliance based on the average of three 1-hour tests, unless otherwise noted.

N/A = Not Applicable

ng = nanograms

ug = micrograms

mg = milligrams

dscm = dry standard cubic meter

dscf = dry standard cubic foot

gr = grain

lb = pound

ppmdv = parts per million by volume, dry basis

Compliance will be verified annually by compliance stack tests using USEPA Reference Method 5.

Subpart Eb also requires large MWC units to meet an opacity level of 10 percent using a six-minute block averaging time. Compliance must be verified both by annually using USEPA Reference Method 9 and by using continuous opacity monitors (COMs).

Subpart Eb also establishes specific emission levels for cadmium (Cd), lead (Pb), and mercury (Hg). Large MWC units are required to meet a Cd emission level of 0.020 mg/dscm (9 gr/million dscf) corrected to 7 percent O₂, a Pb emission level of 0.20 mg/dscm (81.6 gr/million dscf) corrected to 7 percent O₂, and an Hg emission level of 0.080 mg/dscm (35 gr/million dscf) or an 85 percent reduction in Hg emissions corrected to 7 percent O₂, whichever is less stringent. Compliance must be verified annually by compliance stack tests using USEPA Method 29.

MWC Acid Gases

The Subpart Eb NSPS for acid gases require large MWC units to control SO₂ emissions to a level of either 30 ppmv or 80 percent reduction (corrected to 7 percent O₂, dry basis, 24-hour geometric mean) and HCl emissions to a level of 25 ppmv or 95 percent reduction (corrected to 7 percent O₂, dry basis). Compliance with SO₂ emissions must be verified by using continuous emission monitors (CEMs), and compliance with HCl emissions will be verified annually by compliance stack tests using USEPA Method 26.

MWC Organics

Subpart Eb requires large new MWC units to meet a dioxin/furan emission level of 13 nanograms per dry standard cubic meter (ng/dscm) total mass corrected to 7 percent O₂. Compliance will be verified annually by compliance stack tests using USEPA Reference Method 23. Alternatively, compliance with a 7 ng/dscm corrected to 7 percent O₂ emission limit by all four units at the Facility for at least two years can qualify the Facility for dioxin/furan testing of only one unit (rather than all four) each year. Continuous control of MWC organic emissions is achieved by using Good Combustion Practices, which are described separately, below.

NO_x Emissions

Subpart Eb requires that large new MWC units control NO_x emissions to a level of 180 ppmv [corrected to 7 percent O₂, dry basis, on a daily (24-hour) block arithmetic mean basis]. Compliance must be verified by using CEMs. After the first year of operation following the date on which the initial performance test is completed, NO_x emissions cannot exceed 150 ppmv [corrected to 7 percent O₂, dry basis, on a daily (24-hour) block arithmetic mean basis]

Good Combustion Practices (GCP)

Subpart Eb requires large new MWC units to comply with specified operating practices that reflect GCP. These operating practices address CO levels, combustor load levels, and flue gas temperatures.

For a mass-burn refractory large new MWC unit, Subpart Eb specifies a CO emission limit of 100 ppmv (at 7 percent O₂, dry basis) on a four-hour block average basis. Compliance must be verified with Continuous Emission Monitors (CEMs).

MWC units are allowed to operate at up to 110 percent of the unit's maximum capacity, as achieved during the most recent successful dioxin/furan compliance test. Maximum capacity is determined based on the steam flow rate, which must be continuously monitored according to the ASME Power Test Code (PTC) for steam generating units (PTC4.1 and PTC19.5).

MWC units are required to establish a Facility-specific maximum flue gas temperature at the final PM control device inlet. The maximum demonstrated PM control device inlet temperature is the maximum four-hour block average temperature measured during the most recent successful dioxin/furan compliance test. The MWC must then be operated so that the temperature at the final PM control device inlet does not exceed this level by more than 17 deg. C (30 deg. F) on a four-hour block basis.

Operator Certification and Training

Subpart Eb requires full certification of all MWC shift supervisors and MWC chief Facility operators by the American Society of Mechanical Engineers (ASME) (certification QRO-1-1994) or an equivalent state certification program. The NSPS also require that at least one of the following persons be on duty at the MWC at all times when the MWC is combusting waste: a fully certified MWC chief Facility operator, a fully certified shift supervisor, or a provisionally certified chief Facility operator or shift supervisor. A provisionally certified control room operator is allowed to "stand-in" during times when a fully certified Facility chief operator and a fully certified shift supervisor are not on site.

In addition, Subpart Eb requires each owner or operator of an affected MWC unit to develop and maintain a site-specific operating manual and to review it with all employees associated with the operation of the MWC including MWC maintenance personnel, crane/load operators, and ash handlers. The manual and training must be updated annually. The Facility operator, Covanta Hillsborough, Inc. maintains this manual and will update it to include Unit 4 upon completion of acceptance testing.

Fly Ash or Bottom Ash Fugitive Emissions

Subpart Eb NSPS for fugitive ash emissions restrict visible emissions from ash conveyor systems, transfer points, buildings, or enclosures of ash conveying systems to 5 percent or less of the time during the observation period (for example, 9 minutes in a 3-hour observation period). Compliance will be verified annually by USEPA

Reference Method 22 observations. The visible emission limits do not apply during periods of maintenance or repair to ash conveying systems.

Siting and Materials Separation Plan Requirements

Subpart Eb requires that the owner/operator of the affected Facility prepare a materials separation plan for the Facility and its service area. The plan should discuss the amount of waste generation for the service area, the types and amounts of materials proposed for separation and recycling, and the methods proposed for separation. The owner/operator is required to make the plan available to the public; publish a notice for, and conduct, a public meeting; prepare a document responding to comments raised at the public meeting; and finalize the plan based on comments received. The owner/operator is required to submit to DEP, before submitting the PSD air permit application, a copy of the public notice for the meeting, a transcript of the meeting, the document summarizing comments and responses, and copies of both the draft and final materials separation plans. Volume II of this application includes the draft and final Materials Separation Plans along with the public notice and Public Hearing transcripts.

Subpart Eb also requires that the owner/operator prepare a siting analysis for the proposed MWC unit. The siting analysis is required to assess the impact of the proposed MWC unit on ambient air quality, visibility, soils, and vegetation. The analysis is also required to consider air pollution control alternatives that minimize, to the maximum extent practicable, potential risks to public health and the environment. The siting analysis is subject to the same public notice, public meeting, and response-to-comments requirements as the materials separation plan, and Subpart Eb allows their discussion at the same public meeting. However, the siting analysis is not required to be submitted to DEP until the initial notification of construction of the MWC unit is submitted. The information required for the siting analysis is contained in this PSD application and the related application under the Florida Electrical Power Plant Siting Act (see Volume II). The air quality evaluations and impacts analyses are contained in Chapters 6 and 7 of this PSD application. These analyses demonstrate compliance with the AAQS and PSD increments, which demonstrate that human health and the environment will be protected with an adequate margin of safety. The BACT determination in Section 3 evaluates air pollution control alternatives. Potential risks are also evaluated in the Health and Environmental Risk Assessment contained in Volume II.

Compliance and Testing

Subpart Eb includes testing and monitoring requirements for MWC metal emissions. These include PM, opacity, Cd, Pb, and Hg. It also requires testing and monitoring for MWC acid gas emissions (SO₂ and HCl), MWC organic emissions (dioxins/furans), MWC operating parameters (CO, load level, and flue gas temperature), and NO_x. SO₂, NO_x, and CO emissions must be determined using CEMs. Opacity must be monitored using a CEM and must be measured annually by USEPA Reference Method 9. Fugitive ash emissions must also be tested annually by

USEPA Reference Method 22. Emissions of other pollutants must be determined by annual stack tests.

The Subpart Eb emissions limits apply at all times, except during periods of MWC unit startup, shutdown, and malfunction. The NSPS limit the duration of each startup, shutdown or malfunction to no more than three hours per occurrence. However, if a malfunction is a loss of boiler water level control (for example, a boiler waterwall tube failure), or a loss of combustion air control (such as loss of a combustion air fan, induced draft fan, or combustion grate bar failure), then the CO limit can be exceeded for up to 15 hours per occurrence. The Florida Air Regulations have a more stringent requirement: Section 62-210.700, F.A.C. states that, “the duration of excess emissions shall be minimized, but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration.” The County requests that DEP authorize the use of the 40 CFR 60 Subpart Eb excess emissions durations of up to three hours per startup/shutdown/malfunction occurrence, and 15 hours per loss of boiler water level control or combustion air control, because these are more specific to MWC unit operation.

2.4.2 Incinerator NSPS (Subpart E)

The existing Facility is subject to Standards of Performance for Incinerators (NSPS Subpart E at 40 CFR 60.50 et. seq.). These standards apply to all incinerators capable of charging more than 45 metric tons per day (50 tpd) of MSW and that commenced construction or modification after August 17, 1971. Subpart E requirements are:

- Particulate matter emissions limited to 0.18 grams per dry standard cubic meter (g/dscm), equivalent to 0.08 grains per dry standard cubic foot (gr/dscf), corrected to 12 percent carbon dioxide (12% CO₂) [40 CFR 60.52(a)].
- Daily charging rates and hours of operation shall be recorded [40 CFR 60.53(a)].
- Compliance with the particulate matter emission limit shall be demonstrated by conducting a performance test as required in 40 CFR 60.8 (40 CFR 60.54).

The proposed new Unit 4 will also be subject to these requirements. However, the Subpart Eb NSPS, as discussed above, are more restrictive than the Subpart E NSPS requirements.

2.4.3 Industrial-Commercial-Institutional Steam Generating Unit NSPS (Subpart Db)

The Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units (NSPS Subpart Db 40 CFR 60.40b et. seq.) apply to steam generating units that commenced construction, modification, or reconstruction after June 19, 1984, and which have a total heat input capacity of greater than 100 MMBtu/hr. The Facility’s proposed new Unit 4 would have a maximum rated capacity of 250

MMBtu/hr, exceeding the 100-MMBtu/hr threshold on its own. Therefore, Subpart Db applies.

Subpart Db requirements potentially applicable to Unit 4 are:

- Particulate matter emissions are limited to 43 nanograms/joule (ng/J), equivalent to 0.10 pound per MMBtu (lb/MMBtu), for facilities that combust only municipal solid waste or municipal solid waste and other fuels if the annual capacity factor for fuels other than municipal solid waste is 10 percent or less (this standard applies at all times except during periods of startup, shutdown or malfunctions) [40 CFR 60.43b(d)].
- Nitrogen oxides emissions are limited to 130 ng/J (0.30 lb/MMBtu) for facilities that simultaneously combust natural gas with municipal solid waste unless the Facility is subject to a federally enforceable requirement that limits the annual capacity for natural gas to 10 percent or less (this standard is a 30-day rolling average which applies at all times including periods of startup, shutdown, and malfunction) [40 CFR 60.44b(d) and (h)].
- Compliance with the particulate matter and nitrogen oxides emission limits shall be determined through performance testing as required in 40 CFR 60.8 (40 CFR 60.46b).
- If subject to a nitrogen oxides emission standard in 40 CFR 60.44b, continuous emission monitoring for nitrogen oxides shall be performed, with emission measurements recorded in units of ng/J or lb/MMBtu (40 CFR 60.48b).
- Reporting and recordkeeping requirements include recording the amounts of each fuel combusted during each day and calculating annual capacity factors individually for each fuel (40 CFR 60.49b).

2.4.4 Other NSPS Subparts

The proposed new Unit 4 would not be subject to any other NSPS requirements, since there are no other NSPS subparts potentially applicable to MWC units.

2.5 National Emission Standards for Hazardous Air Pollutants

Applicability of the USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPs), in 40 CFR 61, to the Facility is summarized below. These federal NESHAPS are adopted in the state regulations by reference in Section 62-204.800(9)(b), F.A.C. There are two NESHAPS that might be applicable to incinerators or MWC units.

2.5.1 Beryllium NESHAP

- The National Emission Standard for Beryllium (NESHAP Subpart C at 40 CFR 61.30 et. seq.) is applicable to incinerators which process beryllium-containing wastes. The proposed new Unit 4 is not subject to Subpart C, because Unit 4 will not burn beryllium-containing wastes, as defined in Subpart C.

2.5.2 Mercury NESHAP

The National Emission Standard for Mercury (NESHAP Subpart E at 40 CFR 61.50 et. seq.) is applicable to plants that process wastewater treatment plant sludges. Since the existing Facility, as well as the proposed new Unit 4, are prohibited from accepting sewage sludge wastes, Unit 4 is not subject to this subpart.

2.6 Maximum Achievable Control Technology (MACT) Requirements

Section 112 of the Clean Air Act controls hazardous air pollutant (HAP) emissions from major sources. A major source is one that has the potential to emit 10 tons per year of a single HAP, or 25 tons per year of any combination of HAPs. The Facility is an existing major source of HAPs.

40 CFR 63 Subpart B requires case-by-case control technology determinations, in accordance with CAA Section 112(g)(2)(B), for constructed or reconstructed major sources of HAPs, unless an emission limitation established under CAA Section 112 will be met. Florida Administrative Code (F.A.C.) Sections 62-204, 62-210, and 62-212 implement these requirements.

Unit 4 would meet the definition of a constructed major source in 40 CFR 63.41, and there is no emission limitation set under CAA Section 112 that applies to the Facility. However, 40 CFR 60 Subpart Eb NSPS for MWCs, described above, were developed under Section 129 of the CAA specifically to require MACT for HAPs, and the criteria established in the CAA for emission limitations under Section 129 [in Section 129(a)(2)] are essentially identical to the criteria established in the CAA Section 112(d)(1) and 112(d)(2) for MACT. Therefore, the Facility will be meeting a MACT standard, and no case-by-case MACT determination is necessary.

2.7 Compliance Assurance Monitoring (CAM) Rule

The Compliance Assurance Monitoring (CAM) Rule, 40 CFR 64, was written to provide a “reasonable assurance” of continuous compliance with emissions limitations or standards in cases where the underlying requirement for an emissions unit does not require continuous emissions monitoring and for units that are part of major sources that have Title V operating permits. The rule applies to a pollutant-specific emissions limit for a unit at a major source required to have a Title V permit, if the unit satisfies all of the following criteria:

- 1) The unit is subject to an emissions limitation, other than an exempt (defined below) emissions limitation;
- 2) The unit uses a control device to achieve compliance with the emissions limitation; and
- 3) The unit has potential pre-control device emissions of the regulated air pollutant that will equal or exceed the amount, in tons per year, required for a source to be classified as a major source (100 tons per year for criteria air pollutants and 10 tons per year for an individual HAP).

The exempt emissions limitations include any NESHAPs or NSPS proposed after November 15, 1990. (The other exemptions are not relevant to this project.)

Unit 4 will be subject to the emissions limitations of the 40 CFR 60 Subpart Eb NSPS for Municipal Waste Combustors. Since these NSPS were originally promulgated in December, 1995, they are exempt from CAM.

The Subpart E and Subpart Db NSPS predate November 15, 1990. However, their emissions limitations are for pollutants covered by Subpart Eb, and are less stringent than the Subpart Eb limits. Therefore, the requirements of CAM would be met by the Subpart Eb requirements, and a CAM plan is not necessary.

CAM may apply if there is a BACT standard that is different (either more or less stringent) than an NSPS standard. Unit 4 will have BACT-based emission limits for sulfuric acid mist and hydrogen fluoride (see Table 2-2 and Section 3), two pollutants not covered by the Subpart Eb limitations and monitoring requirements. These limits, therefore, are not exempt, so Criterion 1 applies. Unit 4's spray dryer absorber (SDA) would be a control device for these pollutants, so Criterion 2 will apply. On the assumption that the SDA could achieve 90% removal for these two acid gases, uncontrolled emissions of both pollutants would exceed their respective major source thresholds (100 tons/year for sulfuric acid mist, and 10 tons/year for hydrogen fluoride). Therefore, Criterion 3 is met, and a CAM Plan would be required for sulfuric acid mist and hydrogen fluoride emissions. The CAM Rule requires that the CAM Plan be submitted with the Title V Air Operating Permit revision for the proposed project.

2.8 Federal Aviation Administration Requirements for Objects Affecting Navigable Airspace

Federal Aviation Administration (FAA) regulations in 14 CFR 77 govern stack heights and lighting of stacks and other tall structures near airports. The rules require that the FAA be notified for any proposed new construction that:

- would be greater than 200 feet in height above ground level; or

- would be of greater height than an imaginary surface extending outward and upward at one of the following slopes:
 - 100 to 1 for a horizontal distance of 20,000 feet from the nearest point to the nearest runway with at least one runway longer than 3,200 feet;
 - 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway with its longest runway no more than 3,200 feet in actual length.

The notification is required to be submitted to the FAA regional office on FAA Form 7560-1 Notice of Proposed Construction or Alteration. The FAA regional office then reviews the form and responds with its requirements for lighting and/or height limitations.

The tallest structure associated with the proposed project will be the existing Facility's stack, which is 67 meters (220 feet). Unit 4 will exhaust to a flue in the existing stack. Since the stack height will not be changed by the project, it will not be subject to FAA notice requirements. The FAA previously was given notice concerning the construction of the stack for Units 1-3.

2.9 Florida Air Regulations

Florida's air regulations concerning air permits are contained primarily in Rules 62-210, 62-212, 62-213, 62-296, and 62-297, F.A.C. Specifically, Section 62-210.300 F.A.C., requires appropriate permits prior to modification "to any source which emits or can reasonably be expected to emit any air pollutant...unless exempted pursuant to Department rules or statutes." Compliance with these air permit requirements are discussed in Section 2.2, above.

As discussed in Sections 2.4 and 2.5 above, NSPS and NESHAP requirements for the proposed Unit 4 are adopted, mostly by reference, into the F.A.C under 62-204.800. Other air quality requirements in the F.A.C. applicable to the proposed Facility Unit 4 are discussed below. These requirements are contained in Rule 62-210, F.A.C., which contains general requirements, Rule 62-296, F.A.C., which contains Emission Standards for Stationary Sources, or in Rule 62-297, F.A.C., which contains Emission Monitoring Requirements for Stationary Sources.

Section 62-210.700, F.A.C. limits excess emissions during periods of startup, shutdown or malfunction to no more than two hours in any 24 hour period unless specifically authorized by the DEP. As discussed in Section 2.4.1, above, the County requests that DEP authorize the use of the 40 CFR 60 Subpart Eb excess emissions durations of up to three hours per startup/shutdown/malfunction occurrence, and 15 hours per loss of boiler water level control or combustion air control, because these are more specific to MWC unit operation.

The existing Facility, and the proposed Unit 4, must meet the Florida General Pollutant Emission Limiting Standards in Sections 62-296.320(1), 62-296.320(2), 62-296.320(3), 62-296.320(4)(b), and 62-296.320(4)(c), F.A.C. The particulate and opacity emission limiting standards of Section 62-296.320(4)(a), F.A.C., do not apply to any emission units at the Facility because the MWC units are subject to particulate matter standards at Section 62-296.401, and the other emission units do not produce a finished product through a chemical or physical change.

Emission standards for incinerators are set forth in Section 62-296.401, F.A.C. Since Unit 4 will be required to meet the 40 CFR 60 Subpart Eb NSPS limits for particulate matter of 0.010 gr/dscf corrected to 7 percent O₂, Unit 4 will also comply with the Section 62-296.401(3)(a), F.A.C. requirement of 0.08 gr/dscf corrected to 50 percent excess air. Unit 4 will also comply with the Section 62-296.401(3)(b), F.A.C., requirement of no objectionable odor. Emissions monitoring requirements for incinerators are described in Section 62-297.330, F.A.C. The proposed new Unit 4 will meet the more stringent monitoring requirements under the USEPA NSPS for MWCs in 40 CFR 60 Subpart Eb.

As discussed in Section 5.0, the entire State of Florida is either classified as attainment or considered to be in attainment (i.e., unclassifiable) with respect to the Federal AAQS for all pollutants. However, the Facility is located in maintenance areas for lead, ozone, and particulate matter. Therefore, the Facility is potentially subject to Reasonably Available Control Technology (RACT) requirements for these pollutants.

The ozone maintenance area, as described in Section 62-204.340(4)(a), F.A.C., encompasses both Hillsborough and Pinellas Counties. Volatile organic compound (VOC) RACT requirements are given in Section 62-296.500 to 62-296.516, F.A.C., and in Sections 62-296.401 to 62-296.415, F.A.C. There are no VOC RACT requirements in these sections which would apply to Unit 4. The VOC and NO_x RACT requirements in Section 62-296.570 are not applicable since these requirements apply only to Broward, Dade, and Palm Beach Counties, as described at Section 62-296.500(1)(b), F.A.C.

The particulate matter (PM) maintenance area, as described in Section 62-204.340(4)(b), F.A.C., subjects Unit 4 to a number of potential PM RACT requirements in Section 62-296.700, F.A.C. Emission units at the Facility with total allowable emissions of PM less than one ton per year are exempt from RACT requirements by Section 62-296.700(1)(c). Unconfined particulate matter emissions from open stockpiling of materials, vehicular traffic, and other emissions from roads and plant grounds, or construction activities, are also exempt from RACT requirements by Section 62-296.700(1)(e). Non-exempt emission units are subject to the RACT requirements in Sections 62-296.700(4) for permit content, 62-296.700(5) for circumvention, and 62-296.700(6) for operation and maintenance plans.

Specific emission limiting RACT requirements for particulate matter are given in Section 62-296.700 to 62-296.712, F.A.C., and Sections 62-296.401 to 62-296.415, F.A.C.

As noted earlier, Unit 4 will perform better than the Florida particulate matter requirements for incinerators given in Section 62-296.401(3).

Emission units at the Facility other than the MWC units are subject to the specific particulate matter emission limiting standards given in Section 62-296.711, F.A.C., for materials handling, sizing, screening, crushing, and grinding operations. These particulate matter RACT requirements are applicable to:

- Loading/unloading of materials to/from containers such as trucks and storage structures [Section 62-296.711(1)(a)].
- Non-portable conveyor systems [Section 62-296.711(1)(b)].
- Storage of materials in silos or enclosed bins with capacities of 50 cubic yards or greater [Section 62-296.711(1)(c)].

These RACT requirements would be applicable to fugitive particulate matter emissions and particulate matter emissions from the lime and activated carbon storage silos associated with Unit 4, unless exempted by virtue of PM emissions being less than one ton per year [Section 62-296.700(1)(c)].

The specific particulate matter RACT emission limitations are:

- No visible emissions (i.e., five percent opacity) [Section 62-296.711(2)(a), F.A.C.].
- Emissions exhausted through a stack or vent shall be limited to 0.03 gr/dscf or less for operations totally or partially enclosed to comply with the RACT visible emissions limits [Section 62-296.711(2)(b), F.A.C.].

The lime and activated carbon storage silos will be equipped with dust collectors (i.e., baghouses) to control PM emissions during filling operations. As part of the bid specifications for Unit 4, dust collectors with design outlet loadings of 0.015 gr/dscf for silos and ash building ventilation systems will be specified. This proposed emission limitation is more restrictive than FDEP's RACT requirements. Pursuant to Section 62-296.711(3)(c), F.A.C., the County also requests that compliance for minor sources equipped with baghouses be determined using Method 9 visible emission tests indicating no visible emissions (five percent opacity) in lieu of particulate stack tests.

Pursuant to Sections 62-296.711(2)(c) and 62-279.620, F.A.C., the County is requesting that FDEP approve the following alternative limitations as RACT for fugitive Unit 4 PM emissions based on the NSPS requirements: ash conveyors and ash storage, handling, and transfer facilities will be enclosed to minimize fugitive emissions. However, some fugitive emissions may still occur from small openings in the enclosure, from seams around access hatches, from building doors, etc. Also, maintenance and repair activities may require opening of an enclosure, which could generate short-term fugitive emissions.

USEPA recognized in the NSPS that it is not possible to eliminate all visible emissions of ash at all times. USEPA's NSPS in 40 CFR 60.55b(a) do not allow visible emissions "in excess of 5% of the observation period (i.e., nine minutes per three-hour period), as determined by EPA Reference Method 22. . ." Stated differently, visible emissions are allowed up to nine minutes per three-hour observation period. As noted in 40 CFR 60.55b(b), this standard applies to both fugitive emissions and emissions from buildings or enclosures of ash conveying systems. The standard for visible emissions does not apply during maintenance and repair activities of ash conveying systems [40 CFR 60.55b(c)]. The NSPS were developed by USEPA after spending several years studying municipal waste combustors in the United States and these limits are based on the use of Maximum Achievable Control Technology (MACT), which represents the level of performance that is attained by the best performing of all existing facilities. In light of these facts, the County requests that FDEP approve the NSPS emission limitations for fugitive ash emissions as RACT for Unit 4.

The County also requests, in accordance with Section 62-297.620, F.A.C., that compliance for fugitive ash emissions be determined using Method 22, rather than Method 9, as specified in Section 62-296.711(3)(a), F.A.C. Both USEPA methods are incorporated by reference in Sections 62-204.800 and 62-297.401, F.A.C. Since Method 22 is more appropriate for determining the frequency of visible emissions from fugitive sources when there is no need to determine the opacity level, Method 22 is more suitable to the fugitive ash emissions sources.

2.10 Florida Mercury Rule

Section 62-296.416, F.A.C. (the Florida Mercury Rule) establishes standards for mercury emissions from all MWC facilities with charging rates equal to or greater than 40 tons per day. The County is proposing to meet the standards for mercury for Unit 4 using post-combustion control equipment. Therefore, the emission standards of Section 62-296.416(3)(a), F.A.C., will apply, which are that all mercury emissions shall not exceed 70 µg/dscm corrected to 7 percent O₂, or achieve 80 percent control, whichever occurs first. The more stringent of the Florida Mercury Rule or the USEPA 40 CFR 60 Subpart Eb NSPS shall apply, which are 70 µg/dscm (Florida Rule) or 85 percent control (USEPA NSPS), whichever is more restrictive. Compliance shall be determined by annual USEPA Method 29 stack tests.

2.11 Permits Requirements

2.11.1 Existing Permits

The Facility was constructed and went into operation in 1987. In 1983, the County submitted a PPSA application for construction of a new Refuse-to-Energy Facility with three 400-tpd units.

The Facility has a current Title V air operating permit, Permit No. 0570261-005-AV.

The operating permit includes the following emission limits for the existing three units:

PM	27 mg/dscm or 0.012 gr/dscf @ 7% O ₂
SO ₂	29 ppmdvc @ 7% O ₂ or 75% reduction by weight, whichever is less stringent
NO _x	205 ppmdvc @ 7% O ₂
VOC	0.01 gr/dscf @ 12% CO ₂
Lead	0.44 mg/dscm @ 7% O ₂
Cadmium	0.040 mg/dscm @ 7% O ₂
Fluorides	6.74 mg/dscm @ 7% O ₂
HCl	29 ppmdvc @ 7% O ₂
CO	100 ppmdvc @ 7% O ₂
PCDD/PCDF	30 ng/dscm @ 7% O ₂
Mercury	70 µg/dscm @ 7% O ₂
Beryllium	1.48 µg/dscm @ 7% O ₂
Sulfuric Acid Mist	0.072 gr/dscf @ 12% CO ₂

2.11.2 Proposed Permit Conditions

The County is requesting that the following permit conditions be granted for Unit 4:

- Section 62-210.700, F.A.C. limits excess emissions during periods of startup, shutdown or malfunction to no more than two hours in any 24 hour period unless specifically authorized by the DEP. As discussed in Section 2.4.1, above, the County requests that DEP specifically authorize the use of the 40 CFR 60 Subpart Eb excess emissions durations of up to three hours per startup/shutdown/malfunction occurrence, and 15 hours per loss of boiler water level control or combustion air control, because these are more specific to MWC unit operation. The Department's permit should explicitly state that these provisions of Subpart Eb supercede the requirements in Section 62-210.700 in these circumstances.
- The County requests that FDEP approve the NSPS emission limitations for fugitive ash emissions (40 CFR 60.55b) as RACT for Unit 4.
- The County requests, in accordance with Section 62-297.620, F.A.C., that compliance for fugitive ash emissions be determined using Method 22, rather than Method 9, as specified in Section 62-296.711(3)(a), F.A.C.

- The County requests that the VOC limit cited above for the existing Units 1-3 be deleted from the Title V permit, and that no VOC limit be set for the proposed Unit 4. 40 CFR 60 Subparts Cb (existing units) and Eb (proposed unit) do not contain VOC limits. The requirement for continuous CO monitoring in these rules is a more stringent basis on which to ensure good combustion.

2.12 Conclusions

The construction of Unit 4 is subject to review under the PSD program. The proposed Unit 4 will comply with the USEPA NSPS (40 CFR 60, Subpart Eb), Florida Mercury Rule (Section 62-296.416, F.A.C.), and all other applicable air regulations for permits and certificates.

Section 3

Best Available Control Technology Evaluation (BACT)

3.1 Introduction

This section describes the methodology and results of the Best Available Control Technology (BACT) evaluation. As described in Section 1, Hillsborough County will expand the Hillsborough County Resource Recovery Facility (the Facility) by installing a fourth municipal waste combustor (MWC) unit, which will be rated at a nominal capacity of 660 tons per day. This new unit will increase the Facility nominal capacity to 1,980 tons per day. The installation of a new MWC unit at the Facility is a major modification to an existing major stationary source in an attainment area and is subject to Prevention of Significant Deterioration (PSD) review because this change will result in an increase in pollutant emissions in excess of PSD significant emission rates. Specific pollutants with proposed emissions greater than PSD significant emission rates (see Table 2-2) are:

- particulate matter (PM) and particulates with a mean aerodynamic diameter less than ten microns (PM₁₀),
- sulfur dioxide (SO₂),
- carbon monoxide (CO),
- nitrogen oxides (NO_x),
- mercury (Hg),
- sulfuric acid mist (SAM),
- fluorides
- MWC metals (as PM),
- MWC acid gases, as SO₂ and hydrogen chloride (HCl), and
- MWC Organics (as volatile organic compounds (VOCs) and total tetra through octa dioxins and furans).

Consequently, the Facility is subject to a BACT evaluation for each pollutant subject to PSD review.

As part of the BACT evaluation, this section will provide a brief discussion of the applicable air quality regulations that drive the BACT evaluation, the methodology for conducting a BACT evaluation, including assessing the potential pollutant emission reductions benefits of the Hillsborough County's materials separation

program, and the proposed air pollution control technology for the new MWC unit, and its associated equipment.

3.2 Description of BACT Review

In accordance with United States Environmental Protection Agency's (EPA) present policy of determining BACT (EPA, 1990), the analysis involves the identification of all applicable emission control alternatives for the pollutants subject to PSD review and any others requested by the governing regulatory agency. The control alternatives are then evaluated using a "top down" approach where they are ranked in descending order of effectiveness. A "top down" analysis first examines the most stringent or "top" control method to determine if technical considerations or potential energy, environmental, or economic impacts justify a conclusion that the control method is not BACT. If the most stringent or "top" control alternative is determined not to be BACT using this methodology, then the next most stringent alternative is considered until BACT is determined. Equipment with equivalent control capabilities does not require an evaluation. For those pollutants which have applicable air pollutant emission standards, such as New Source Performance Standards (NSPS), BACT needs to be at least as stringent as the applicable standard.

On December 19, 1995, EPA promulgated standards and guidelines for MWCs in 40 Code of Federal Register (CFR) Part 60 Subparts Eb and Cb, respectively. The NSPS under 40 CFR 60 Subpart Eb apply to each MWC unit with a combustion capacity greater than 250 tons per day (tpd) of MSW for which construction is commenced after September 20, 1994, or which modification or reconstruction is commenced after June 19, 1996. The Subpart Eb standards were developed under Section 111 (d) and 129 of the Clean Air Act (CAA). Under Section 129 of the CAA, the NSPS were also established to reflect Maximum Achievable Control Technology (MACT) and to specify emission levels for additional pollutants. Florida adopted the Subpart Eb regulations by reference in FAC 62-204.800(7). The Subpart Eb standards require states to develop regulations that would limit MWC emissions from new and modified MWCs to levels at least stringent as the federal requirement. EPA established emission limits for PM, opacity, cadmium (Cd), lead (Pb), Hg, SO₂, HCl, CO, NO_x, MWC metals, organics, acid gases and dioxins/furans. **Table 2-3** presents Subpart Eb emission limits for new or modified large MWC units. Only the Lee County Energy Recovery Facility's (LCERF) new MWC unit and the Harrisonburg Resource Recovery Facility (HRRF) have recently been permitted in the US since the promulgation of the final standards and guidelines for MWCs. Note that since the HRRF was a reconstruction project, their permit limits were not as restrictive as LCERF's permit limits. The information presented in this BACT for Hillsborough County reflect information from the LCERF approved permit, the LCERF supporting BACT determination and EPA's conclusions in establishing the final standards and guidelines for MWCS in 1995. EPA's conclusions have not changed since there has been little activity in the municipal waste combustion industry.

According to EPA's Draft New Source Review Manual, five steps need to be followed to determine BACT:

- Identify all available control technologies;
- Evaluate the technical feasibility of alternative technologies ;
- Rank remaining control technologies by control effectiveness, with the most effective control alternative at the top;
- Evaluate environmental, economic and energy impacts, and
- Select BACT.

The purpose of technical feasibility analysis is to determine whether a technology can realistically be anticipated to remove or reduce emissions of a specific pollutant from a source's exhaust. Those technologies considered technically feasible are then evaluated based on their potential energy, economic and environmental impacts or benefits. The energy impact analysis is based on whether the energy needed to apply a control technology is excessive relative to other available technologies. The purpose of the economic impact analysis is to determine the cost-effectiveness of applying a given control technology. The cost effectiveness estimates are developed as a "cost per ton of pollutant removed" for evaluating the reasonableness of various emission control technology costs. This is completed by dividing the total annual cost of each control alternative by the amount of emissions (in tons) reduced by each control alternative. Finally, the environmental impact evaluation is based on identifying both beneficial and non-beneficial environmental impacts resulting from application of a given control technology.

Development of the proposed control strategies is based on previously selected BACT evaluations for other permitted facilities and the proven capabilities of various control technologies. The EPA's BACT/LAER Clearinghouse (www.epa.gov/ttn/catc) contains a partial list of permitted municipal solid waste (MSW) facilities. Although the Clearinghouse is a principal source of information, it is not always complete. The submittal of information from state permitting agencies to the Clearinghouse is voluntary. The Clearinghouse may not contain information on recently permitted facilities, and not all of the facilities listed as MSW combustion facilities by the Clearinghouse would necessarily be similar to the proposed Facility. A listed facility may use another fuel, such as refuse-derived fuel (RDF), employ different combustion or air pollution control technologies, or operate at much lower or higher firing rates. Certain pollutant emission rates vary inversely with one another, (e.g., NO_x and CO), hence automatic reliance on the Clearinghouse for lowest permitted values for each pollutant could result in an erroneous composite being applied to a "top down" BACT analysis. A review of the database indicated that in the most recent three years (2002-2004) only three MSW facilities have submitted approved air permit applications for modifications or upgrades to their existing facilities. These facilities included Harrisonburg County, Virginia, Camden County, New Jersey and Lee

County, Florida. Of these three facilities, Lee County had the most stringent air pollutant emissions standards. In addition, the Lee County MWC unit is identical to the one proposed at the Facility. Therefore, the Lee County permit limits were used as guide for preparing the BACT evaluation. Table 3-1 presents a summary of the permit limits at each facility.

Table 3-1
Comparison of Most Recent Municipal Waste Combustor Emission Limits and Control Technologies
EPA RACT/BACT/LAER Clearinghouse

Facility Name:	Camden County Resource Recovery Facility, Camden, NJ		Harrisonburg Resource Recovery Facility, Harrisonburg, VA		Lee County Waste-to-Energy Facility, Lee County, FL	
Permit No.:	NJ-0037		VA-81016		PSD-FL-151C & 0710119-002-A	
Date:	3/22/2002		3/25/2003		10/13/2003	
Combustion Unit Type:	(4) Mass Burn Waterwall Incinerators		(2) Modified MWCs		(1) New MWC Unit (291.5 MMBtu/hr)	
MSW Throughput:	350 TPD per unit		100 TPD per unit		660 TPD	
Pollutant	Emission Limit	Control Technology	Emission Limit	Control Technology	Emission Limit	Control Technology
Particulate Matter	32 mg/dscm @ 7% O ₂ 4.5 lb/hr each 0.31 lb/ton	ESP-Semi-Dry Scrubber	24 mg/dscm @ 7% O ₂ 1.68 lb/hr (each) 7.37 tpy (each)	Fabric Filter	20.6 mg/dscm @ 7% O ₂	Baghouse
Nitrogen Oxides	5.08 lb/ton 338 lb/hr (all units)	--	160 ppmdv @ 7% O ₂ 10.25 lb/hr (each) 44.9 tpy (each)	FGR with low NOx burners & GCP	110 ppmdv @ 7% O ₂ (12-mo rolling avg.) 150 ppmdv @ 7% O ₂ (24-hr avg.) 60% control eff.	Non-Selective Catalytic Reduction
Sulfur Dioxide	2.36 lb/ton 138 lb/hr (all units)	--	30 ppmdv @ 7% O ₂ 5.5 lb/hr (each) 24.11 tpy (each) 80% control eff.	Dry Flue Gas Scrubbing System with hydrated lime sorbent	26 ppmdv @ 7% O ₂ 80% control eff.	Dry Scrubbers
Carbon Monoxide	4.13 lb/ton 249 lb/hr (all units)	--	100 ppmdv @ 7% O ₂ 8.03 lb/hr (each) 35.16 tpy (each)	Carbon Injection & GCP	80 ppmdv @ 7% O ₂ (12-mo rolling avg.) 100 ppmdv @ 7% O ₂ (4-hr avg.)	Equipment Design & GCP
Cadmium	0.0002 lb/ton 0.0140 lb/hr	--	0.02 mg/dscm @ 7% O ₂	GCP	--	--
Mercury	0.005 lb/ton 0.31 lb/hr	--	0.08 mg/dscm @ 7% O ₂	Carbon Injection & GCP	0.028 mg/dscm @ 7% O ₂ 85% control eff.	Carbon Injection
	0.006 lb/ton 0.333 lb/hr	--	0.2 mg/dscm @ 7% O ₂	GCP	--	--
Arsenic	0.0 lb/ton 0.0021 lb/hr	--	--	--	--	--
Beryllium	0.0 lb/ton 0.0001 lb/hr 0.086 lb/hr	--	--	--	--	--
Nickel	0.0012 lb/ton 0.072 lb/hr	--	--	--	--	--
Chromium	0.0015 lb/ton 0.086 lb/hr	--	--	--	--	--
Hydrogen Chloride	1.21 lb/ton 70.5 lb/hr	--	25 ppmdv @ 7% O ₂ 2.58 lb/hr (each) 95% control eff.	Dry Flue Gas Scrubbing System with hydrated lime sorbent	25 ppmdv @ 7% O ₂ 95% control eff.	Dry Scrubbers
H ₂ SO ₄	0.18 lb/ton 10.4 lb/hr	--	--	--	15 ppmdv @ 7% O ₂ 15 lbs/hr	
Hydrogen Fluoride	0.026 lb/ton 1.5 lb/hr	--	--	--	3.5 ppmdv @ 7% O ₂	Dry Scrubbers
Nonmethane Hydrocarbons	0.2 lb/ton 27 lb/hr	--	--	--		
PAH	0.001 lb/ton 0.058 lb/hr	--	--	--		
PCDD/PCDF	0.0 lb/ton 0.0 lb/hr	--	13 ng/dscm @ 7% O ₂	Carbon Injection & GCP	13 ng/dscm @ 7% O ₂	Furnace Design/ Temperature Control
Volatile Organic Compounds	--	--	0.42 lb/hr (each) 1.84 tpy (each)	GCP		
Visible Emissions			10% Opacity		10% Opacity	
Fugitive PM (ash)			5% Opacity			
Metals	--	--	--	--	20.6 mg/dscm @ 7% O ₂	Baghouse

3.3 Proposed Control Technologies

Hillsborough County (County) proposes the following control technologies to reduce air pollutant emissions from the new MWC:

- Acid gases such as SO₂, MWC acid gases (SO₂, HCl, and HF), and SAM will be controlled with a spray dry absorber (SDA) in combination with the fabric filter (FF).
- PM₁₀ as well as MWC Metals (as PM₁₀) will be controlled with a high efficiency FF baghouse.
- NO_x will be controlled with a combination of Selective Non-Catalytic Reduction (SNCR) and Flue Gas Recirculation (FGR).
- GCP will provide maximize burnout of products of incomplete combustion such as CO, volatile organic compounds (VOCs), and trace organics (PCDD/PCDF).
- Activated carbon injection system in combination with flue gas cooling in the spray dry absorber (SDA) and particulate control in the FF for control of Hg.

Table 3-2 presents a summary of the BACT evaluation for each pollutant.

3.4 Materials Separation

Hillsborough County intends to meet or exceed the 30 percent recycling goal set by the state of Florida. The County has been successful in consistently achieving this goal during the last few years. Recycling is a crucial component of the County's integrated waste management system. The County achieves a considerable portion of its materials diversion and recycling by special collection of certain recyclable materials separated by the resident or business. The County also mandates the separation of yard waste. Franchise haulers collect recycled materials curbside in residential areas of the unincorporated portion of the County. The County also maintains collection facilities where County residents and business can drop off many types of recyclable items including glass, paper, plastic, cardboard, motor oil, white goods, household hazardous waste, tires, and electronic waste. The County also recycles construction and demolition (C&D) debris.

The County provides weekly, curbside pickup of recyclables to all residents in the unincorporated portion of the County through private franchise contractors. The County also provides recycling bins to residents for easy separation of paper, glass, metal and plastic. Two privately owned materials recovery facilities accept and process these materials. These facilities will accept a variety of recyclable materials, including aluminum cans, glass bottles and jars, multiple types of paper, wood waste, tin cans, cardboard, plastic bottles, Christmas trees, and some yard waste. The curbside recycling program collects approximately 30,000 tons of recyclables each

Table 3-2
Summary of Hillsborough County Resource Recovery Facility New MWC Unit Best Available Control Technology Determination

Pollutant	Control Technology	Technology Ranking	Control Efficiencies	Technology Evaluation	Economic (Total Capital Investment)	Energy	Environmental	Cost Per Ton of Pollutant Removed	Selection
Sulfur Dioxide & Acid Gases	Wet Scrubber	1	SO ₂ : 90-95%; Acid gases (HCl & HF) 95-99%	Primarily used in European MWCs. Typical applications uses a two-staged scrubber allows for removal of HF and HCl with water in 1st stage and using an alkaline reagent in the 2nd scrubber for SO ₂ control. Disadvantages include: only moderately effective in controlling heavy metals and organic emissions, liquid effluent treatment, corrosion problems, and visible water vapor plumes.	--	--	--	--	
Sulfur Dioxide & Acid Gases	Semi-Dry Absorption/Fabric Filter (SDA/FF)	2	SO ₂ : 85-95%; Acid gases (HCl & HF) 95-99%	SDA scrubbers effectively control SO ₂ and acid gases and have been applied to the majority of MWC facilities in the U.S. SDA scrubbers are also designed to control organics and volatile metal emissions. FF generally preferred over ESP in combination with SDA. Disadvantages include: clogging of spray nozzles, accumulation of reagent on scrubber walls, requires large quantities of sorbent, and larger installation space than wet scrubbers.	--	--	--	--	BACT
Sulfur Dioxide & Acid Gases	Dry Sorbent Injection (DSI)	3	SO ₂ : 50-90%; Acid gases (HCl & HF) 90-95%	There are several types of DSI techniques (furnace, economizer, duct and hybrid) for controlling acid gas emissions for conventional MWCs. FF generally preferred over ESP in combination with DSI. Ideal for retrofitting older combustion facilities. Disadvantages include: requires large quantities of hydrated lime which is more expensive than pebble lime, more scrubber waste than SDA; more frequent FF cleaning; lower SO ₂ removal than SDA.	--	--	--	--	
Sulfur Dioxide & Acid Gases	DeSONOX	4	--	DeSONOX process is a flue gas purification process during which NO _x and SO ₂ are simultaneously extracted. Combination of catalysts for NO _x control by NH ₃ and oxidizing catalysts to convert SO ₂ to SO ₃ . Primarily marketed for low SO ₂ concentration flue gas streams, and it has not been applied to large-scale facilities. Considered an experimental technology.	--				
Particulate Matter/Metals	Fabric Filter (FF)	1	0.009 grains/dscf @ 7% O ₂	U.S. EPA considers both FF and ESPEquivalent in providing control of PM.	--	--	--	--	BACT
Particulate Matter/Metals	Electrostatic Precipitator (ESP)	2	0.009 grains/dscf @ 7% O ₂	U.S. EPA considers both FF and ESP equivalent in providing control of PM.	--	--	--	--	
Nitrogen Oxides	Selective Catalytic Reduction (SCR)	1	50-90%	Has been applied to MWCs in Europe, Asia and Canada. In "hot-side" application (pre-PM removal device), the catalyst is fouled by HCl, metals and high PM loadings. In "cold-side" application (post-PM removal device), flue gas is clean of contaminants, but catalysts do not perform well at lower temperatures which requires reheating gas at a higher energy cost and adding pollutant emissions to flue gas.	\$22,985,000	\$298,000	405 tons removed	\$14,100	
Nitrogen Oxides	Selective Non-Catalytic Reduction (SNCR) with Flue Gas Recirculation (FGR)	2	35-60%	SNCR using direct injection of aqueous ammonia in the MWC. NH ₃ emissions may result if NH ₃ is injected outside desired temperature range at a higher than normal rate, causing ammonium chloride to form stack plumes and possible corrosion of boiler tubes. Has been applied to MWCs in U.S., with FGR.	\$3,050,000	\$36,000	324 tons removed	\$2,400	BACT
Nitrogen Oxides	Ecotube	3	possible 60%	Ecotube essentially consists of one or more retractable rotating lances (3 to 7 meters long) located just above the primary combustion zone. The lances are designed to inject high velocity air, ammonia or urea through nozzles into the upper combustion zone of the furnace. There is serious question as to how the rotating lances would survive in the combustion zone of the furnace.	--	--	--	--	
Nitrogen Oxides	Good Combustion Practices/Low Excess Air (GCP/LEA)	4	20-50%	Effective but also could increase CO, HC and PICs emissions and lower combustion efficiency	--	--	--	--	
Nitrogen Oxides	Flue Gas Recirculation (FGR)	5	10-25%	Somewhat effective, but the relatively moist flue gas from after the baghouse in combination with GCP may lead to increased emissions of CO and boiler corrosion problems.	--	--	--	--	
Nitrogen Oxides	Gas Reburning	6	Unknown	Combined with LEA/FGR achieved up to 60-70% NO _x control during MWC pilot-scale study and 60% NO _x control at Olmstead, MN MWC study. However, has not been applied to MWCs in U.S.	--	--	--	--	
Nitrogen Oxides	Wet Flue Gas Denitrification (FGD _N)	6	Unknown	FGD _N oxidation-reduction converts NO to NO ₂ by spraying an oxidant, such as ozone into flue gas stream ahead of wet scrubbers. Produces liquid effluent that is difficult and expensive to treat. Has not been applied to MWCs in U.S.	--	--	--	--	

Summary of Hillsborough County Resource Recovery Facility new MWC Unit Best Available Control Technology Determination

Pollutant	Control Technology	Technology Ranking	Control Efficiencies	Technology Evaluation	Economic (Total Capital Investment)	Energy	Environmental	Cost Per Ton of Pollutant Removed	Selection
Nitrogen Oxides	E-Beam	6	Unknown	E-Beam reacts NH ₃ or lime using a high-intensity E-Beam emitted across the flue gas by an electron gun. Reaction takes place in a steel vessel with a concrete shell. Has not been applied to MWCs in U.S.	--	--	--	--	
Nitrogen Oxides	Prism	6	Unknown	Prism is a combustion process modification which consists of a prism shaped, water-cooled structure located just above the grate of a MWC. Prism provides more uniform flue gas temperature and oxygen distributions across the furnace and lower maximum temperatures at the furnace outlet. When used in combination with SNCR, Prism's main benefit is lower ammonia consumption. Its overall impact on NOx control is limited and it appears that other less costly furnace modifications such as FGR can accomplish similar results.	--	--	--	--	
Nitrogen Oxides	Water Cooled Grates	6	Unknown	This technology has been used for a number of years. The drawback of WC grates is that they lower combustion efficiency, but when used in combination with SNCR, WC grates reportedly reduce baseline NOx emissions and reduce ammonia usage. There is no data to support the theory that the beneficial effect of WC grates and FGR are additive. WC grates is judged to be another means of enhancing SNCR but does not appear to offer any improvement over FGR either singularly or in combination with FGR.	--	--	--	--	
Nitrogen Oxides	SCONox	6	Unknown	SCONox is a catalytic control method for NO _x without using NH ₃ as a reagent. It has been applied to clean-fired combustion equipment, such as natural gas-fired boilers and turbines. However, it has not been applied to MWCs in U.S. Catalyst could experience fouling from trace materials in flue gas.	--	--	--	--	
Carbon Monoxide	Thermal Oxidizers	1	90 percent control	Thermal oxidizers successfully applied to industrial sources, but not on MWC units in U.S. In addition, thermal oxidizers generate increased electrical energy and fan power demands, and produce secondary pollutant emissions.	--	--	--	--	
Carbon Monoxide	Good Combustion Practice (GCP)	2	80 ppmv @ 7% O ₂	Continuous compliance with CO limit: a load limit and a temperature limit at the inlet of PM control device. No adverse environmental impacts.	--	--	--	--	BACT
Carbon Monoxide	Oxidation Catalyst	3	--	Oxidation catalyst installed on natural gas combustion turbines; however, could be quickly poisoned by trace contaminants in MSW flue gas. Technically infeasible option.	--	--	--	--	
MWC Organics	Thermal Oxidizers	1	--	Thermal oxidizers successfully applied to industrial sources, but not on MWC units in U.S. In addition, thermal oxidizers generate increased electrical energy and fan power demands, and produce secondary pollutant emissions.	--	--	--	--	
MWC Organics	Good Combustion Practice (GCP)	2	VOCs 0.1 lb/ton Dioxin 13 ng/dscm @ 7% O ₂	Continuous compliance with CO limit: a load limit and a temperature limit at the inlet of PM control device. No adverse environmental impacts.	--	--	--	--	BACT
MWC Organics	Oxidation Catalyst	3	--	Oxidation catalyst installed on natural gas combustion turbines; however, could be quickly poisoned by trace contaminants in MSW flue gas. Technically infeasible option.	--	--	--	--	
Mercury	Activated Carbon Injection (ACI)	1	85 percent control	Activated carbon with a semi-dry scrubber system consisting of SDA and FF removes 85 percent of Hg emissions. In addition, tests shown that dioxins and furans emissions reduced by 95 to 98 percent with ACI followed by SDA/ESP.	--	--	--	--	Top BACT
Mercury	Wet Scrubbers	2	possible 90 percent control	Wet scrubber systems for mercury control applied to European MWCs. Soluble species of mercury compounds (HgCl ₂ and HgO) can be captured at 90 percent or greater; however, if significant elemental Hg in flue gas, collection efficiencies limited. Disadvantages include: treating wastewater before disposal and possible release of more toxic dioxin and furan congeners.	--	--	--	--	
Mercury	Carbon Filter Beds	3	--	Three types of filter beds (cross flow, counter-current flow, and counter-cross flow). Developed in Europe as final cleaning stage to remove Hg, dioxins and furans, and acid gases. No data available proving that carbon filter bed mercury removal is better than ACI with SDA/FF.	--	--	--	--	

year. Commercial recycling is voluntary in Hillsborough County. Currently, businesses are responsible for delivering their own recyclables to the appropriate facilities.

While certain materials separation efforts could potentially reduce air emissions, the amount of emissions reductions cannot be quantified. Also, there is no evidence to demonstrate that source separation of certain components by itself provides for consistent and measurable reductions of pollutant emissions. Therefore, source separation does not qualify as BACT and will not be further evaluated in this section.

3.5 BACT Review for Sulfur Dioxide, MWC Acid Gases, Fluorides and Sulfuric Acid Mist

The combustion of MSW generates acid gases which include SO₂, MWC acid gases, such as HCl and hydrogen fluorides (HF), and SAM. Acid gases are generated in the combustion unit due to chemical reactions between the sulfur, chlorine, fluorine, and other compounds in MSW and combustion air. Scrubber systems are the most effective control technology currently available to reduce acid gas emissions from MWC units. These scrubber systems include wet, semi-dry, and dry applications. A description of each control technology is presented below.

3.5.1 Emission of Gaseous Sulfur Compounds and Acid Gases

The sulfur which contributes to pollutant emissions from solid waste combustion is chemically bound to other compounds. During combustion, a fraction of these elements escapes from the furnace as gaseous sulfur compounds while the remainder leaves as bottom or fly ash. The type of sulfur compounds released from the furnace is dependent on the presence of other gaseous compounds, combustion temperatures, and chemical (oxidizing or reducing) conditions in the furnace. Furnace conditions (oxidizing or reducing) directly influence the types of sulfur compounds which may form and exit during combustion. Excess oxygen conditions, typical of a solid waste combustor, generally result in the formation of SO₂ and SO₃, while reducing (oxygen deficient) conditions result in hydrogen sulfide (H₂S), carbonyl sulfide (COS) and elemental sulfur. Since Unit 4 will be operated under excess oxygen conditions, reduced forms of sulfur are not likely to form, and hence emissions of reduced sulfur compounds will be negligible.

Various sulfur compounds are produced from direct combustion processes. SO₂ is the predominant form of sulfur compound released from the municipal solid waste combustion process. Some of the SO₂, when released into the ambient environment, reacts with atmospheric water vapor to form sulfuric acid. Sulfuric acid and emitted sulfuric acid mist may further react in the atmosphere to form sulfate salts, a particulate aerosol.

Chlorine, and fluorine are also chemically bound to other compounds. A portion of these substances are also released during combustion and escape the furnace in various forms. Similar to sulfur, emitted chlorine and fluorine react with water vapor

to form HCl and HF. The presence of these acid gases in the atmosphere results in reduced visibility, material corrosion, sensitive organ irritation in humans and animals, and can add to acid rain/fog problems.

3.5.2 Available Control Technologies

The emissions of SO₂ and acid gases from solid waste combustion can be reduced through the application of acid gas scrubbing devices. There are three general types of acid gas scrubbers offered by the air pollution control industry: wet scrubbers, dry scrubbers, and dry injection scrubbers. Although the specific operation of each of these scrubbers differs significantly, each incorporates the use of an alkaline reagent to neutralize acid gases in the flue gas stream. Wet scrubbers and dry scrubbers subject flue gas to a sorbent water solution while dry injection scrubbers inject completely dry sorbent into the flue gas.

The relative removal efficiencies of these technologies for SO₂, HCl and HF are shown in Table 3-3. As the table shows HCl and HF are generally better controlled than SO₂ because they are highly reactive acids. The higher removal efficiencies of dry scrubbers and wet scrubbers, in contrast to the dry injection scrubber, can be attributed to their lower operating temperatures and to their liquid-gas contact which provides better mass transfer of gaseous pollutants to the absorbing interface.

A scrubber's ability to achieve consistent and continuous control of these pollutants is better represented by the values in the lower end of the control efficiency ranges noted in Table 3-3.

Table 3-3 Control Efficiencies of Sulfur Dioxide and Acid Gas Control Technologies ^a		
Pollution Control System	Achievable Removal Efficiencies	
	SO ₂	Acid Gas (HCl and HF)
Wet Scrubber	90-95%	95-99%
Spray Dryer	85-95%	95-99%
Dry Injection Systems	50-90%	90-95%

Source: ^a Air Pollution Engineering Manual (Davis, W.T., 2000)

In addition to scrubber devices, another control system that has been tested and/or employed in various forms uses a catalytic method of SO₂ control. These technologies are described in the following review of control alternatives for the proposed Unit 4.

3.5.2.1 Wet Scrubbing Systems

Wet scrubbers have been used on refuse combustion facilities in the past primarily as particulate control devices; however, they can also be designed to provide effective

acid gas control. Acid gas wet scrubbers differ from particulate matter removal wet scrubbers in several ways. The dominant mechanisms by which particulate are collected in a wet scrubber is inertial impaction of the particulate with the fluid which is dependent on the pressure drop across the unit. Therefore, particulate control wet scrubbers are typically high energy units with large pressure drops. In contrast, the process which governs the overall rate of acid gas absorption and control in a wet scrubber is the diffusion of an acid gas molecule into a liquid alkaline droplet for a reaction to occur. The design of an acid gas wet scrubber reflects this governing process since the emphasis is to increase the contact time of the liquid and gas, and the chemical composition of the liquid.

Wet scrubbers for acid gas control use an alkaline liquid which may consist of either caustic soda (sodium) solution or lime slurry (calcium) to scrub the flue gases. In larger systems, the use of lime slurry is common since the cost of the alkali favors using the less expensive lime instead of caustic soda in spite of the higher capital costs involved. Lime slurry systems react with the SO_2 and other acid gases to form calcium based salts which require clarifying, thickening, and vacuum filtering to avoid a concentration build-up of precipitated salts in the system. Sodium-based systems produce a liquid waste with highly soluble sodium based salts which may require the use of large, carefully contained, holding pond(s) or wastewater treatment plants. The holding pond(s) are used to evaporate and concentrate the dissolved salts, therefore, they are feasible in warmer climates.

Currently, wet scrubbers are operating on numerous sources in the U.S., predominantly high sulfur fuel (coal and oil) fired power plants, municipal sludge combustors, and hazardous waste combustors. Wet, calcium-based FGD systems have been the preferred acid gas control option for large utility power plants. However, wet scrubbers have not gained popularity in the U.S. waste-to-energy industry. Municipal waste combustion plants in the U.S. have predominantly utilized dry or semi-dry FGD systems in combination with a FF baghouse to minimize water use and for enhanced fine particulate control (RTP, 2003).

The bulk of recent wet scrubber experience with municipal waste combustion systems and thus, municipal waste combustion flue gas cleaning systems, comes primarily from Europe. European facilities equipped with wet scrubber systems include the Kiel and Krefeld facilities in West Germany. The Kiel plant was the first refuse burning facility in West Germany to have used electrostatic precipitators (ESPs) in combination with a single stage wet scrubber. Acceptance testing data for the original wet scrubber at the Kiel plant showed HCl and HF removal efficiencies of greater than 95 percent. In addition, emissions of sulfur oxides (SO_2 and SO_3) were reduced by approximately 50 percent (CARB, 1984). The Kiel plant demonstrated high on-line reliability for continuous operation (Beaumont Environmental, Inc. (BEI), 1986). However, the lower SO_2 removal efficiency relative to the higher HF and HCl removal efficiencies shown at the Kiel facility identified a problem with single-stage scrubbing utilizing a calcium based sorbent for acid gas control. The performance of wet

scrubbers is dependent on many factors, and at the time, the data base was too limited on MWC applications for detailed evaluations of the effects.

The Krefeld plant, built soon after the Kiel plant was similar in design to the Kiel facility, except that it incorporated two-stage wet scrubbers. Each stage uses a different alkaline reagent in the scrubber solution. The first stage uses calcium hydroxide to reduce emissions of gaseous HCl and HF. Emissions of sulfur oxides are reduced in the second stage through use of either a sodium or calcium based reagent (CARB, 1984). Results from tests conducted on the Krefeld facility showed an optimum 99 percent or greater HCl removal, 97 percent or greater HF removal and 96 percent or greater SO₂ reduction when firing refuse only (BEI, 1986).

The major advantage of an acid gas wet scrubber system over either a dry scrubber or a dry injection scrubber system is its high abatement efficiency. Data on a limited number of European installations show that acid gas wet scrubbers are very efficient and can achieve removal rates of SO₂ and acid gases that are greater than or equal to those of dry scrubbers.

Although wet scrubbers may provide very effective SO₂ and other acid gas control, the technology has several disadvantages which discourage its use on solid waste combustion facilities. In addition, to the extensive and expensive liquid effluent treatment required, wet scrubbers produce a saturated gas which increases the potential corrosion of wet scrubber internals and downstream equipment. It also creates an aesthetically displeasing visible water vapor plume. The Kiel facility combustor unit has a wet scrubber which confirms these corrosion problems. The facility has been reported to have experienced severe corrosion of the wet scrubber's internals and the stack.

Other disadvantages of wet scrubber systems include:

- Wet scrubbers alone are only moderately effective in controlling heavy metals and organic emissions. Generally, ESP's are used in conjunction with wet scrubbers for added particulate removal (Davis, W.T., 2000).
- Fabric filters are not typically used with wet scrubbers due to the detrimental effect of saturated moisture on the filter bags (Davis, W.T., 2000).
- The results of several test studies regarding the ability of wet scrubbers to remove additional pollutants at municipal waste combustion facilities indicated that although there may be a reduction in the mass rate of organics, the overall dioxin/furan toxicity of the emission increases (Franklin Associates, 1991).
- Wet scrubbers are generally not effective in controlling submicron aerosol mists which would include SAM or volatilized mercury vapor (Franklin Associates, 1991).

Because of these significant technical disadvantages, the wet scrubber alternative is not considered a viable means of acid gas control, and no further analysis of this option was performed. A more detailed analysis of various control options focuses on those technologies with fewer restricting features.

3.5.2.2 Dry Scrubbers

Dry scrubbers, also referred to as wet-dry, spray dryer, semi-dry, or spray dry scrubbers, offer an effective and practical means of controlling acid gas emissions from solid waste combustion facilities. Of these types of dry scrubbers, semi-dry sorbent systems (SDA) have been applied to the majority of MWC units in the U.S. in the last ten years, and have been the technology of choice for retrofit to existing municipal waste combustors to meet the emission guidelines acid gas removal requirements.

During operation of a dry scrubber system, the flue gases from the boiler are introduced into an absorbing chamber where the gases are contacted by a finely atomized alkaline lime slurry. Acid gases are absorbed by the slurry mixture and the alkaline component reacts with the gases to form salts. Evaporation of the water produces a finely divided particle of mixed salt and unreacted alkali and flue gas having a lower temperature. A portion of the dry powder drops to the bottom of the scrubber vessel while the flue gases, containing the remaining powder with reacted acid gas salts and the particulates generated during solid waste combustion, are delivered to the particulate collector (FF or ESP) for removal.

To form the lime slurry, pebble lime (CaO) is hydrated by slaking with water ($\text{Ca} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$). The slurry and any additional cooling water which may be required are then pumped to nozzles or a rotary atomizer located inside the scrubber's contact chamber. The slurry contains greater than the stoichiometric quantity of lime required to neutralize the SO_2 and acid gases in the flue gas.

Most SDA systems used to date have employed either a rotary-type atomizer or a dual fluid nozzle with an external or internal mixing design. The type of atomization system has pros and cons; however, both are capable of meeting performance specifications. Rotary designs have the following benefits:

- Better control of droplet size.
- Less energy needed for equivalent atomization at certain sizes.
- Higher throughput per single component.
- Longer lifespan of atomization component.

The dual-fluid nozzle designs also offer advantages, including:

- No moving parts – easier to operate and maintain, and less expensive.

- Compact unit allowing for easier installation and inspection during normal operations.
- Flexible installation – mounting may be vertical or horizontal.
- Flexibility – flow from a failed nozzle can be re-directed through others in the absorbing chamber while it is replaced, thus preventing the loss of operating time and providing on-line maintenance.

In the absorbing chamber the water in the slurry droplets is rapidly evaporated by the hot flue gases. SO₂ and other acid gases are absorbed onto the hydrated lime particles and react to form calcium salts. The reduction in flue gas temperature provided by the evaporating water has been shown to be a major factor influencing the removal of acid gases. Studies such as the 1986 Environment Canada Study (R. Klieius et. al., 1987) have shown that SO₂ and other acid gas removal efficiencies are significantly higher when the scrubber is operated at temperatures approaching the saturation temperature of the flue gas. As a result of the scrubbing process a dry, free-flowing powder is produced consisting of unreacted lime, salts (most prevalent being CaCl₂, CaSO₃ and CaSO₄), and flyash. The largest of these particles are separated by gravity from the gas in the absorbing chamber by gravity and fall to the bottom. The smaller particles are carried to the PM control device for separation from the flue gas.

The FF is generally preferred over the ESP in combination with SDA because of its inherent high efficiency and especially because of its greater secondary reaction capability. This secondary reaction capability relates to the creation of a porous filter cake on the FF bags which contains both spent and unspent reagent. This filter cake is credited with controlling pressure drops, dampening surges or pollutant spikes, providing a site for increased reagent utilization, and increasing equipment reliability (BEI, 1986).

The results of a performance summary of SDA/FF on several facilities supported the use of a SDA/FF as a means of controlling several pollutants in addition to MWC acid gases. Factors affecting acid gas removal by SDA/FF systems include stoichiometric ratio, SDA outlet temperature (FF inlet), and inlet SO₂ concentration to the SDA. A stoichiometric ratio in excess of three is generally necessary to obtain consistently high acid gas removal efficiencies of 90 percent SO₂ and 98 percent HCl. Suppliers have claimed that SDA/FF systems are capable of achieving 90 percent or greater SO₂ and 95 percent or greater HCl removal efficiencies (EPA, 1989a and EPA, 1995d). Three years of data (2000-2002) from the existing Hillsborough County facilities have demonstrated the ability to consistently achieve this performance level.

The major disadvantages of SDA systems include potential clogging of atomizers or spray nozzles and reagent accumulation on the dry scrubber walls. A dry scrubbing system also requires a relatively greater quantity of sorbent and a relatively larger installation space than does a wet scrubbing system.

The significant performance advantages of a dry scrubber system far outweigh its disadvantages. The major advantages include:

- SDA systems provide effective SO₂ and other acid gas control. With the use of an efficient particulate control device, dry scrubbers, unlike wet scrubbers, also have the ability to reduce emissions of organics and metals.
- Unlike a wet scrubber, a SDA system produces a dry waste which is easier to handle and dispose.
- SDA exhaust streams are not saturated, and therefore, the potential for corrosion is greatly reduced when compared to a wet scrubber. Flue gas reheating, which would increase energy costs, is not required to prevent a saturated plume.
- Unlike a wet scrubber, a SDA system may be easily used with currently available particulate control devices.
- Unlike a wet scrubber, a SDA system uses a small amount of water, which evaporates and does not require treatment.

In developing and promulgating the MWC NSPS, the EPA concluded that SDA/FF systems are the best demonstrated control technology for reducing MWC facility emissions of acid gases, particulate matter and metals, and providing additional control of MWC facility organic emissions. This conclusion is based on operating data from a number of operating modern MWC facilities (EPA, 1989b and EPA, 1995d).

3.5.2.3 Dry Sorbent Injection (DSI)

Sorbent injection system can be divided into four types. These are:

- Furnace sorbent injection;
- Economizer sorbent injection;
- Duct sorbent injection, and
- Hybrid sorbent injection.

The simplest technology is furnace sorbent injection where a dry sorbent is injected into the upper part of the furnace to react with the SO₂ in the flue gas. The finely grained sorbent is distributed quickly and evenly over the entire cross section in the upper part of the furnace in a location where the temperature is in the range of 750-1,250°C (1382-2282°F). Commercially available limestone (CaCO₃) or hydrated lime (Ca(OH)₂) is used as sorbent. While the flue gas flows through the convective pass, where the temperature remains above 750°C (1382°F), the sorbent reacts with SO₂ and O₂ to form CaSO₄. This is later captured in a fabric filter or ESP together with unused sorbent and fly ash. Removal efficiency of up to 50 percent can be obtained; with some studies indicating up to 95 percent removal is achievable under the right

operating and sorbent mix (IEA Clean Coal Centre, 2004). Potential disadvantages of furnace sorbent injection include fouling and erosion of convective heat transfer surfaces by the injected sorbent (EPA 1989a).

In an economizer sorbent injection process, hydrated lime is injected into the flue gas stream near the economizer zone where the temperature is in the range of 300-650°C (572-1202 °F). Wang and others (1993) reported the results of an experimental study of the process. They found that in contrast to the furnace sorbent injection process, where the reaction temperature is around 1100°C (2012°F), $\text{Ca}(\text{OH})_2$ reacts directly with SO_2 since the temperature is too low to dehydrate $\text{Ca}(\text{OH})_2$ completely. In this temperature range, the main product is CaSO_3 instead of CaSO_4 and the reaction rate is comparable to or higher than that at 1100°C (2012°F). The production of carbonate in the process is undesirable, since it not only consumes the sorbent but also blocks the access of SO_2 to active sorbent surfaces. The tests showed that carbonation significantly increased with reaction temperature (IEA Clean Coal Centre, 2004).

Economizer injection of sorbent appears useful for SO_2 removal, especially for retrofit projects. However, this control method has not been proposed or demonstrated on modern municipal waste combustion facilities in the U.S. In addition, interaction of the hydrates with trace contaminants in MSW combustion flue gas is not completely understood. Because of the lack of available operational data, this experimental control option cannot be entirely assessed. Therefore, this method is not considered further in this BACT evaluation.

In duct sorbent injection, the aim is to distribute the sorbent evenly in the flue gas duct after the preheater where the temperature is about 150°C (302°F). At the same time, the flue gas is humidified with water if necessary. Reaction with the SO_2 in the flue gas occurs in the ductwork and the by-product is captured in a downstream filter. Removal efficiency is greater than with furnace sorbent injection systems. An 80 percent SO_2 removal efficiency has been reported in actual commercial installations (IEA Clean Coal Centre, 2004).

There are many factors, which influence the performance of a duct sorbent injection process. These include sorbent reactivity, quantity of injected sorbent, relative humidity of the flue gas, gas and solids residence time in the duct, and quantity of recycled, unreacted sorbent from the particulate control device. Finally, when designing a duct sorbent injection system, a good working knowledge of the flow conditions in the flue gas ductwork is important. The easiest and most efficient way of achieving this is to ensure well-controlled flow conditions. As the process needs reaction time, the most obvious solution would be to establish a dedicated reaction chamber. However, even a simple reaction chamber can contribute prohibitively to the capital costs of such a process (IEA Clean Coal Centre, 2004).

The hybrid sorbent injection process is usually a combination of the furnace and duct sorbent injection systems aiming to achieve higher sorbent utilization and greater SO_2 removal. Various types of post furnace treatments are practiced in hybrid systems,

such as injection of second sorbents such as sodium compounds into the duct, and humidification in a specially designed vessel.

Humidification reactivates the unreacted CaO and can boost SO₂ removal efficiency up to 90 percent depending on the process. The hybrid process offers the following advantages:

- Relatively high SO₂ removal;
- Low capital and operating costs;
- Easy to retrofit;
- Easy operation and maintenance with no slurry handling;
- Reduced installation area requirements due to compact equipment; and
- No wastewater treatment.

Although hybrid sorbent injection has been successfully applied in coal-fired boiler applications, this control method has not been proposed or demonstrated on modern municipal waste combustion facilities in the U.S. (IEA Clean Coal Centre, 2004). Therefore, this control option cannot be fully evaluated, and is not considered further in this BACT evaluation.

Greater acid gas control can be achieved by combining the DSI system with an FF rather than an ESP. Collected particulate builds up on the FF bags forming a filter cake. The presence of unreacted sorbent in the filter cake provides additional acid gas removal. FFs may also provide additional control of metals through control of fine particulate (EPA, 1989a).

An analysis of performance of DSI/FFs at several facilities, including Dutchess County, New York; Claremont, New Hampshire; Quebec City, Canada; and Wurzburg, West Germany indicated that up to 90 percent SO₂ and 95 percent HCl removal efficiency has been demonstrated with an FF inlet temperature of 250°F (121°C) and increased stoichiometric ratio of lime to acid gas. The ability to achieve these removal levels consistently has not yet been documented. The results also showed that outlet PM concentrations averaged 0.01 gr/dscf or lower at the tested DSI/FF systems. Removal efficiency for metals was available for only one facility. Removal efficiencies were estimated for other facilities based on measured outlet concentrations. Removal efficiencies for Pb, Cd, and As were estimated to average 99 percent or better. Estimates of removal efficiencies for chromium (Cr) and nickel (Ni) ranged from 94-99 percent. Removal efficiencies for Hg ranged from zero control to 99 percent control and appeared tied to the FF inlet temperature. Removal of dioxins and furans also appeared dependent on the FF inlet temperature, showing decreased emissions with temperature decrease. At less than 300°F (149°C), emissions were below 7.7 ng/dscm at 7% O₂ (EPA, 1989a).

Because the dry sorbent can be injected directly into existing furnace or duct work, capital costs for installation of the system are minimal. Therefore, a dry injection scrubber may be ideal for retrofitting older combustion facilities which have no acid gas control and where control goals are modest.

The disadvantages of a dry injection scrubber system for use on a new MWC unit are:

- Dry injection scrubbers require the use of large quantities of hydrated lime which is more expensive than the pebble lime used for dry scrubbers. The larger amount of sorbent is necessary in order to meet NSPS SO₂ removal requirements. Therefore, the operating cost differential resulting from the poor reagent use for a dry injection scrubber is significant.
- More scrubber waste is produced by a dry injection scrubber in comparison to a dry scrubber system because of the large quantities of sorbent which must be injected.
- The residual alkalinity of the waste from a dry injection scrubber may require special handling.
- The use of a larger quantity of sorbent than that used in a dry scrubber system results in the need for more frequent fabric filter cleaning which accelerates wear-out of the filter bags.
- The increased solids loading and altered properties of the particulate matter may result in decreased particulate control device efficiency (Offen, McElroy, and Munzio, 1987).
- Sorbent injected into the economizer may result in fouling of the convective heat transfer surfaces.
- Dry injection scrubbers, such as the system used at the Claremont, NH facility, do not decrease the flue gas temperature as much as wet scrubbers and dry scrubbers. Therefore, while plume buoyancy (enhanced plume dispersion) is maintained, the secondary benefit of removing condensable trace metals or organic emissions is reduced.
- With currently available sorbents, dry injection scrubbers provide lower SO₂ removal efficiencies than do wet and dry scrubbers.

Until such time as improved sorbents and processes are developed and tested on full-scale MSW combustion facilities, dry injection alone cannot be considered BACT for control of SO₂ and acid gases because of lower control efficiencies and minimal application to U.S. facilities.

3.5.2.4 Innovative Acid Gas Control Processes

The DeSONOx method is a combined catalytic procedure for the purification of flue gases, the end product being a sulfuric acid which can be used in industrial application. Nitrogen oxides, sulfur dioxides, chlorides, fluorides, remaining dusts and aerosols are precipitated. The core of the installation is the different types of series-connected converters. With ammonia added, the first converter type transforms nitrogen oxides into the harmless constituents of nitrogen and water vapor. During the next stage, which is the oxidation-type catalytic converter, sulfur dioxide (SO₂) is transformed into sulfur trioxide (SO₃) that combines with a substantial amount of steam in the flue gas to form gaseous sulfuric acid. The sulfuric acid is then condensed and washed out in the heat exchanger (cooler). Sulfuric acid aerosols posed a particular challenge. Very fine sulfuric acid droplets (aerosols) form in the transition from the gaseous state to the liquid state. These tiny droplets are deposited in wet electric filters (www.stadtwerke-muenster.de, 2004).

Although recently this technology has been marketed as a specialty technology for low SO₂ concentration flue gas streams, it has not been applied to large scale facilities. Therefore, currently, it appears that this technology must still be considered an experimental technology and has yet to be demonstrated for application to large-scale MWC facilities. Furthermore, test results have not shown acid gas control efficiencies as high as either the SDA or wet scrubber systems. Also, this technology does not appear to offer the secondary pollutant control of HCl, HF, trace metals, etc. that the SDA/FF offers. Therefore, this innovative technology will not be further considered for application to Unit 4.

3.5.3 Selection of BACT

The preceding technology evaluation identified wet scrubbers and semi-dry SDA scrubbers as the two "top" acid gas control technologies as providing the highest removal efficiencies relative to other technologies. However, because of wet scrubbers significant technical disadvantages, the wet scrubber alternative was not considered a viable means of acid gas control. The negative aspects of wet scrubbers compared to SDA systems include:

- Higher water consumption or wastewater treatment requirement resulting in increased energy and utility operating costs.
- Liquid effluent from the wet scrubber requires pretreatment to meet regulatory requirements before discharge to a municipal sewer.
- Problems associated with the disposal of wet sludge resulting from the process. Extensive sludge thickening and dewatering equipment is required.
- Corrosion, scaling and fouling of scrubber internals. Costly acid corrosion resistant construction materials are required for scrubber and downstream equipment. These materials include high nickel chromium alloys, which are extremely expensive.

- Visible steam plume under most meteorological conditions, especially during periods of high relative humidity.
- A relatively low stack gas temperature resulting in reduced buoyancy. This reduced buoyancy results in lower plume rise and poorer plume dispersion of the residual pollutants.
- It is a relatively undemonstrated control technology for modern municipal waste combustion facilities in the U.S.

Furthermore, available test data demonstrate the effectiveness of SDA/FF systems for SO₂ and acid gas emissions as well as secondary pollutant (trace organics and trace metals) control. Thus, based on the negative aspects of wet scrubbers in comparison to SDA systems, BACT for the control of SO₂ and acid gases at the proposed Unit 4 is determined to be the SDA/FF option.

Furthermore, when EPA developed the NSPS for municipal waste combustion facilities, EPA stated that the best demonstrated technology for reducing emissions of acid gases from large MWCs (i.e., greater than 250 tpd) is a SDA followed by a FF (EPA, 1989b and EPA, 1995d). The system proposed for Unit 4 is a SDA system, which is a post furnace injection technology followed by a FF baghouse. The SDA system will be designed to achieve SO₂ control levels of 26 ppm_{dv}, corrected to 7% O₂ or 80% removal of uncontrolled emissions (geometric mean 24-hour block average), whichever is least stringent; a HCl emission limit of 25 ppm_{dv}, corrected to 7% O₂, and SAM emission limit of 15 ppm_{dv}, corrected to 7% O₂. The emission rates for SO₂ and acid gases are given in Section 4.

3.6 BACT Review for Particulate Matter (PM₁₀) and MWC Metals

For the purposes of this BACT review, particulate matter refers to PM₁₀ and MWC metals. PM₁₀ and MWC metals may be removed from the combustion gases by various types of air pollution control devices. Technologies which have been used on MWCs include fabric filters (also referred to as baghouses), ESPs and wet scrubbers. Hillsborough County proposes to use a FF system with a particulate outlet grain loading of 0.009 grains per dry standard cubic foot (gr/dscf), corrected to 7% O₂, as BACT for the emission of PM₁₀ and MWC metals.

For the proposed Unit 4, there are several operations that generate particulate emissions that are controlled by FF systems. The primary source of particulate matter at the proposed Unit 4 is the combustion unit. Secondary particulate matter sources are the tipping floor area, various conveyors that will be part of the facility modification, ash handling areas and the storage and handling of lime used in the SDA and carbon used in the activated carbon injection (ACI) system. The combustion air intake for Unit 4 will collect particulate matter and odors from the tipping floor area, as is done with the existing three units. Since tipping area particulate emissions

are controlled in the combustion unit and collected by the SDA/FF, these are evaluated as part of the combustion unit particulate emissions. Fugitive particulate created by the delivery and use of lime and carbon will be controlled by a separate control device mounted on each storage silo.

PM emissions from the ash handling building vent are expected to be negligible. The ash handling building is currently maintained under negative pressure and has a fabric filter mounted on top of the building to control fugitive PM emissions. The ash handling practices at the Facility limit the resuspension of ash residue. Ash residue from the furnace exit (bottom ash) and the air pollution control system (fly ash) are combined and quenched with water (15-25 percent by weight H₂O) to prevent fugitive emissions. This ash handling practice has been successfully performed for the current MWC units.

3.6.1 Emission of Particulate Matter

There are four main sources of particulate matter emissions: dust generated in the tipping hall, combustion of MSW in the furnace, particulate loadings after the SDA system, and secondary emissions from the lime and carbon silos.

The particulates generated in the pit area or tipping hall will be entrained in the air used by the combustion unit. The primary dust generating mechanisms are the movement of trucks and other equipment in the tipping area, the discharge of refuse into the pit area, the mixing and movement of refuse by the overhead cranes, the loading of refuse into hoppers, and other minor activities. The air intakes for the combustion unit are located in the tipping hall area to provide control of odors and particulate matter. Within the tipping floor area, the negative pressure created by the induced draft fans directs movement of air to the screened vents, therefore preventing odors and dust from escaping to the environment (RTP, 2003).

Particulate matter (PM) is emitted as a result of incomplete combustion of fuel as well as the entrainment of noncombustible inert matter in the flue gases. PM emissions may be solid or condensable substances. Solid PM generally consists of noncombusted inert matter, inorganic oxides, unburned combustibles and metals. A fraction of the vapor phase trace organics which were not completely converted to CO₂ and H₂O during the combustion process and the vaporized heavy metals make up the condensable portion of PM.

The size and quantity of particulates emitted from solid waste combustion depend upon such factors as flue gas residence time, underfire air velocity through the combustor system, oxidizing/reducing conditions within the furnace, temperature, flue gas mixing, boiler tube spacing, boiler configuration, flue gas velocity and the chemistry of the fuel which is burned. If the combustion takes place at higher temperatures and with the proper quantity of oxygen, the result will be more complete combustion of the fuel, and a decreased particle mass. High combustion temperatures and long residence times allow for more complete burning of organic particles with a commensurate decrease in particle size. Boiler configuration (180

degree turns) and decreased gas velocity will allow the larger, heavier particles to fall out of the flue gases as they pass the boiler, but the majority move downstream to the SDA unit. Particulates collected in the bottom ash from the boiler section are mixed in the ash discharger with fly ash particulate matter collected by the SDA system. All collected flyash is conveyed by enclosed screw conveyors.

Once the combustion exhaust gases enter the SDA, the flue gas cleaning system introduces a lime-slurry spray into the exhaust gas stream and thereby increases the particulate loading in the flue gas. As the lime-slurry dries and the water evaporates, the exhaust gases cool and the dry lime particles disperse from the resultant intense turbulence within the reaction chamber. This intense turbulence causes intimate contact between the fine lime particulate and acid gases and other constituents in the exhaust stream. Condensation onto particles and agglomeration of finer particles occurs. Some large particles in the exhaust gases are collected in the hopper of the SDA vessel. The remaining particles are carried to the FF control system where the combination of reacted and unreacted lime helps form a filter "cake" on the baghouse fabric that assists in particulate removal and ultimately, highly efficient exhaust gas cleaning (RTP, 2003).

In addition to the PM emitted from the furnace, the facility will have three secondary sources of particulate matter emissions. These sources are located at the top of the two lime (pebble and dolomite lime) and carbon silo vent(s). The lime silos are storage vessels for lime and will be used by the dry scrubbers to control SO₂ and acid gas emissions. The carbon will also be stored in a silo and will be used in the carbon injection system to control mercury emissions. Each silo will be equipped with its own fabric filter (FF) (slaker dust collector) mounted on its roof to control lime and carbon dust emissions. The FFs will be designed to discharge collected dust directly back into the storage bin.

3.6.2 Available Control Technologies

Particulate matter may be removed from the combustion gases by various types of air pollution control devices. Technologies which have been used on MWC units include FFs, electrostatic precipitators (ESP), cyclones, wet scrubbers, and others. From a top-down perspective, the most effective types of particulate matter control equipment being successfully applied to municipal waste combustors are FF and ESP systems. EPA, in its review of control technologies in support of the NSPS for municipal waste combustors, considered FF and ESP systems to be equivalent in providing control of particulate matter (EPA, 1989e; and EPA, 1995d). This equipment has been successfully applied to numerous municipal waste combustor installations in the U.S. It is a generally accepted conclusion that either an ESP or a FF system can effectively reduce the particulate loading in an exhaust gas stream from a municipal waste combustor and either technology represents the most restrictive emission control technology available for particulate emissions. The application of FF systems has been made possible primarily by the installation of acid gas scrubbers, which decrease flue gas temperature excursions to limits which are acceptable for the bag fabric. This

makes the possibility of a fire due to incandescent particles igniting the fabric negligible. The trend of using baghouse rather than an ESP is due to a combination of factors. Although both of these technologies may be designed and operated to achieve the same outlet grain loading, it is proven that FF systems are better able to control the finer PM emitted, which have been proven as a source of trace heavy metal and organic emissions. Unit 4 will incorporate a FF system designed to limit particulate emissions to 0.009 grains per dry standard cubic foot (gr/dscf) of exhaust gas, corrected to 7% oxygen (O₂).

Developments in FF technology have produced a variety of filter materials including coated or non-coated fiberglass, felts, and synthetic membranes to deal with differences in ash characteristics and resistivity, inlet flue gas temperature, filter cake cohesiveness, and other problems encountered with specific FF design parameters. Hillsborough County will utilize a bag material that will meet the proposed PM₁₀ emission limit of 0.009 grains per dry standard cubic foot (gr/dscf) at 7% O₂.

3.6.3 Selection of BACT

Hillsborough County is proposing to install a FF system to control particulate matter emissions which represents the "top" technology available. No further evaluation of control options is required. Therefore, a FF designed to achieve a particulate matter emission rate of 0.009 gr/dscf, controlled 7% O₂ is selected as BACT for Unit 4.

The proposed FF system will also control metal emissions from Unit 4. The proposed metal emissions limits are:

- Cadmium of 20 ug/dscm @7% O₂
- Lead of 200 ug/dscm @ 7% O₂
- MWC metals of 20.6 mg/dscm @ 7% O₂

In addition, two lime silos and one carbon silo will be added to the facility for additional lime and carbon storage needed for the Unit 4 carbon injection and SDA system. The lime and carbon silos will each be equipped with a FF unit to control particulate emissions during filling operations of each silo. The FFs for the lime and carbon silos will be designed to achieve an outlet grain loading of 0.015 gr/dscf, which is considered BACT for small, low flow FF units.

The cooling tower will use drift eliminators which will be designed to control the quantity of drift to 0.001 percent of the recirculation rate.

3.7 BACT Review for Nitrogen Oxides Emissions

NO_x is a product of all air-oxidized combustion processes, including MSW combustion. The two mechanisms that generate NO_x emissions during the combustion of MSW are thermal NO_x and fuel NO_x. Each is described in more detail in Section 3.7.1.

Generally, NO_x control technologies are based on two main principles:

- Combustion control and/or combustion process modification, and
- Post-combustion control.

Combustion control and combustion process modification technologies reduce the formation of the nitrogen oxides during the combustion processes while post-combustion/flue gas treatment technologies remove the nitrogen oxides from flue gas stream after their formation. In general, combustion controls and process modifications have been applied to a large number of MWCs. However, these NO_x control technologies have provided only modest levels of NO_x reduction. Post combustion technologies have the potential of achieving significantly greater NO_x reductions. The available post-combustion NO_x control technologies which have achieved a status of commercial applications are the Selective Catalytic Reduction (SCR) and the Selective Non-Catalytic Reduction (SNCR) flue gas treatment techniques.

Each of these NO_x control technologies are discussed in more detail in Section 3.7.2.

3.7.1 Emission of Nitrogen Oxides

The predominant form of NO_x produced during combustion is nitric oxide (NO). Nitrogen dioxide (NO₂) is also produced in lesser amounts. Upon exiting the stack essentially the entire NO formed during combustion is further oxidized to form NO₂. The resulting NO₂ is a brownish-red gas which, in the presence of sunlight and hydrocarbons, can react to form ozone (photochemical smog) and other secondary pollutants.

NO_x emissions are classified according to the source of the nitrogen from which the NO_x is formed. Nitrogen from combustion air produces "thermal NO_x," while that which originates from organically bound components in refuse produces "fuel NO_x." Though the precise mechanisms involved in converting fuel nitrogen to NO_x are not completely understood, the relative quantities of fuel NO_x and thermal NO_x produced are known to be functions of furnace design, refuse composition, and plant operating conditions.

The two major factors affecting the formation of thermal NO_x are the oxygen concentration present in the combustion zone and the flame temperature. The rate of NO_x formation has been shown to be linearly dependent on the oxygen concentration when temperature is constant. Additionally, NO_x formation tends to increase significantly with increasing temperature (at temperatures approximately above 2,100 °F) in the presence of O₂. In addition to these characteristics, NO_x formation increases linearly with increasing residence time at temperatures conducive to thermal NO_x formation (Russell and Roberts, 1984).

Fuel NO_x is formed when MSW containing nitrogen and its compounds is burned, and the nitrogen is oxidized in the process. Fuel NO_x formation is strongly affected by the local oxygen concentration present in the flame and also by the mixing rate of fuel (MSW) and combustion air. Like thermal NO_x, formation of fuel NO_x is dominated by the local combustion conditions (specifically how and at what temperature combustion air and MSW are mixed) (RTP, 2003).

3.7.2 Available Control Technologies

Emissions of NO_x from solid waste combustion can potentially be reduced by three methods: 1) reducing the solid waste nitrogen content (material separation); 2) minimizing the quantity of NO_x produced during combustion (combustion modification); and 3) reducing the quantity of NO_x in the post combustion flue gas stream (flue gas controls).

Table 3-4 is a summary of the potential NO_x control techniques which may be used at MWCs. The information also presents the current status and the projected control efficiency of each method.

Regarding source separation, while this would presumably be a means of reducing the nitrogen content of the solid waste, there is no EPA or other data which quantifies the claim that reducing the nitrogen content of the waste stream will reduce the NO_x emissions from a MWC. Thus, even though source separation is extensively practiced in Hillsborough County (as discussed in Section 3.4), source separation is not considered a NO_x control technology and therefore will not be addressed in the BACT determination. Combustion modifications and flue gas controls for minimizing NO_x emissions were the only NO_x controlling methods evaluated. Each method was evaluated using "top down" BACT methodology. A comprehensive description and technical evaluation of each technology is presented in the following subsections.

3.7.2.1 Combustion Modifications

Combustion modification techniques can be used to reduce the conversion rate of fuel nitrogen to NO_x and suppress thermal NO_x formation as well. Three methods—staged combustion/low excess air (LEA), flue gas recirculation (FGR), and natural gas reburning—are means to reduce NO_x emissions.

Staged Combustion/Low Excess Air (LEA)

These techniques may be used separately or together to control NO_x emissions. During staged combustion, air and fuel mixtures are combusted in two separate zones. In one zone, the fuel is fired with less than a stoichiometric amount of air thereby preventing the oxidation of fuel bound nitrogen. This creates a fuel rich local zone in regions of the primary flame. The second zone is an air rich zone where the remainder of the combustion air is introduced to complete the combustion of the fuel. The heat in the primary flame zone is not as intense as with normal firing because combustion is incomplete. The air mixed with fuel is sub-stoichiometric in the NO_x forming region of the flame, thus creating a low NO_x condition.

Similar to staged combustion, combustor operation at low excess air (LEA) reduces the oxygen available in the NO_x forming region of the flame, thereby inhibiting the formation of thermal NO_x.

LEA and staged combustion together reduce NO_x emission due to a combination of several factors. First, a lack of available oxygen for NO_x formation in the fuel rich combustion stage results in reduction of fuel-bound nitrogen to molecular nitrogen (N₂) rather than NO_x. Second, the flame temperature is generally lower in the first stage than would be expected with single stage combustion at stoichiometric conditions. Third, the peak temperature in the second stage (air rich) is lower thus reducing the generation of thermal NO_x. Thus, LEA and the staged combustion (the introduction of air at different points in the combustion system) promote reducing conditions which favor N₂ release and it also limits peak temperatures in both the primary and secondary combustion zones. This slow combustion air and fuel (MSW) mixing process assists in converting fuel bound nitrogen to molecular nitrogen rather than NO_x.

Although lower NO_x emissions can be partly attributable to a lower quantity of thermal and fuel NO_x due to lower flue gas temperatures, lower temperatures can also generate higher CO emissions and lower combustion efficiency. If this technique is not properly applied, it can result in higher emissions of CO, hydrocarbons (HC), and other products of incomplete combustion (PIC).

The formation of thermal NO_x is minimized in the Martin combustor by controlling the flame temperatures below 2,400°F (1316°C). The distribution of the combustion air is controlled with the Martin reverse reciprocating grate firing system and master combustion control system such that the available oxygen in the primary combustion zone is maintained at desired levels (RTP, 2003).

Table 3-4 Alternative Control Methods for Nitrogen Oxides		
Control Method	Control Efficiency	Status
Source Separation	Not Quantifiable	Effect on MWC emissions are not quantifiable
Combustion Modification		
Good Combustion Practices (GCP), including Low Excess Air (LEA) and Staged Combustion	30-60%	Effective, but unknown side effects on combustion process and combustion related pollutants
Flue Gas Recirculation (FGR)	10-25%	Somewhat effective, but the relative moist flue gas from after the baghouse in combination with GCP may lead to increased emissions of CO and boiler problems
Gas Reburning	Unknown	Has not been applied to MWCs in the U.S.
Prism	Unknown	Has not been applied to MWCs in the U.S.
Ecotube	60% ^b	Has not been applied to MWCs in the U.S.
Water Cooled Grates	Unknown	Technology used with SNCR to reduce NO _x and NH ₃ emissions ; however, they lower combustion efficiency
Flue Gas Controls		
Selective Catalytic Reduction (SCR)	50-90%	Has not been applied to MWCs in the U.S.
Selective Non-Catalytic Reduction (SNCR)	35-60%	Has been applied to MWCs in the U.S.
Wet Flue Gas Denitrification (FGD _n)	Unknown	Has not been applied to MWCs in the U.S.
Electron-Beam (E-Beam)	Unknown	Has not been applied to MWCs in the U.S.

Note: ^b Based on manufacturer quote.

In the Martin combustor approximately 60% to 70% of the combustion air is introduced below the grate to promote reducing conditions and hence conversion of fuel nitrogen to N₂. The remaining combustion air is injected at overfire air ports

above the grate to complete the oxidation of combustibles. Combustion temperatures are reduced in both the primary combustion zone (the grate) by limiting the oxygen concentration and the secondary zone above the grate by the large volume of air supplied.

Flue Gas Recirculation (FGR)

In FGR, a portion of the flue gas stream is extracted and returned to the furnace. The system consists of an FGR fan assembly, air apportioning and mixing system and necessary duct work. Because the recirculated flue gas is relatively cool, the bulk furnace temperature decreases, resulting in a reduced thermal NO_x formation. FGR reduces NO_x emissions by lowering the flame temperature and reducing available oxygen. Although FGR is a technique designed to reduce thermal NO_x, the system can also help in slightly reducing fuel NO_x by a means of staging the combustion process.

Results from tests conducted at the 660-tpd Volund refractory wall furnace at the Kita refuse combustion facility in Japan indicated that 10 to 25 percent NO_x emission reductions were achievable (Radian, 1989). This level of NO_x emission reduction was achieved by recirculating an amount of flue gas equivalent to 20 percent of the combustion air.

Based on FGR's relatively low levels of NO_x reduction, MWC suppliers in the past were reluctant to incorporate FGR into their furnace designs. However, within the last 5 years MWC suppliers and operating companies have realized the benefit of FGR, particularly in combination with other NO_x control technologies. In fact, two of the major MWC suppliers (Martin and Von Roll) now include FGR as part of their standard combustion system offering. The benefit of FGR, particularly in combination with SNCR, is that it reduces the baseline NO_x level and it reduces ammonia use. Since FGR has proven to be effective in combination with other NO_x control technologies and is now part of the standard MWC offering, FGR will be considered in combination with SNCR and SCR as NO_x control technologies.

Natural Gas Reburning

Gas reburning is a NO_x control technique that overlaps combustion modification techniques. LEA is provided in the combustor, with recirculated flue gas introduced above the grate. Natural gas is added to this LEA zone to generate a fuel-rich zone. Air is supplied above the fuel-rich zone to complete combustion. This process is designed to reduce NO_x formation without increasing CO emissions.

A program was initiated to evaluate the potential for reducing air pollutant emissions from MSW combustion systems using natural gas reburning. The program was conducted jointly by the Institute of Gas Technology, the Gas Research Institute, Riley Stoker Corporation and Takuma Company Ltd.

Three major tasks were included in the program: (1) acquisition of baseline data from a commercial operating facility, (2) pilot-scale development and testing of the

reburning technology, and (3) field demonstration testing of the technology. The gas reburning concept being evaluated for MSW combustion is similar to the reburning technique being investigated to reduce NO_x emissions from fossil fuel combustion systems. Natural gas is introduced above the main combustion zone to create a reducing environment where significant amounts of NO_x and other fixed nitrogen species (NH₃, HCN), generated in the main combustion zone, are reduced to molecular N₂.

Results of the pilot scale testing demonstrated up to 70 percent reduction in NO_x emissions using gas reburning. The effects of gas injection location, reburning zone stoichiometry and residence time, overall boiler excess air and the amount of natural gas reburning on NO_x emissions are characterized. The impact of gas reburning on reducing other emissions such as CO, unburned THC and dioxin is also possible (Abbasi, et al, 1989).

Additional tests with natural gas reburning were conducted at the Olmsted County (Minnesota) municipal waste combustion facility by a joint program with the Gas Research Institute (Abbasi, et al., 1991). The test data showed that the natural gas injection of 12 percent to 15 percent (heat input basis) and FGR of 6 percent to 8 percent resulted in NO_x reduction of 60 percent and CO reduction of 50 percent. Natural gas reburning also allowed a reduction of excess air from 80 percent to 40 percent which provided increased boiler efficiency. The test data also indicated that optimization of residence time in the combustor is important for simultaneous reduction of NO_x and CO. However, long-term operational data on natural gas reburning in MWCs is not available (RTP, 2003).

Natural gas reburning has primarily been applied to fossil fuel boilers as a retrofit NO_x control technique or for seasonal NO_x reductions, and has not been used as a NO_x control method on large-scale MWCs. Although this technology has been applied to fossil-fuel combustion, it is not considered BACT for MSW combustion because of the increased natural gas costs and operational costs compared to less expensive, yet equally effective NO_x reduction techniques.

Ecotube

Ecotube is a recently developed staged combustion process offered by Synterprise. Ecotube essentially consists of one or more retractable rotating lances (3 to 7 meters long) located just above the primary combustion zone. The lances are designed to inject high velocity air, ammonia or urea through nozzles into the upper combustion zone of the furnace. Synterprise claims that Ecotube can: reduce NO_x by 60% or more, reduce CO and VOC emissions, improve mixing of the overfire air in a MWC, lower overall excess air levels by allowing the lower furnace to operate at near stoichiometric conditions, and improve boiler efficiency, due to the smaller amount of flue gas. To support these claims, Synterprise has offered limited data from a retrofit Ecotube installation on a MWC in Coventry, England.

Emissions data from the Coventry installation has the following characteristics:

NO_x: range of 140 to 280 ppm_{dv} at 7% O₂ with an estimated average of 210 ppm_{dv} at 7% O₂

CO: average of approximately 25 ppm_{dv} at 7% O₂ with spikes of 400 ppm_{dv} at 7% O₂ occurring every couple of hours

Since it is not known what the uncontrolled NO_x level was, the percent of NO_x reduction can not be determined. In any case, an average outlet NO_x level of 210 ppm_{dv} is rather unimpressive as a controlled NO_x emission level. The CO data with spikes of 400 ppm_{dv} suggest an unstable combustion process, which could be in violation of the EPA MWC performance standard for CO (100 ppm_{dv} of CO at 7% O₂, 4-hour block average).

Regarding the overall practicality of the system, there is serious question as to how the rotating lances would survive in the combustion zone of the furnace. The lances would be subject to metal fatigue, corrosion, plugging and slag formation. Furthermore, when the lances are retracted for repair or routine maintenance, emission characteristics as well as control of overfire air would significantly deteriorate.

In conclusion, there is too little data available and not enough operating experience with Ecotube to judge whether it has any significant advantage over current MWC systems which use high velocity overfire air ports to stage combustion and introduce secondary combustion air. Due to the limited data and operating experience with Ecotube, it will not be considered further as a NO_x BACT.

Prism

Prism is a combustion process modification offered by Seghers which consists of a prism shaped, water-cooled structure located just above the grate of a MWC. The flue gas flow off the grate is divided into two streams which flow on either side of the prism structure. Secondary air is injected into the two gas streams from the four corners of the combustor. The benefit of prism appears to be that, due to the prism structure, the secondary air needs to penetrate only ¼ of the furnace depth and hence better mixing of secondary air is achieved. Based on performance data taken from the AZN Moerdijk facility, Prism provides more uniform flue gas temperature and oxygen distributions across the furnace and lower maximum temperatures at the furnace outlet. When used in combination with SNCR, Prism's main benefit is lower ammonia consumption.

In summary, Prism is a rather substantial configuration change to the standard MWC grate technology. While it appears to improve the temperature and oxygen distributions within the combustor, its overall impact on NO_x control is limited and it appears that other less costly furnace modifications such as FGR can accomplish similar results. Due to the limited operating data and experience with Prism and relatively small (if any) improvement on reducing NO_x emissions, Prism will not be further considered as a NO_x BACT.

Water Cooled (WC) Grates

Another means of reducing combustion zone temperatures and thereby reduce NO_x emissions is to use WC grates. This technology has been used for a number of years and both Martin and Von Roll can offer a MWC with WC grates. The drawback of WC grates is that they lower combustion efficiency; however, the grates should last longer. When used in combination with SNCR, WC grates reportedly reduce baseline NO_x emissions and reduce ammonia usage. While one might assume that the use of WC grates and FGR with SNCR would further reduce NO_x emissions, there is no data to support the theory that the beneficial effect of WC grates and FGR are additive. In fact it may be that with so many combustion process parameters to control, it may be difficult or impossible to optimize any of them. In conclusion, WC grates is judged to be another means of enhancing SNCR but does not appear to offer any improvement over FGR either singularly or in combination with FGR. Based on the above, WC grates will not be further considered as a NO_x control technology.

3.7.2.2 Flue Gas Controls

Flue gas controls can generally be placed into one of two categories: SCR and SNCR. These two processes are both based on selective reduction of NO_x present in flue gas. A chemical reagent is injected into flue gas stream selectively reducing nitrogen oxides into molecular nitrogen, N₂, more stable form of nitrogen in the atmosphere, and water. A metal-based catalyst is employed in the SCR process. A relatively high NO_x removal efficiency of about 50 to 90 percent can be obtained by the SCR process while the SNCR is capable of reducing NO_x with efficiency ranging from 35 up to 60 percent.

The flue gas from MSW combustion contains high concentrations of dusts and acid compounds that cause the catalyst damage. Therefore, these pollutants should be removed from the flue gas prior to treatment in the SCR unit. For this reason, SCR units are usually installed after acid gas and dust removal units, where the flue gas temperatures are lower. Because the SCR process requires the flue gas temperature of 300-400°C (572-752°F), flue gas must be pre-heated. It implies high installation and operation costs, which limits the SCR application on MWC facilities despite its high NO_x removal efficiency. Therefore, there have been more SNCR systems used due to its simplicity of installation and low installation costs.

Three additional technologies, flue gas denitrification (FGD_n), the electron-beam (E-Beam) process, and other catalytic methods such as SCONOX® have been tested or applied for NO_x control on industrial facilities and are also discussed below.

The following discussion explains the technological aspects of each of these control methods and their associated environmental, energy and economic impacts.

Selective Catalytic Reduction (SCR)

The SCR process reduces NO to water and elemental nitrogen by injecting aqueous NH₃ into the flue gas through a catalyst bed. The function of the catalyst is to effectively lower the activation energy of the NO in its decomposition reaction to N₂.

This lower energy allows the reaction to proceed in a lower and broader temperature range than would otherwise be possible. The reactions between NO_x and NH_3 occur at temperatures of 375-750°F (191-399°C), depending on the specific catalyst and the type and level of competing contaminants in the flue gas. Lower temperatures yield slow reaction rates and higher temperatures result in shortened catalyst life.

Application of SCR technology to MWCs is difficult mainly due to the acid gas content and relatively high particulate grain loading of the flue gas. These flue gas components erode the catalyst and substrate material as well as poison the catalyst rendering the bed ineffective for NO_x removal. If these problems are to be avoided, then the SCR reactor must be located downstream of the air pollution control equipment and would have significant economic disadvantages since it would require reheating of the flue gas prior to entering the bed (Radian, 1989).

SCR has been successfully applied at coal, oil, and natural gas-fired facilities in the U.S. Reductions of NO_x emissions have ranged from 50 to 90 percent and have been measured at these facilities. There are no applications of SCR on municipal waste combustion facilities in the U.S. SCR systems have been applied and are operating on municipal waste combustion facilities in Europe and Asia, and most recently in Canada. Therefore, there are technical and cost data available for these international facilities.

Hillsborough County attempted to obtain information from foreign facilities regarding continuous operation of the SCR units and their long-term emission reduction capabilities. An intensive search for information was initiated, with requests for information submitted to a number of catalyst manufacturers, catalyst system suppliers, and individual facilities. The focus of the information request was to obtain a list of MWCs employing SCR as well as obtain information on system operation. It was considered necessary to have this information in order to perform proper feasibility analyses as required by EPA. Very limited data was received from European facilities and SCR system suppliers.

Table 3-5 provides a sample list of European municipal waste combustion facilities utilizing SCR. Table 3-6 provides NO_x outlet emissions information received from a number of European facilities. The data provided consisted only of outlet emissions data. As shown, control efficiencies were not reported as well as averaging times and emissions compliance testing procedures. Although relatively low outlet NO_x concentrations are reported, it is difficult to determine the true applicability of these levels relative to the requirement to guarantee a continuous emission level tied to a short-term averaging period as required of U.S. MWCs. In addition there is no indication of the variability of the NO_x emissions.

Table 3-5 Sample List of European Municipal Waste Combustion Facilities Utilizing SCR and Their Air Pollution Control Equipment Configuration ^{a,b}		
Municipal Waste Combustion Facility Name	Location	Air Pollution Control Equipment Configuration
MVA Spittelau	Vienna, Austria	ESP, Two Stage Scrubber using lime and caustic, EDV, SCR
AVR Rotterdam	Rotterdam City, The Netherlands	ESP, Two Scrubbers, Fixed Carbon Filter, SCR
SITA ReEnergy	Roosendaal, The Netherlands	ESP, Gas Suspension Absorber (lime injection), ACI, FF, SCR
COMMUNAUTE URBAINE DE LILLE	Lillie, France	ESP, SDA with Rotary Atomizer, FF, Wet Scrubber, SCR
U.V.E. SMEDAR (SICDOM)	Rouen, France	ESP, SDA with Rotary Atomizer, FF, SCR
RMHKW Boblingen	Boblingen, Germany	FF, 2-Stage HCl Scrubber, 1-Stage SO ₂ Scrubber, ACR, SCR
IVAGO	Ghent, Belgium	ESP, SDA with Rotary Atomizer, FF, SCR
MVA Koln	Koln, Germany	Spray Dryer, FF, 1-Stage Prescrubber, 1-Stage SO ₂ Scrubber, SCR, ACR
AEZ Kreis Wesel	Wesel, Germany	Spray Dryer, ESP, 1-Stage Prescrubber, 1-Stage SO ₂ Scrubber, SCR, ACR
GML	Ludwigshafen, Germany	SDA with Diffusers, ESP, WS, SCR
AVI TWENTE b.v.	Twente, The Netherlands	ESP, SDA with Rotary Atomizer, ESP, WS, Filsorption, SCR

Note: ESP = Electrostatic Precipitator, EDV = Electrodynamic Venturi, SCR = Selective Catalytic Reduction, ACI = Activated Carbon Injection, ACR= Activated Carbon Reactor, FF = Fabric Filter Baghouse, SDA = Spray Dry Absorber WS = Wet Scrubber

Source: ^a RTP Environmental Associates, Inc. 2003. Lee County Energy Recovery Facility, Lee County Solid Waste Division, Lee County, Florida. Prevention of Significant Deterioration Air Permit Application Major Modification to Add a Third Municipal Waste Combustor Unit to the Existing Lee County Energy Recovery Facility. February 2003.

Table 3-6
European Municipal Waste Combustion Facility with SCR
Emissions Information Received During the BACT Preparation Process ^a

Municipal Waste Combustion (Location)	NO _x Emissions (ppmdv) ^b	Averaging Time of Reported Emissions	Testing Procedures Information
MVA Spittelau (Vienna, Austria)	0 to 64	Not Specified	Not Specified
AVR (Rotterdam, The Netherlands)	37	24-hour avg. ^c	Not Specified
SITA ReEnergy (Formerly Heeren) (Roosendaal, The Netherlands) ^d	26-31	Three 1-hour tests	Not Specified
SITA ReEnergy (Roosendaal, The Netherlands) ^e	39,35,42 ^f	Not Specified	Not Specified
German Municipal Waste Combustion Facilities	19-37	Not Specified	Not Specified
MHKW (Kassel, Germany)	52	Not Specified	Not Specified
Gavi Wijster (The Netherlands)	52	Not Specified	Not Specified
Renova (Gothenburg, Sweden)	45-52	Not Specified	Not Specified
IVAGO (Ghent, Belgium)	51	Not Specified	Not Specified
(Hagen, Germany)	90	Not Specified	Not Specified
MV Huisvuilcentrale N-H (Alkmaar, The Netherlands)	41	Not Specified	Not Specified

Sources: ^a RTP Environmental Associates, Inc. 2003. Lee County Energy Recovery Facility, Lee County Solid Waste Division, Lee County, Florida. Prevention of Significant Deterioration Air Permit Application Major Modification to Add a Third Municipal Waste Combustor Unit to the Existing Lee County Energy Recovery Facility. February 2003.

^b Reported NO_x emissions are corrected to 7% O₂ at 20C and 1 Atmosphere.

^c Average based on reported 1-hour average values over a two-week period.

^d Reference: CRI Catalyst Co. UK Ltd., 1997.

^e Reference: Heath, S., 2001c.

^f First value from year 1998, second value from year 1999, third value from year 2000 (No other information provided).

Selective Non-Catalytic Reduction (SNCR)

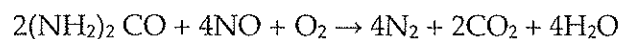
SNCR also called Thermal DeNO_x, is a flue gas treatment technology for NO_x control that involves the injection of an amine-based compound into the flue gas stream at an appropriate temperature range for the reduction of NO_x. An amine-based compound,

such as ammonia, NH_3 , or urea, $(\text{NH}_2)_2\text{CO}$, is used as a nitrogen oxides reducing agent for the SNCR processes. Either anhydrous or aqueous ammonia can be used. When ammonia or urea is injected into the flue gas stream at an appropriate temperature window, it selectively reduces the NO_x into molecular nitrogen, N_2 , and water, H_2O . At stoichiometric conditions, when the adequate residence time is reached, the overall reactions that occur may be written as:

Anhydrous Ammonia



Aqueous Ammonia (Urea)



Generally, the appropriate temperature window of flue gas that is necessary for the desirable chemical reactions between the nitrogen oxides and the injected ammonia or urea is determined to be approximately 800° to 1050°C (1472° - 1922°F). However, these reactions are very sensitive to temperature and dominate at the flue gas temperature range of 800° - 1000°C (1472° - 1832°F) (R. Gavasci, et al, 1999).

Since oxygen is present in the flue gas, a portion of the ammonia is oxidized too. The reaction of ammonia oxidation at temperatures greater than 1100°C (2012°F) can be expressed as below:



At the flue gas temperature above 1100°C (2012°F) the reaction of ammonia oxidation becomes predominant which is undesirable. Nitrogen monoxide, NO , is formed as a product of this reaction of ammonia oxidation. As a result, when the flue gas temperature at reagent injection locations is higher than the appropriate temperature window the SNCR process results in NO_x formation rather than NO_x reduction (R. Gavasci, et al, 1999).

The peak or the optimum NO_x reduction takes place in a very narrow temperature range of 927° to 1028°C (1701° - 1882°F). This relatively high reaction temperature required for the process can be achieved by injecting the chemical reagent into the flue gas stream directly after the post-combustion chamber or at the inlet of the boiler where the flue gas temperature is more or less within the appropriate range. By injecting a readily oxidizable gas, such as hydrogen, H_2 , with the ammonia, NH_3 , the required temperature window for NO_x reduction can be lowered to approximately 740°C to 760°C (1364° - 1400°F) (R. Gavasci, et al, 1999).

At temperatures lower than the required temperature window the NO_x reduction reaction rates become lower, and unreacted ammonia may slip through and be

emitted from the stack. This phenomenon, commonly called “ammonia-slip”, is unacceptable above certain limits because ammonia is considered an air pollutant and is odorous at very low concentrations. In full scale applications it is very difficult to maintain the flue gas temperature at chemical reagent injection locations within the temperature window required for the SNCR process (R. Gavasci, et al, 1999).

As discussed above, the SNCR process commonly uses injection of anhydrous or aqueous ammonia. A urea injection technique developed by Fuel-Tech. Inc. (NOxOUT technology) has been applied to control combustion NO_x emissions. Both ammonia and urea processes have been demonstrated on municipal waste combustion facilities in the U.S. Since both ammonia injection and urea injection are the most widely used, both technologies are further discussed. The only difference between these reagents is the physical form of the reagent. Anhydrous ammonia requires vaporizers to convert the compressed, liquid ammonia into a gaseous vapor. Aqueous ammonia is stored in a liquid form at an ammonia concentration of approximately 20-29 percent by weight. To avoid the safety and regulatory issues associated with anhydrous ammonia, the usage of aqueous ammonia has been adopted at numerous facilities including the existing Facility Units 1, 2 and 3. The existing Facility Units 1, 2 and 3 use aqueous ammonia-based SNCR and have consistently achieved permitted NO_x emission levels throughout the operational history of the units. Table 3-7 presents the NO_x permit emission limits and annual averages.

Table 3-7 Existing MWC Units NO_x Permit Limits and Equivalent Annual Average Emission Rates		
MWC Units	NO_x Permit Limit ^a (ppmv, corrected to 7% O₂)	3-Year Average NO_x Concentration ^b (ppmv, corrected to 7% O₂)
Unit 1	205	190.0
Unit 2	205	188.7
Unit 3	205	189.0

Note: ^a Permit limit is based on a 24-hour daily arithmetic mean.

^b Based on three years of stack test data for the existing MWC units.

One advantage of aqueous ammonia over anhydrous ammonia is that aqueous ammonia can be more readily and more completely mixed in the flue gas stream and hence achieve higher NO_x removal efficiencies at lower ammonia slip levels than gaseous ammonia injection systems.

Although SNCR technology has been successfully applied to modern MWC facilities, the technology presents several environmental and technical disadvantages. These disadvantages include:

- Residual NH_3 may react with acid gases in the boiler to form by-product ammonium salts. Two of the salts formed, ammonium sulfate and ammonium bisulfate, could potentially cause fouling and corrosion problems in the boiler particularly at the rear section of the boiler, the economizer.
- The presence of CO above approximately 100 ppmv adversely affects the SNCR chemistry. The detrimental effect of CO is due to the fact that both reactions (namely, the oxidation of CO and the reduction of NO_x) require and compete for the same OH radicals to proceed. The presence of CO in the combustion gases causes a shift and reduction in the effective NO_x/NH_3 temperature reaction range (EPA, 1989c).
- Residual ammonia emissions are emitted as a result of the SNCR process.

Fuel Tech's NOxOUT uses urea, instead of ammonia. The urea is fed to the boiler as a 50 percent by-weight solution cut with water to maintain the required volumetric flow rate to give adequate distribution across the boiler. NO_x control is affected using essentially the same net chemistry as Thermal DeNO_x. The overall reaction between urea and NO can be expressed as follows:



The reaction takes place in a temperature range similar to that for Thermal DeNO_x and the lower temperature limit can also be expanded to 700° C (1300° F) with the use of a proprietary urea additive.

The Fuel-Tech NOxOUT process has been installed and demonstrated on a number of utility and industrial boilers in North America and Europe, as well as several MWCs. The NO_x reductions achieved at U.S. facilities have ranged similarly to the ammonia based SNCR process. The NOxOUT process has also been used in full-scale European municipal waste combustion facilities at Frankfurt, Germany, and Switzerland (RTP, 2003). Proponents of NOxOUT claim that a urea based reagent can achieve NO_x removal as high as or higher than ammonia based reagents at lower ammonia slip levels.

Hillsborough County is proposing to install SNCR utilizing direct injection of aqueous ammonia in combination with FGR at the Unit 4 combustor to meet an outlet emission level of 110 ppmv corrected to 7% O_2 averaged over a 12-month period and 150 ppmv corrected to 7% O_2 averaged over a 24-hour period. These NO_x emission limits are based on the experience acquired by Covanta from operation of the SNCR systems at the Facility and other MWC facilities. It is noted that the existing units at the Facility averaged 190 ppmv over a 3 year period. Thus, the proposed SNCR system for the 4th MWC will have to operate at a significantly greater NO_x removal

efficiency. Achieving 110 ppmdv will require 59% control of NO_x which on a continuous basis is at the limit of SNCR control capability.

Wet Flue Gas Denitrification (FGD_n)

FGD_n systems may be divided into at least four major process systems: 1) oxidation-absorption-reduction (OAR), 2) oxidation-absorption, 3) absorption-reduction, 4) absorption-oxidation. Of these four types, OAR is somewhat more advanced because it is a derivative of already established FGD systems.

OAR operates by injecting oxidizing agents, such as ozone into the flue gas upstream of wet scrubbers (CARB, 1984). The relatively insoluble NO oxidizes to the more soluble NO₂ which, when in solution, reduces to N₂ by consuming some of the absorbed SO₂. It is possible to modify conventional flue gas desulfurization systems that use water soluble SO₂ absorbents by adding oxidizing agents which circulate with the scrubber fluid. Simultaneous NO_x and SO₂ removal efficiencies as high as 90 percent may be achieved (CARB, 1984). Such modified flue gas desulfurization systems may be applicable to refuse-fired boilers (Beaumont, 1986).

Absorption-oxidation processes are not as developed as the other previously described wet NO_x control systems. Results from pilot-scale facilities indicate high NO_x removal efficiencies are achievable, but suggest that the system faces undesirable operational problems (CARB, 1984).

Supplier information was researched from several corporations specializing in pollution control technology with specific experience with wet FGD_n systems. Tri-Mer Corporation attests to having approximately 50 installations currently operating throughout the U.S. The Tri-Mer TRI-NO_x technology is proprietary but appears to be a type of absorption-reduction system with oxidation steps, if necessary. Tri-Mer's technology has not been applied to flue gas from a municipal solid waste combustion facility. Tri-Mer Corporation has specialized in controlling emissions from the chemical and metal finishing industries and normally designs systems to handle flue gas flow rates of between 20 and 20,000 scfm. These flow rates are at best an order of magnitude lower than the flue gas flow rate of Unit 4. Also, the industrial flue gases described normally contains substantially higher concentrations of NO_x than is found in the flue gas of municipal waste combustion facilities (RTP, 2003).

Disadvantages of these systems stem from the cost of oxidizing agents, wastewater treatment associated with wet scrubber effluent, and flue gas reheat requirements. The wet FGD_n processes have not been demonstrated on a wide-scale to be technically reliable nor economically sound, and therefore cannot be considered BACT.

Electron Beam

E- beam FGT process is very versatile and an effective process to remove SO₂ and NO_x from of the flue gas produced in the combustion of fossil fuel. This process is a dry process using electron beam irradiation in the presence of ammonia (NH₃) to initiate chemical conversion of nitrogen oxides into an aerosol which can be easily collected

by conventional methods using an electrostatic precipitators or bag house filters (Turhan, et al, 2004).

The flue gas flows into the process vessel then gas mixture is subjected to an intense field of energized electrons, which collide with the flue gas molecules resulting in molecular ionization. These ions interact with flue gas constituents resulting in the creation of free atoms and radical species such as O, OH, N and HO₂. These are capable of rapid reaction with NO_x and water in the flue gas to ultimately yield a mixture of fine mist and vapor of nitric acids (HNO₃). In the presence of NH₃, these acids are converted to ammonium nitrate (NH₄NO₃). These salts are recovered as a dry powder using a conventional particle collector. The collected powder is potentially salable as an agricultural fertilizer. Other organic compounds such as VOCs can also be treated using the same principle (Turhan, et al, 2004).

The potential of using radiation to initiate the process aimed at removal of SO₂ and NO_x from combustion flue gas, in order to prevent environmental pollution, was recognized in the early 1970s in Japan. The success of the initial tests indicated a future potential use for the electron beam process. Although this technology has been installed in cleaning flue gas from fossil fuel combustion, there have been no tests or demonstrations on modern MWC units (Turhan, et al, 2004).

The E-Beam process, though not technically infeasible, is an undemonstrated technology for NO_x control on large scale, modern MWCs that is not expected to remove NO_x as efficiently as either SCR or SNCR. It is also expected that costs for this system would be substantially higher than other proven NO_x control technologies in the industry. Therefore, this technology cannot be considered BACT and will not be evaluated further.

Innovative NO_x Control Methods

Emerichem, LLC (formerly Goalline Environmental Technologies) markets the SCONOX[®] pollution control technology. SCONOX[®] is a catalytic control method for NO_x that does not utilize ammonia (or urea) as a reagent. SCONOX[®] has been applied to clean-fuel fired combustion equipment, such as natural gas-fired boilers and turbines, and has demonstrated high NO_x removal efficiencies. SCONOX[®] has not been tested or applied to a large-scale MWC for NO_x control and is not currently marketed in this application. Furthermore, a representative of Emerichem stated that the company would decline from offering to provide SCONOX[®] in this application due to the potential for catalyst fouling and deactivation from trace materials in the flue gases. (Hober, M., 2002a) Hence, this innovative technology must be considered technically infeasible at this time for application to Unit 4.

3.7.3 Ranking of Alternative Control Technologies

Due to technical problems and system non-availability associated with wet FGD_n, the E-Beam process, and the SCONOX[®] process; these technologies will not be evaluated with FGR further. Relative to NO_x control, the "top" control method to be evaluated is SCR with FGR with a stack NO_x emission limit of 70 ppm_{dv}. SNCR with FGR with a

stack NO_x emission limit of 110 ppm_{dv} is considered the second most effective option relative to SCR.

A key parameter in the BACT analysis is the selection of the SCR stack emission limit. Some of the SCR system suppliers offered a NO_x emission limit of 50 ppm_{dv} or lower. However, it must be taken into consideration that a vendor is only responsible for achieving an emission guarantee during a relatively short performance test conducted under very controlled and stable conditions. Since NO_x is a combustion parameter, its rate of formation is very sensitive to changes in combustion conditions, namely: local temperatures and oxygen concentrations and fuel characteristics, all of which exhibit significant variations in a MWC. Inspection of a typical NO_x emission monitor strip chart from the IVAGO MWC in Ghent, Belgium shows that NO_x concentrations continuously fluctuated between 35 to 70 ppm during each hour of operation. Given the significant fluctuation in SCR controlled NO_x emissions and the fact that the SCR emission limit must be achieved continuously on a year in year out basis, it is reasonable and prudent to apply a safety factor to the vendor's "guaranteed" NO_x emission limit. One approach is to set the NO_x emission limit at the NO_x permit limit in a country where SCR systems on MWCs have been in practice for many years. The Austrian NO_x permit limit for MWCs is one of the lowest in Europe and is equivalent to 70 ppm_{dv} corrected to 7% oxygen. This limit was selected as the NO_x SCR emission limit for this BACT evaluation.

3.7.4 Environmental Impact

The beneficial environmental impacts of SNCR and SCR are the removal of significant quantities of NO_x from the atmosphere. SNCR will remove 324 tons of NO_x per year and SCR will remove 405 tons of NO_x per year. Neither SNCR nor SCR produces a continuous side stream which requires treatment. Both urea and aqueous ammonia are subject to SARA (Superfund Amendments and Reauthorization Act), Title III reporting as hazardous substances, and there are risks associated with the shipping, handling and storage of these chemicals. However, both chemicals are significantly safer to store and use than anhydrous ammonia.

One of the possible detrimental effects of both SNCR and SCR is the possible formation of a visible plume. A visible plume can result from the reaction of any excess ammonia and any remaining chlorides in the flue gas to form ammonium chloride. Visible plumes have been observed at some MWCs with SNCR when ammonia injection rates were raised to high levels. However, both processes would be designed using sophisticated fluid dynamic models to optimize the chemical reaction kinetics and the placement of the ammonia injectors. Real time computer control systems would be continuously monitoring process temperatures and outlet NO_x and ammonia levels to control the feed rate of ammonia and minimize its use. Also the spray dry absorber and fabric filter (SDA and FF) will achieve 95% control of HCl resulting in HCl emissions of less than 25 ppm_{dv}. Thus, state-of-the-art control systems and low HCl concentrations in the flue gas will minimize the chance of a visible plume.

The only significant environmental impact of SCR would be the disposal of approximately 3,000 to 4,000 pounds of spent catalyst per year. Since the catalyst life is estimated at 3 years, the quantity of spent catalyst is estimated at 1/3 rd of the catalyst initially provided by the SCR supplier. The spent catalyst would most likely have to be disposed of as hazardous waste.

3.7.5 Economic Impact

The determination of the economic impact of the various control technologies involves an assessment of capital and annual operations and maintenance (O&M) costs. For the SCR alternative the economic assessment was hampered for the following reasons:

1. There are no operating SCR systems on MWCs in the USA from which to obtain operating and cost data.
2. The proposals and operating data provided by SCR vendors were limited and incomplete.
3. Efforts to contact European SCR installations to obtain performance and cost data yielded limited useful information.

It is noteworthy that all of the SCR vendors contacted only proposed using a "cold side" SCR system downstream of the SDA and FF which would remove particulate matter, metals and acid gases. The use of a "hot side" SCR system would expose the catalyst to severe plugging from particulate and to potential catalyst poisons such as sodium, potassium, calcium, chlorine, fluorine, arsenic, lead and phosphates. A "hot side" SCR system would also convert some of the SO₂ to SO₃ which would then react with the ammonia to form ammonium sulfate and ammonium bisulfate. Both of these ammonium salts form sticky deposits that can plug up the catalyst and downstream duct passageways. Therefore, only a "cold side" SCR system was evaluated.

In developing the capital and O&M cost estimates, standardized methods presented in USEPA OAQPS Air Pollution Control Manual were used (USEPA, OAQPS, 2002). Although the most recent edition of this manual (dated January 2002) contains a chapter on NO_x control using SCR, the procedures developed are for a "hot side" SCR system on a coal fired boiler and thus are not suitable for a "cold side" SCR system on a MWC. Therefore the cost procedures in the latest edition of this manual were not used.

In order to prepare the economic analysis, budgetary quotations on a "cold side" SCR system were solicited from a number of SCR catalyst manufactures and SCR system suppliers. In addition to the capital cost, design, operating and performance data were requested. Specifically, the following data were requested: catalyst composition and minimum temperature required to achieve stated NO_x reduction, catalyst volume, expected catalyst life, guaranteed NO_x emission limit, ammonia slip level, dimensions of SCR system, utility and chemical requirements (natural gas, power,

ammonia), estimated O&M labor, estimated maintenance materials cost and SCR vendor's scope of supply.

A "cold side" SCR system would consist of the following components:

- Flue gas inlet and outlet ductwork
- Flue gas to flue gas heat exchanger
- Steam coil heat exchanger
- In line duct burner
- Aqueous ammonia storage tanks and feed pumps
- Aqueous ammonia evaporator and evaporator blower
- Gaseous ammonia injection grid and piping
- Interconnecting ductwork between heat exchangers, ammonia injection grid and catalyst bed
- Ammonia to flue gas static mixers
- Catalyst and catalyst housing
- Catalyst handling system: hoists, monorail and loading carts
- Structural steel including all stairs, platforms, railing and ladders
- NOx analyzer
- Instrumentation and controls

Solicitations for capital and O&M costs were sent to the following SCR vendors:

- Riley Power, a Babcock Power Inc. Company
- Seghers/Keppel
- BD Heat Recovery Division Inc./Haldor Topsoe
- Argillon (formerly Siemens)
- KWH
- Cormetech
- Foster Wheeler

- Alstom Power
- CRI Catalyst Company
- Mobotec

Some of the vendors are strictly catalyst manufacturers who were not able to provide a complete system cost. Three of the vendors (Riley Power, Seghers/Keppel and BD Heat) provided complete system costs. Argillon stated that they did not wish to propose an SCR system for a MWC application. Two of the vendors (KWH and Cormetech) did not respond to our inquiries. Foster Wheeler (FW) said that they have no direct experience with waste incineration type SCR systems, but they have designed many SCR systems for other type fuels. FW said they could provide an SCR proposal for Hillsborough on a "reimbursable basis with the agreement that FW would be awarded the work in the event the project moves ahead". Alstom provided some process and performance data on their SCR system and an 'indicative estimate' of the capital cost which did not include provision for heating the flue gas to the temperature required for their SCR system (525°F). CRI Catalyst provided a cost proposal but it also did not include any provision for heating the cold flue gas to the temperature required by the SCR system. Hence Alstom's and CRI Catalyst's proposals were of limited value.

Mobotec was very interested in supplying their ROFA/ROTAMIX technology which essentially was an enhanced flue gas recirculation combined with SNCR. Mobotec's system consisted of using a high pressure blower to recirculate flue gas from the outlet of the boiler back to the inlet of the boiler above the combustion zone. Ammonia would be injected into the turbulent zone created by the recirculated flue gas. Mobotec claimed that by using Computational Fluid Dynamics (CFD) this technology could achieve low NO_x emission levels. The Mobotec representative stated that based on an inlet NO_x concentration of 270 ppm_{dv} an outlet NO_x level of 110 to 130 ppm_{dv} could be expected. Since the Mobotec system could not provide a lower outlet NO_x concentration than what Covanta was willing to guarantee with SNCR and FGR, the Mobotec system was not further evaluated.

BD Heat provided a substantial cost proposal with accompanying process data. The BD Heat proposal contained an all carbon steel flue gas to flue gas heat exchanger. We have significant concerns regarding its reliability and durability, particularly in a waste incineration flue gas stream, albeit downstream of the SDA and FF. We do not know if the BD Heat SCR system with all carbon steel heat exchanger has been successfully used on a MWC. The overall dimensions of the BD Heat SCR system were 43 ft by 31 ft by 60 ft in height. Interestingly, BD Heat proposed a catalyst operating temperature of 650°F versus approximately 500°F to 540°F proposed by other SCR suppliers. Since the BD Heat capital cost was not consistent with the two other cost proposals presented below, it was not used in the economic analysis.

Seghers/Keppel provided process data, technical papers and brochure on their SCR process and an uninstalled budgetary cost estimate for a complete “cold end” SCR system of \$5,900,000. Riley Power, a Babcock Power Company, provided a well documented, uninstalled budgetary estimate of \$6,500,000. Based on Babcock Power’s impressive number of SCR installations and their successful track record with SCR systems on MWCs, their uninstalled cost estimate was used as the basis of the economic analysis.

The economic analysis of SCR with FGR for the 4th MWC at Hillsborough is presented in Table 3-8. Installed costs and indirect costs are based on cost factors from similarly complex APC systems from the OAQPS Manual. Note that the installation costs had to take into consideration the fact that the Hillsborough WTE plant site is very congested and has limited space available for the SCR system for the 4th MWC. The original Hillsborough WTE plant was designed with just electrostatic precipitators (ESPs) for APC systems. When the plant was upgraded to SDA and FF approximately 5 to 6 years ago, the ESPs at the end of each MWC train had to be demolished and the new SDA and FF installed. To keep the plant in operation, the SDA and FF for unit 1 were located in the space where the ESP for unit 2 was located. Likewise the SDA and FF for unit 2 were located in the space where the ESP for unit 3 was located. The SDA and FF for unit 3 were located in the space allotted for the APC systems for unit 4. Thus the SDA and FF for unit 4 will have to be located north of unit 4 beside the Ash Handling Building. The logical place to locate the SCR system for the 4th MWC is presently occupied by the existing ID fan, lime silo, carbon silo, access stair case, pumps and utilities for unit 3. The only available space for the SCR system for the 4th MWC would be approximately 400 feet away from the 4th MWC on the west side of the Ash Handling Building and perimeter road. Alternatively, the Ash Handling Building could be relocated north to make room for the SCR system. In any case, extensive rearrangement of existing equipment, utilities and structures will be required to fit in the SCR system, particularly considering the large footprint required for the system. The capital costs presented in Table 3-8 include this degree of installation difficulty. The total capital investment includes the purchased cost of the equipment, the direct installation costs and the indirect costs and is equal to \$22,985,000. The total capital investment is amortized at an interest rate of 7% over a 20 year period. The annualized capital cost is equal to \$2,170,000.

Annual O&M costs were developed for operating and maintenance labor, maintenance materials, catalyst replacement, chemicals (aqueous ammonia), power, steam for flue gas heating, lost revenue attributable to SCR downtime, catalyst disposal, insurance, administration and regulatory compliance. The total annual O&M cost is equal to \$3,521,000. Combining the annualized capital cost and the annual O&M cost yields a total annual cost of \$5,691,000. Dividing the total annual cost by the tons of NO_x removed per year (405 tons) yields a total cost per ton of NO_x removed of \$14,100. The unit cost for SCR at \$14,100 per ton is significantly greater than the upper limit of economic feasibility, and therefore, SCR is judged to be not economically feasible.

The economic analysis of SNCR with FGR for the 4th MWC is presented in **Table 3-9**. The cost of the SNCR system is based on a budgetary estimate provided by Fuel Tech for their NO_xOUT process. The NO_xOUT process is based on the use of urea and some proprietary chemical additives which prevent scale formation and extend the effective temperature range of the SNCR process. The required equipment for the NO_xOUT process would consist of the following:

- Urea storage tank
- Urea circulation module containing feed pumps and electric heaters
- Urea metering module containing metering pumps, water supply line and control valves, static mixers and booster pumps
- Three urea distribution modules for air atomization of the urea solution into the furnace and air cooling of the injector nozzles
- 21 urea injector assemblies
- NO_x analyzer
- Instrumentation and controls

The purchase cost for the uninstalled SNCR system and FGR equipment is \$1,045,000. The total capital investment including installation and indirect costs is \$3,050,000. The total capital cost is annualized using an interest rate of 7% and an amortization period of 20 years. An SNCR system is vastly simpler than an SCR system and the capital and O&M costs reflect this difference. O&M costs are based on utility requirements provided in vendor supplied data. The total annual cost is \$788,000 and the total cost per ton of NO_x removed is \$2,400. The unit cost for SNCR is well within the range of economic feasibility and is therefore economically feasible.

It should be noted that the incremental cost of SCR above SNCR is calculated as follows:

$$(\$5,691,000 - \$788,000) / (405 - 324 \text{ tons of NO}_x \text{ removed}) = \$60,530/\text{ton of NO}_x$$

The incremental cost of \$60,530 per ton of NO_x removed demonstrates that SCR represents an exorbitant cost for a relatively modest amount of additional NO_x removal.

3.7.6 Energy Impact

SCR will use significantly more electrical energy (616 kilowatts) than SNCR which will use 75 kilowatts. The greater electrical energy usage for SCR over SNCR is due to the increased fan static pressure needed to overcome the pressure drop across the catalyst bed and for power for pumps and the evaporator blower. The SCR system will require a significant amount of flue gas reheat which will mostly be supplied by

the flue gas to flue gas heat exchanger. However, the final temperature increment must be done by either burning a fossil fuel or using high pressure steam from the WTE facility. For this analysis, it was assumed that high pressure steam would be used for the final heating of the flue gas prior to the SCR catalyst. Approximately 11.5 MM Btu/hr of energy in the form of steam would be required. SNCR does not require flue gas reheat.

3.7.7 Selection of BACT

Based on a review of environmental, economic and energy impacts, SCR is rejected as BACT for Unit 4 at the Facility and SNCR with FGR is determined to be BACT. Hillsborough County is proposing to install SNCR with FGR to meet an outlet NO_x emission level of 110 ppmdv at 7% O₂ averaged over a 24-hour period. This is an aggressive limit and will require 'fine tuning' of the SNCR with FGR control system.

3.8 BACT Review for Carbon Monoxide

CO is formed by the incomplete combustion (oxidation) of carbon containing compounds in the MSW fuel. Emissions of CO can potentially be reduced at municipal waste combustion facilities by two main methods: 1) utilizing good combustion design and operation to maximize the oxidation of CO to CO₂, and 2) reducing the quantity of CO in the post-combustion flue gas stream (flue gas controls).

Table 3-8

SCR with FGR System for 600 TPD Municipal Waste Combustor - Capital and O&M Costs

CAPITAL COSTS		
Direct Costs		
Purchased Equipment Costs		
SCR Supplier's Equipment: inlet & outlet ducts, heat exch. bypass duct, gas to gas heat exchanger, dampers, gas duct burners, flue gas & reagent mixers, reactor casing, catalyst, hoists, monorail, two aqua ammonia storage tanks, ammonia feed pumps & injection system, structural steel, stairs, platforms, instrumentation & controls, In Situ NOx analyzers,		\$6,500,000
FGR ducts and fan		\$200,000
Additional flue gas ductwork (580 ft at \$1000/ft)		\$580,000
DCS interconnect		\$50,000
Increased ID fan size		\$100,000
Firewater booster pump		\$25,000
Sales Tax and Freight @ 8%		\$596,000
1. Purchased Equipment Cost = A		\$8,051,000
Direct Installation Costs		
Foundations 0.12xA		\$966,000
Structural Steel - Allowance for hurricane windloads 0.12xA		\$966,000
Handling and Erection 0.40xA		\$3,220,000
Retrofit existing plant site for SCR - Relocation of ext facilities 0.30xA		\$2,415,000
Electrical 0.08xA		\$644,000
Piping & Ductwork 0.35xA		\$2,818,000
Painting 0.02xA		\$161,000
Insulation 0.01xA		\$81,000
2. Total Direct Installation Cost		\$11,271,000
Indirect Costs		
Engineering 0.10xA		\$805,000
Construction and Field Expenses 0.20xA		\$1,610,000
Contractor Fees 0.10xA		\$805,000
Start-Up, Performance Test & Contingencies 0.05*A		\$403,000
Working capital (2 months supply of ammonia)		\$40,000
3. Total Indirect Cost		\$3,663,000
TOTAL CAPITAL INVESTMENT (1+2+3)		\$22,985,000
TOTAL ANNUALIZED CAPITAL COST (i =7%, 20 yrs, crf = 0.09439)		\$2,170,000
ANNUAL O&M COSTS		
Operating Labor		
(8 hr/day x 365day/yr x \$30/hr x 1.60 for fringe benefits)		\$140,000
Supervisory Labor		
(15% of operating labor)		\$21,000
Maintenance Labor		
(12 hr/day x 365 days/yr x \$35/hr x 1.60 f.b.)		\$245,000
Maintenance Materials (includes spare parts inventory replacement)		
(100% of maintenance labor)		\$245,000
Catalyst Replacement (i = 7%, 3 yrs, crf = 0.38105)		
(\$754,900 x 0.38105)		\$288,000
Chemicals - Aqueous Ammonia		
(56.9 lbs NH ₃ /hr x gal 19% NH ₄ OH solution/1.47 lbs NH ₃ = 38.7 gal/hr)		
(38.7 gal NH ₄ OH/hr x 8760 hr/yr x \$0.773/gal x 0.92 avail.)		\$241,000
Power - Additional ID Fan Power cost		
(0.000157 x 167,700 acfm x 14 inches wc x 1/0.55 = 670 hp)		
(670 hp x 0.75 kw/hp x 8760 hr/yr x \$0.06/kwhr x 0.92 avail.)		\$243,000
Power - for pumps, evaporator blower, FGR fan, I&C		
(114 kw x 8760 hr/yr x \$0.06/kwhr x 0.92)		\$55,000
Steam for Flue Gas Heating - Lost Power Revenue		
(10,400 lb steam/hr x 1105 Btu/lb steam x kw-hr/10,560 Btu = 1088 kw)		
(1088 kw x \$0.060/kwhr x 8760 hr/yr x 0.92 avail)		\$526,000
Lost Revenue from Combustor Unavailability due to SCR		
Tip Fee: 10 days/yr x 600 tons refuse/day x \$56/ton refuse		\$336,000
Power: 10 daysx 600 tons/day x 2000 lbs/tonx 5000 Btu/lb = 6.0x10 ¹⁰ Btu		
(6.0x10 ¹⁰ Btu x kwhr/15,160 Btu x \$0.06/kwhr)		\$237,000
Catalyst Disposal		
(engineering estimate)		\$25,000
Administration, Insurance & Regulatory Compliance		
(0.04 x Total Capital Investment)		\$919,000
TOTAL ANNUAL O&M COST		\$3,521,000
TOTAL ANNUAL COST		\$5,691,000
Tons of NOx Removed per Year		405.0
TOTAL COST PER TON OF NOx REMOVED		\$14,100

Table 3-9

SNCR with FGR for 600 TPD Municipal Waste Combustor - Capital and O&M Costs

CAPITAL COSTS		
Direct Costs		
Purchased Equipment Costs		
SNCR Supplier's Equipment: 15,000 gal urea storage tank, urea circulation/heating module, urea metering module, 3 distribution modules for air atomizing & cooling, 21 urea injector assemblies, temperature monitor, instrumentation & controls, NOx analyzer	\$1,045,000	
FGR ducts and fan	\$200,000	
Ammonia analyzer	\$25,000	
Sales Tax and Freight	\$102,000	
1. Purchased Equipment Cost = A	\$1,372,000	
Direct Installation Costs		
Foundations and Supports 0.05xA	\$69,000	
Steel Supports, Ladders and Platforms 0.06xA	\$82,000	
Handling and Erection 0.30xA	\$412,000	
Electrical 0.08xA	\$110,000	
Piping & ductwork 0.25xA	\$343,000	
Painting 0.02xA	\$27,000	
Insulation 0.01xA	\$14,000	
2. Total Direct Installation Cost	\$1,057,000	
Indirect Costs		
Engineering 0.08xA	\$110,000	
Construction and Field Expenses 0.20xA	\$274,000	
Contractor Fees 0.10xA	\$137,000	
Start-Up, Performance Test & Contingencies 0.05*A	\$69,000	
Working capital (2 months supply of urea)	\$31,000	
3. Total Indirect Cost	\$621,000	
TOTAL CAPITAL INVESTMENT (1+2+3)	\$3,050,000	
TOTAL ANNUALIZED CAPITAL COST (i =7%, 20 yrs, crf = 0.09439)		\$288,000
ANNUAL O&M COSTS		
Operating Labor (2 hr/day x 365day/yr x \$30/hr x 1.60 for fringe benefits)	\$35,000	
Supervisory Labor (15% of operating labor)	\$5,000	
Maintenance Labor (3 hr/day x 365 days/yr x \$35/hr x 1.60 f.b.)	\$61,000	
Maintenance Materials (100% of maintenance labor)	\$61,000	
Power - for compressed air, urea feed and injection system (75 kw x 8760 hr/yr x \$0.06/kwhr x 0.92 availability)	\$36,000	
Chemicals - Urea (18.6 gal/hr x 8760 hr/yr x 0.92 avail x \$1.20/gal)	\$180,000	
Administration, Insurance & Regulatory Compliance (0.04 x Total Capital Investment)	\$122,000	
TOTAL ANNUAL O&M COST		\$500,000
TOTAL ANNUAL COST		\$788,000
Tons of NOx Removed per Year		324.0
TOTAL COST PER TON OF NOx REMOVED		\$2,400

3.8.1 Emission of Carbon Monoxide

CO is formed by incomplete oxidation of carbon compounds during combustion. The sources of carbon compounds during combustion are the solid waste, pyrolysis products formed near the fuel bed, or immediate combustion products. The emission of relatively high concentrations of CO is largely dependent on the underfire air dispersion to the combustor, the under/overfire air ratio, the design of the overfire air jets, and furnace combustion temperature. Careful operation of the furnace is essential to maintain good combustion practices (GCP). A low CO concentration is a good indication that furnace is achieving a high combustion efficiency; while a high CO concentration may indicate poor combustion and a potential increase in the level of trace organic emissions. In addition, elevated emissions of CO in municipal waste combustion facilities may be due to excessive carryover of particulate-bound organics from the furnace into lower temperature regions of the combustion system prior to completion of combustion (EPA, 1989d and EPA, 1995d).

Specific add-on technologies for controlling CO in the flue gas, such as thermal oxidizers and oxidation catalyst systems, have been applied to other combustion sources but, have not been used on MWCs. Although thermal oxidizers have been successfully applied to industrial sources these units generate increased electrical energy and fan power demands. In addition, thermal oxidizers produce secondary pollutant emissions. Oxidation catalysts are made from precious or semi-precious metals that tend to be easily poisoned by contaminants, such as sulfur, phosphorous and trace metals in the flue gas. These systems generally cannot be installed on sources burning sulfur emitting fuels. Therefore, these systems are not considered further in this BACT evaluation.

The ability of the furnace to minimize CO formation is a fundamental requirement of GCP. The occurrence of spatial and temporal temperature variations during normal operating conditions necessitates that municipal waste combustion facilities be designed and operated in a manner that will ensure that all combustion products are exposed to minimum destruction temperatures for sufficient residence times. Furnace combustion gas residence time is also an important requirement to ensure minimum CO formation. Emissions of CO are limited under EPA's definition of GCP. It involves continuous compliance of three parameters: a CO emission limit, a load limit, and a temperature limit at the inlet of the particulate matter control device. The use of GCP reduces CO emissions by promoting more thorough combustion (RTP, 2003).

3.8.2 Selection of BACT

Since no add-on CO control technologies have been deemed feasible for current MSW combustion facilities, GCP design and operation is determined to be BACT for CO. The BACT for CO will be achieved through the design and control of the combustion process. CO emissions will be limited to 80 ppm_{dv} over a 12-month averaging period and 100 ppm_{dv} over a 4-hour averaging period, exclusive of start-up, shutdown, and malfunction conditions. The emission rate for CO given in Section 4 represents the BACT as per PSD regulations and FDEP requirements.

3.9 BACT Review for MWC Organics

MWC organics including dioxins and furans are formed by incomplete oxidation of carbon compounds during combustion. Emissions of MWC organics can potentially be reduced at municipal waste combustion facilities by two main methods: 1) GCP which utilize good combustion design and operation to maximize the oxidation of CO to CO₂, and 2) flue gas controls, which reduce the quantity of MWC organics in the post-combustion flue gas stream.

3.9.1 Emission of MWC Organics

MWC organics are formed by incomplete oxidation of carbon compounds during combustion. The sources of carbon compounds during combustion are the solid waste, pyrolysis products formed near the fuel bed, or immediate combustion products. The actual formation of MWC organics in the flue gases is not well understood. MWC organics emissions are reduced by either GCP or GCP with post-combustion flue gas controls.

GCP is important to reducing dioxin formation by completely oxidizing the organic compounds and carbonaceous solids that are precursors to dioxin formation. Good combustion practice consists of "time, temperature, and turbulence" in the combustion chamber. Combustion temperatures approaching 1800° F (982°C) at residence times of 1 to 2 seconds will destroy most gas-phase compounds. Flue gas composition and process conditions downstream of the furnace/boiler section of MWC determine the extent of dioxin synthesis, which occur in the temperature range of 250° – 600° F (121-316°C). At higher temperatures chloro-organics are rapidly destroyed while at low temperatures the reaction rate is minimal. MWC facilities that use GCP and perform continuous emission monitoring can achieve dioxin emissions averaging 13 ng/dscm @ 7% O₂. GCP involves continuous compliance of three parameters: a CO emission limit, a load limit, and a temperature limit at the inlet of the particulate matter control device. All three of these continuous compliance parameters have been shown to correlate with either formation or emission of dioxins/furans (EPA, 1995d).

Post combustion control such as thermal oxidizers and oxidation catalyst systems for the removal of MWC organics in flue gas streams have not been employed on MWCs in the U.S. In addition, thermal oxidizers generate increased electrical energy and fan power demands, and they produce secondary pollutant emissions. Oxidation catalysts are made from precious or semi-precious metals that tend to be easily poisoned by contaminants, such as sulfur, phosphorous and trace metals in the flue gas. These systems generally cannot be installed on sources burning sulfur emitting fuels. Therefore, these systems are not considered further in this BACT evaluation.

3.9.2 Selection of BACT

Since no add-on MWC organics control technologies have been deemed feasible for current MSW combustion facilities, GCP is determined to be BACT for MWC organics. The BACT for MWC organics will be achieved through the advanced design of the combustion chamber and temperature control found in the Martin combustor.

MWC organics emissions will be limited to 0.1 lb of VOCs/ton and dioxins will be limited to 13 ng/dscm at 7% O₂. The emission rate for MWC organics given in Section 4 represents the BACT as per PSD regulations and FDEP requirements.

3.10 BACT Review for Mercury Emissions

The combustion MSW generates mercury emissions, and its main source is discarded batteries in MSW. Most metals have low enough vapor pressures they condense on to PM, which makes it possible to be collected by the PM control device. However, mercury has a higher vapor pressure which makes its collection by PM control devices highly variable. Therefore, additional add-on control devices are typically installed to reduce mercury emissions. These add-on control devices include activated carbon injection, wet scrubber systems and carbon filter beds. A description of each control technology is presented below.

3.10.1 Emission of Mercury

Most metals have sufficiently low vapor pressures at typical air pollution control device operating temperatures that condensation onto PM is possible, except for mercury. Mercury has a high vapor pressure at typical air pollution control device operating temperatures, and collection by PM control devices is highly variable. Factors that enhance mercury control are low temperature in the air pollution control device system (less than 150 °C [300 to 400 °F]), the presence of an effective mercury sorbent and a method to collect the sorbent (Nebel and White, 1991). In general, high levels of carbon in the fly ash enhance mercury sorption onto PM. The ash is then removed by the PM control device. Additionally, the presence of HCl in the flue gas stream can result in the formation of mercuric chloride (HgCl₂), which is readily adsorbed onto carbon-containing PM. Conversely, sulfur dioxide (SO₂) in the flue gas can act as a reducing agent to convert oxidized mercury to elemental mercury, which is more difficult to collect (Schager, 1990) (EPA, 1997).

3.10.2 Available Control Technologies

Add-on controls to reduce mercury emissions from MWCs are discussed below. These include:

- Activated carbon injection upstream of the air pollution control device
- Wet scrubber systems
- Carbon filter beds

3.10.2.1 Activated Carbon Injection

Activated carbon injection involves the injection of powdered activated carbon into the flue gas upstream of an air pollution control device. Activated carbon is a specialized form of carbon produced by pyrolyzing coal or various hard, vegetative material (e.g., wood) to remove volatile material. After injection into the flue gas and adsorption of mercury and other contaminants, the activated carbon is captured in the

PM control device. The factors affecting the performance of activated carbon injection are the temperature of the flue gas, the amount of activated carbon injected, the concentration and species of mercury in the flue gas, the extent of the contact between the carbon and mercury and the type of carbon used. Flue gas temperature, as noted above, is important because mercury is a vapor at temperatures above 150 to 200 °C (300 to 400 °F). The flue gas temperature needs to be within, or preferably below this range for the mercury to adsorb onto the carbon. The injection of activated carbon into the flue gas can achieve at least 85 percent control of mercury emissions (EPA, 1997).

In addition to removing mercury, injection of activated carbon may increase the removal of chlorinated dioxins and furans and potentially other semivolatile organics. Data from tests with activated carbon injection on an MWC equipped with a SDA/ESP, show 95 to 98 percent reduction of dioxin and furans, versus a reduction of 78 to 80 percent without carbon injection (Richman et al., 1993). Furthermore the addition of carbon to MWCs has a minimal impact on the quantity of collected PM requiring disposal (EPA, 1997).

In developing the MWC emissions guidelines and NSPS for mercury emissions, EPA evaluated data and conducted tests of an activated carbon injection system at two U.S. MWCs (Stanislaus County, California and Camden County, New Jersey) and based on their evaluation of the test results has recognized activated carbon injection in combination with a FF as a very effective control system for mercury. This led to establishment of the Subpart Eb NSPS level of 0.08 milligrams per dry standard cubic meter (dscm) or 85 percent control, whichever is least stringent.

Furthermore, the Facility Units 1, 2 and 3 using activated carbon injection have demonstrated compliance with the NSPS Hg emission limits. Tested levels at Hillsborough County Units 1, 2 and 3 from 2000 to 2002 have ranged from 5.41 to 9.70 ug/dscm at 7% O₂. These outlet Hg emissions concentrations are well below the EPA NSPS and Florida Mercury Rule levels.

3.10.2.2 Wet Scrubber Systems

Wet scrubber systems can be used to control acid gases, metals, PM, and dioxins and furans. Wet scrubbers for the purpose of enhanced mercury control have not been applied to MWCs in the U.S., although they have been applied to MWCs in Europe. Soluble species of mercury compounds, such as HgCl₂ and mercuric oxide (HgO), can be effectively captured (greater than 90 percent) in the wet scrubber. However, if there is significant elemental mercury in the flue gas, collection efficiencies will be limited. The captured mercury is precipitated out during wastewater treatment through the use of several additives (e.g., sodium sulfide, trimercapto-s-triazine and dithiocarbamate) (Reimann, 1993), (EPA, 1997).

The use of wet scrubbers requires treatment of wastewater before it is disposed. Another concern with the wet scrubber option is dechlorination of dioxin and furan isomers. Dechlorination raises concerns because the lesser-chlorinated dioxin and

furans congeners are believed to be more toxic. However, it is theorized that a reagent can be added to the scrubber water to control dioxin and furan shifts across all isomer classes (Krivanek, 1993) (EPA, 1997).

No other more recent data relative to Hg emissions reductions from MWCs equipped with wet scrubbers were identified that showed that potential for higher removal capability than activated carbon injection.

3.10.2.3 Carbon Filter Beds

Carbon filter beds have been developed in Europe for use as final cleaning stage to remove heavy metals (e.g., mercury), organic pollutants (e.g., dioxins and furans), and acid gases (e.g., SO₂, HCl) (Hartenstein, 1993). Three filter designs have been used in Europe: 1) cross flow, 2) counter current, and 3) counter-cross flow. Both the cross flow and counter-current flow designs have been applied to MWCs. Most of the information available on carbon filter beds pertains to the cross flow design (EPA, 1997).

Application of carbon filter bed technology to MWCs in Europe was undertaken primarily for the purpose of reducing emissions of residual organic compounds, in addition to reducing heavy metals and acid gases. This flue gas polishing step has been installed on some European MWCs in response to a political desire in several countries (including Germany, Austria, Switzerland and the Netherlands) to reduce all air pollutants to the maximum extent possible, typically without regard to cost or the effect on plant efficiency (Hartenstein, et al, 1996). No data has been identified that indicates that significant additional Hg removal would occur with the activated carbon reactor over carbon injection with a SDA/FF. In fact, with activated carbon in the filter cake of the FF, a similar effect of an activated carbon reactor is created. Thus, for purposes of this review, it is considered that activated carbon injection in conjunction with a SDA/FF would provide equivalent control as an activated carbon reactor (RTP, 2003).

A potential negative impact associated with the carbon filter technology is disposing of the spent carbon. Options for disposal include burning the carbon or disposing of it in a hazardous waste landfill. Another concern with this technology is the formation of "hot spots" in the bed that can result in bed fires. To monitor hot spot formation, carbon monoxide concentrations in the flue gas are monitored upstream and downstream of the carbon bed, and grate temperatures are measured (EPA, 1997).

3.10.3 Ranking of Alternative Control Technologies

Control of Hg emissions has been established through proper operation of acid gas/particulate control devices with low scrubber outlet temperature in conjunction with activated carbon injection. In addition, wet scrubbers or activated carbon reactors have not established a higher removal efficiency for Hg from MWC flue gases. Therefore, SDA/FF and additional control by reagent (activated carbon injection) ranks as the most effective or "top" technology for flue gas Hg removal.

3.10.4 Selection of BACT

The proposed control technology for Hg is injection of activated carbon in conjunction with a semi-dry scrubber system consisting of an SDA and FF is considered BACT. This technology is considered to be the most effective in controlling Hg, and therefore, represents the highest ranking control technology from a top-down BACT perspective.

Hg emissions will be controlled to a level of 0.134 mg/dscm corrected to 7% O₂ or 85 percent control, whichever is least stringent.

3.11 Summary of BACT Determinations

Table 3-10 below summarizes those pollutants that are subject to PSD review for the proposed Unit 4 project at the Facility. Table 3-10 also includes a summary of the proposed control technology for each pollutant.

Table 3-10 Pollutants Applicable to PSD Review and Proposed Control Technology	
PSD Pollutant	Proposed BACT
PM ₁₀	FF
MWC Metals (as PM)	FF
MWC Acid Gases ^a	SDA/FF
SO ₂	SDA/FF
SAM	SDA/FF
NO _x	SNCR/FGR
CO	GCP
Mercury	ACI
MWC Organics ^b	GCP

Note: ^a MWC Acid Gases as HCl, HF, and SO₂.

^b MWC Organics as Total Dioxins and Furans (measured as total tetra- through octa- chlorinated dibenzo-p-dioxins and dibenzo furans).

Section 4

Emissions Estimates

4.1 Introduction

The combustion of municipal solid waste (MSW) results in emissions of air pollutants. The addition of a fourth municipal waste combustor (MWC) unit will increase the emissions from the Hillsborough County Resource Recovery Facility (Facility). However, state of the art air pollution control (APC) equipment will be installed to minimize the increase in emissions. Emissions reductions will be accomplished through GCP and the use of an APC system. The APC system will consist of an SDA/FF system, an ACI system, and an SNCR with a flue gas recirculation (FGR) system on the new MWC unit. The proposed control technologies and the expected control levels were described in Section 3 of this application. The estimated emission rates from the MWC units with the proposed APC system are discussed in Section 4.2. The estimated emissions from miscellaneous minor sources are discussed in Section 4.3. The discussion of emissions factors and rates presented in this section focuses primarily on pollutants of public health and regulatory concern. The equivalent annual and air dispersion modeling emission rate calculations are presented in **Appendix A**.

MSW is a heterogeneous mixture of materials, and the physics and chemistry of its combustion are very complex. The combustion process involves chemical reaction kinetics and equilibrium, combustor fluid mechanics, and heat transfer rates. Covanta, Inc. performed a mass-balance modeling analysis of the combustion process for a reference waste. Model results were used to estimate stack gas flow rates, temperature, and composition. The ultimate analysis for the reference waste used for Unit 4 is presented in Section 6. The results from the mass-balance modeling analysis along with stack test monitoring data from the Facility's existing MWC units, emissions data from comparable other facilities, and federal and state regulatory limits were used to calculate emission rates for Unit 4. The stack test monitoring data are presented in **Appendix A**.

4.2 Pollutant Emission Estimates- New Municipal Waste Combustor Unit

The emission estimates presented in this application were developed based on the evaluation of 11 worst-case operating conditions for the proposed Unit 4. The analysis considered variations in waste throughput, waste feed type, and heating values. Estimated emissions rates for Unit 4 were based on 115 percent of design heat release rate (287.5 MMBtu per hour) firing 660 tons per day (tpd) of waste at 5,227 Btu per pound and operations of 24 hours, 365 days per year. The modeled air flow rate at this load is 74,188 dry standard cubic feet per minute (dscfm) at 7 percent O₂.

As discussed in Section 2, EPA promulgated NSPS under 40 CFR 60 Subpart Eb for large MWC units (a combustion capacity greater than 250 tpd). The NSPS were also

established to reflect Maximum Achievable Control Technology (MACT) and to specify emission levels for additional pollutants. Florida adopted the Subpart Eb regulations by reference in FAC 62-204.800(7). The APC system will be designed to achieve or be below the NSPS limits in a consistent manner. Emission estimates and limits for SO₂, HCl, Pb and Cd are based on the NSPS (40 CFR 60 Subpart Eb). Emission estimates for NO_x are based on a vendor guarantee for the proposed SNCR with FGR system. The Hg, PM, CO, HF and SAM emissions estimates are based on emissions limits from the Lee County Energy Recovery Facility (LCERF) PSD Air Construction Permit 0710119-002, AC, PSD-FL-151-C, October 13, 2003. The dioxins and furan emissions are based on congener percentages obtained from two years of stack test data from the Facility. Emissions of beryllium (Be) are based on stack test results for the existing HCRFF MWC Units 1, 2 and 3. Finally, VOCs emission estimates are based on a permit emission limit for the Harrisonburg, VA Resource Recovery Facility. The projected emission limits of pollutants from the proposed project are shown in **Table 4-1**.

The basis for the proposed emission limits is the NSPS (40 CFR 60 Subpart Eb). As described in the preamble to the December 19, 1995, Federal Register announcement promulgating this rule (Federal Register Vol. 60, No. 243, p. 65387), these limits are based on the best demonstrated performance at operating MWC facilities. EPA studies showing that MWC facilities can meet these limits, and other supporting data for the emission limits, are contained in Municipal Waste Combustion: Background Information for Promulgated Standards and Guidelines, EPA-453/R-95-0136, and Standard Form 83 Supporting Statement for ICR No. 1506.5-1995 Standards for New Municipal Waste Combustors (Subpart Eb), September 29, 1995, as well as other background documents contained in Dockets A-90-45 and A-89-08. These are EPA-recommended emission limits, supported by stack test data and documentation; thus, there is reasonable assurance that these emission limits are achievable. In addition, a professional engineer's seal is provided on the permit application forms (Volume III) to comply with FDEP requirements. Further, the full-service vendor will guarantee the proposed emission limits for which control equipment is specifically provided.

4.2.1 Particulate Matter and PM₁₀

When solid waste is burned, PM may originate from three sources: inorganic substances, organo-metallic substances, and unburned waste. Inorganic materials are not combusted; consequently, the majority of these materials exit the system primarily as bottom ash, with a small portion entrained in the flue gas stream and carried through the APC equipment for collection. Organo-metallic compounds appear as inorganic oxides or metal salts in the flue gas, resulting from high temperature oxidation. Unburned solid waste entrained in the combustion flue gas is a result of incomplete combustion and agglomeration of small particles. Trace metals in the solid waste also become entrained in the flue gas. Some trace metals also may be found adsorbed onto entrained solids.

Table 4-1 Proposed Emissions Limits and Air Dispersion Modeling Emissions Rates			
Pollutant	MWC Unit No. 4 Proposed Emission Limits		
	Flue Gas Concentration Limit @ 7% O ₂	Equivalent Annual Emissions Rates ^{1,2} (tons/year)	Air Modeling Emission Rate (g/s)
Sulfur Dioxide (SO ₂)	26 ppmdv (based on 80% reduction) ^{3,7}	84.3	2.42
Nitrogen Oxides (NO _x)	110 ppmdv ⁴	256.1	7.37
Carbon Monoxide (CO)	80 ppmdv ³	113.4	3.26
Particulate Matter (PM)	20.6 mg/dscm ^{3,5}	25.1	0.72
Dioxin ⁶	13 ng/dscm ⁸	1.58E-05	4.55E-07
Metals (as PM)	20.6 mg/dscm ³	25.	0.72
Mercury (Hg)	0.028 mg/dscm ³ 0.134 mg/dscm based on 85% reduction ^{7,9}	1.63E-01	4.67E-03
Cadmium (Cd)	0.02 mg/dscm ⁸	2.43E-02	7.00E-04
Lead (Pb)	0.2 mg/dscm ⁸	2.43E-01	7.00E-03
Hydrogen Chloride (HCl)	25 ppmdv ⁸ 60 ppmdv based on 95% reduction ^{7,9}	111.1	3.20
Hydrogen Fluoride (HF)	3.5 ppmdv ³	3.5	0.102
Ozone (as VOCs)	0.1 lb/ton ¹	12.0	0.35
Sulfuric Acid Mist (SAM)	15 ppmdv ²	74.4	2.1
Ammonia	50 ppmdv ³	43.0	1.24

Notes:

¹ Estimated emission rates for MWC Unit 4 based on 115% of design heat release rate firing 660 tpd of waste at 5,227 Btu/lb and operation of 24 hours a day, 365 days per year. The modeled air flow rate at this load is 74,188 dscfm @7% O₂.

² Equivalent annual emission rates are not permit limits, but are for informational purposes only.

³ Lee County Energy Recovery Facility Prevention of Significant Deterioration Air Permit Application, February 2003 and Lee County Resource Recovery Facility Air Construction Permit 0710119-002-AC, PSD-FL-151C, October 13, 2003.

⁴ Based on a NO_x concentration limit of 110 ppmv @7% O₂ for the selective non-catalytic reduction (SNCR) with flue gas circulation (FGR) system.

⁵ For purposes of analysis, PM₁₀ is equivalent to PM.

⁶ Total tetra through octa PCDD and PCDF.

⁷ Whichever is less stringent.

⁸ Estimated emission rates for each MWC unit is based on New Source Performance Standards emission limits for "new" large MWC units.

⁹ Uncontrolled concentration is based on 95% confidence interval of 2000-2002 stack test results for the existing Hillsborough County RRF MWC Units 1-3 multiplied by a factor of 1.5 (660 tpd/440 tpd) to account for increase capacity of the proposed Unit 4.

¹⁰ Based on Harrisonburg, VA Resource Recovery Facility VOC emission limit of 0.1 lb/ton.

The size and quantity of particulates emitted from solid waste combustion depend upon such factors as flue gas residence time, underfire air velocity through the combustor system, oxidizing/reducing conditions within the furnace, temperature, flue gas mixing, boiler tube spacing, boiler configuration, flue gas velocity and the chemistry of the fuel, which is burned. If the combustion takes place at higher temperatures and with the proper quantity of oxygen, the result will be more complete combustion of the fuel, and a decreased particle mass. High combustion temperatures and long residence times allow for more complete burning of organic particles with a commensurate decrease in particle size. Boiler configuration (180 degree turns) and decreased gas velocity will allow the larger, heavier particles to fall out of the flue gases as they pass the boiler, but the majority move downstream to the SDA unit. Particulates collected in the bottom ash from the boiler section are mixed in the ash discharger with fly ash particulate matter collected by the SDA system. All collected flyash is conveyed by enclosed screw conveyors.

The proposed control technologies include a FF system to remove fly ash (including trace metals) from combustion flue gas and reaction products generated in the SDA. The estimated maximum PM concentration at the FF system outlet is proposed to be limited to 0.009 grains per dry standard cubic foot (gr/dscf) at 7 percent O₂. Emissions calculations are presented in **Appendix A**.

To perform a conservative assessment of ambient impacts from PM with an aerodynamic diameter less than or equal to 10 microns (PM₁₀), it has been assumed in this application that all emissions of PM consist of PM₁₀.

4.2.2 Municipal Waste Combustor Acid Gases

The sulfur which contributes to pollutant emissions from solid waste combustion is chemically bound to other compounds. During combustion, a fraction of these elements escapes from the furnace as gaseous sulfur compounds while the remainder leaves as bottom or fly ash. The type of sulfur compounds released from the furnace is dependent on the presence of other gaseous compounds, combustion temperatures, and chemical (oxidizing or reducing) conditions in the furnace. Furnace conditions (oxidizing or reducing) directly influence the types of sulfur compounds, which may form and exit during combustion. Excess oxygen conditions typical of a solid waste combustor; generally result in the formation of SO₂ and SO₃ while reducing (oxygen deficient) conditions result in hydrogen sulfide (H₂S), carbonyl sulfide (COS) and elemental sulfur.

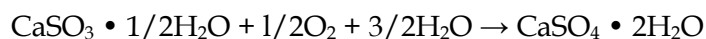
Various sulfur compounds are produced from direct combustion processes. Sulfur dioxide (SO₂) is the predominant form of sulfur compound released from the MSW combustion process. Some of the SO₂, when released into the ambient environment, reacts with atmospheric water vapor to form sulfuric acid. Sulfuric acid and emitted sulfuric acid mist may further react in the atmosphere to form sulfate salts, a particulate aerosol.

Chlorine, and fluorine are also chemically bound to other compounds. A portion of these substances are also released during combustion and escape the furnace in various forms. Similar to sulfur, emitted chlorine and fluorine react with water vapor to form hydrochloric acid (HCl) and hydrogen fluoride (HF). The presence of these acid gases in the atmosphere results in reduced visibility, material corrosion, sensitive organ irritation in humans and animals, and can add to acid rain/fog problems.

4.2.2.1 Sulfur Dioxide

Sulfur dioxide (SO₂) is formed in the furnace when sulfur in the solid waste oxidizes during combustion. The SDA in series with the FF system will be used to reduce SO₂ emissions. The flue gas containing SO₂ enters the SDA where it comes into contact with a finely atomized lime slurry.

The resultant reactions are:



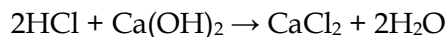
The SDA in series with the FF system proposed for the Facility will provide stable and reliable control of SO₂ emissions. The SO₂ outlet concentration of Unit 4 is estimated to be at or below 26 ppm_{dv} corrected to 7 percent O₂, assuming 80 percent control. Achieving at least an 80-percent reduction of SO₂ is consistent with the NSPS limit. This outlet concentration is based on the most recently approved permit limit for the LCERF by FDEP. The SO₂ emissions calculations are presented in **Appendix A**.

4.2.2.2 Sulfuric Acid Mist

When released into the environment, sulfur dioxide may react with water vapor to form sulfuric acid. Sulfuric acid may further react to form sulfate salts, a particulate aerosol. The SDA/FF system will control Sulfuric Acid Mist (SAM) emissions from Unit 4 to a maximum level of 15 ppm_{dv} at 7 percent O₂. Emissions calculations are presented in **Appendix A**.

Hydrogen Chloride

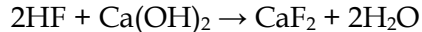
Hydrogen chloride (HCl) is formed and emitted to the atmosphere during the combustion of waste materials containing chlorinated compounds (typically plastics). The SDA in series with the FF system will be used to reduce HCl emissions. The flue gas containing HCl will enter the SDA where it will come into contact with a finely atomized lime slurry. The resultant reaction is:



The latest three years (2000-2002) of stack test data for each of the existing MWC units at the Facility were reviewed to develop a reasonable upper bound HCl inlet gas concentration. Using the three-year average stack concentration for all three existing units, a 95-percent confidence interval (CI) statistical analysis was conducted on the stack test data. This 95-percent CI concentration was then multiplied by 1.5 (ratio of 660 tpd/440 tpd) to account for the increase design capacity of the Unit 4 compared to the existing MWC units. The maximum inlet HCl concentration was calculated to be approximately 1,204 ppm_{dv} corrected to 7 percent O₂. The HCl outlet concentration from the SDA/FF system of the new MWC unit will be at or below 60.2 ppm_{dv} corrected to 7 percent O₂, based on reduction of the maximum inlet concentration by 95 percent using the SDA/FF system. Achieving at least 95 percent reduction of HCl is consistent with the NSPS limit. The statistical analyses of the stack test data and the HCl emissions calculations are presented in **Appendix A**.

Hydrogen Fluoride

Hydrogen fluoride (HF) is formed and emitted to the atmosphere during the combustion of waste materials containing fluorinated compounds. The SDA in series with the FF system will be used to reduce HF emissions. The flue gas containing HF will enter the SDA where it will come into contact with a finely atomized lime slurry. The resultant reaction is:



The SDA/FF system will control HF emissions from Unit 4 to a maximum concentration level of 3.5 ppm_{dv} at 7 percent O₂. This proposed level is based on the most recent approved permit limits for the LCERF by FDEP, and is lower than the existing HF permit limit of 6.74 mg/dscm (7.9 ppm_{dv}) at 7 percent O₂. Emissions calculations are presented in **Appendix A**.

4.2.3 Carbon Monoxide

CO is formed by incomplete oxidation of carbon compounds during combustion. The sources of carbon compounds during combustion are the solid waste, pyrolysis products formed near the fuel bed, or immediate combustion products. The emission of relatively high concentrations of CO is largely dependent on the underfire air dispersion to the combustor, the under/overfire air ratio, the design of the overfire air jets, and furnace combustion temperature. Careful operation of the furnace is essential to maintain good combustion practices (GCP). A low CO concentration is a good indication that furnace is achieving a high combustion efficiency; while a high CO concentration may indicate poor combustion and a potential increase in the level of trace organic emissions.

The CO outlet concentration of Unit 4 is estimated to be at or below 80 ppm_{dv} corrected to 7 percent O₂ (4-hour arithmetic block average), based on the most recent

approved permit limit for the LCERF by FDEP. Emissions calculations are presented in **Appendix A**.

4.2.4 Nitrogen Oxides

Nitrogen oxides (NO_x) are produced in all combustion processes. There are two mechanisms by which NO_x are formed during combustion:

- Thermal NO_x are formed by high temperature oxidation of nitrogen in the combustion air.
- Fuel NO_x are formed by the oxidation of nitrogen in the fuel.

The two major factors affecting the formation of thermal NO_x are the oxygen concentration present in the combustion zone and the flame temperature. The rate of NO_x formation has been shown to be linearly dependent on the oxygen concentration when temperature is constant. Additionally, NO_x formation tends to increase significantly with increasing temperature (at temperatures approximately above 2,100 °F) in the presence of O₂. In addition to these characteristics, NO_x formation increases linearly with increasing residence time at temperatures conducive to thermal NO_x formation (Russell and Roberts, 1984). Fuel NO_x is formed when MSW containing nitrogen and its compounds is burned, and the nitrogen is oxidized in the process.

The NO_x outlet concentration from Unit 4 will be at or below 110 ppm_{dv} corrected to 7 percent O₂, based on a vendor guarantee for the SNCR with FGR system. Emissions calculations are presented in **Appendix A**.

4.2.5 Municipal Waste Combustor Metals

Combustion of solid waste results in the emission of trace metals. These metals are present in both the combustible and non-combustible parts of the waste. During combustion, the non-volatile metals are distributed in two general areas: bottom ash and fly ash. Volatile metal emissions also occur as vapor phase emissions. Trace metals in the flue gas will be controlled by the SDA/FF system. The SDA will condition the flue gas and reduce its temperature to between 285 and 325°F. At that temperature, volatilized metals will condense on available PM to be collected in the FF system.

The NSPS specify emission limits for Hg, Pb, and Cd. The Florida Mercury Rule (Section 62-296.416 FAC) provides additional emission limits for mercury emissions. Emissions of Be for the existing MWC units are limited by the PSD permit; however, Be emissions for Unit 4 will be based on stack test monitoring data for the existing MWC units. The other metals are regulated by the particulate control standard established by the NSPS (see Section 4.2.1). The emission rates for Hg, Pb, Cd, and Be are discussed below.

Mercury

Mercury (Hg) is a trace metal found in solid waste. Its origin is attributable to many different waste materials. Within the temperature range of the combustion process for solid waste, mercury is found as a metallic vapor. The melting point and boiling point of mercury are -38.0°C (-36.4°F) and 356.9°C (674°F), respectively (Perry and Chilton, 1973).

The Hg outlet concentration from Unit 4 will be at or below 0.028 mg/dscm corrected to 7 percent O₂ based on the most recently approved permit limit from the LCERF by FDEP. The ACI system proposed for the Facility will provide stable and reliable control of Hg emissions. Similar to the methodology used to calculate the HCl inlet gas concentration, the maximum inlet Hg concentration was calculated to be approximately 0.89 mg/dscm corrected to 7 percent O₂. The Hg outlet concentration from the ACI system of the new MWC unit will be at or below 0.134 mg/dscm corrected to 7 percent O₂, based on reduction of the maximum inlet concentration by 85 percent using the ACI system. Achieving at least 85 percent reduction of Hg is consistent with the NSPS limit. Unit 4 will meet the less stringent of the two outlet concentration limits. The statistical analyses of the stack test data and the HCl emissions calculations are presented in **Appendix A**.

Lead

Lead (Pb) is a trace metal found in solid waste. Pb emissions are directly proportional to the content of Pb in the solid waste. The melting and boiling points of Pb are 327.5°C (621.5°F) and 1,620°C (2,948 °F), respectively (Perry and Chilton, 1973). Lead will liquidify during combustion and, due to its vapor pressure, some volatilization with subsequent condensation and solidification onto fly ash will occur. Liquid Pb will either become part of the bottom ash or adhere to the fly ash which will be collected in the SDA and FF system.

It has been shown that an SDA followed by a FF system results in a high degree of Pb removal from combustion flue gas (NITEP, 1986). The Pb outlet concentration from the SDA/FF system of Unit 4 will be at or below 200 µg/dscm corrected to 7 percent O₂, consistent with the NSPS limit. Emissions calculations are presented in **Appendix A**.

Cadmium

Cadmium (Cd) is present in both the combustible and non-combustible parts of the solid waste stream and is, for the most part, collected in the FF system. The Cd outlet concentration from the FF system of Unit 4 will be at or below 20 µg/dscm corrected to 7 percent O₂, consistent with the NSPS limit. Emission calculations are presented in **Appendix A**.

Other trace metals are controlled with the FF, and compliance is verified by the PM standard.

4.2.6 Municipal Waste Combustor Organics

The principal compounds of MWC organics of concern are dioxins and furans. The NSPS specifies limits for total emissions of all tetra- through octa-isomers of dioxins and furans. The dioxins and furans adsorbed on fly ash will be removed from the flue gas with the PM in the FFs. Removing dioxins and furans from the gaseous phase can be accomplished with scrubbers in combination with FFs. The ACI system may also provide some reduction in dioxin/furan emissions.

MWC organics are formed by incomplete oxidation of carbon compounds during combustion. The sources of carbon compounds during combustion are the solid waste, pyrolysis products formed near the fuel bed, or immediate combustion products. The actual formation of MWC organics in the flue gases is not well understood. MWC organics emissions are reduced by either GCP or GCP with post-combustion flue gas controls.

GCP is important to reducing dioxin formation by completely oxidizing the organic compounds and carbonaceous solids that are precursors to dioxin formation. GCP consists of "time, temperature, and turbulence" in the combustion chamber. MWC facilities that employ GCP and perform continuous emission monitoring can achieve dioxin emissions averaging 13 ng/dscm corrected at 7 percent O₂. GCP involves continuous compliance of three parameters: a CO emission limit, a load limit, and a temperature limit at the inlet of the particulate matter control device. All three of these continuous compliance parameters have been shown to correlate with either formation or emission of dioxins/furans (EPA, 1995d). The use of GCP reduces emissions of MWC organics by promoting thorough combustion, minimization of particulate carryover and condensation of vapor phase constituents through FF temperature control. Unit 4 will employ GCP in combination with the ACI/SDA/FF system to minimize dioxin and furan formation and emissions. GCP will include providing sufficient oxygen for the destruction of organic species, limiting PM carryover, and monitoring PM inlet temperature to minimize post-combustion dioxin/furan formation.

The dioxin and furan (total) outlet concentration from the SDA/FF system of Unit 4 is estimated to be at or below 13 ng/dscm corrected to 7 percent O₂, which is consistent with the NSPS limits. Emissions calculations are presented in **Appendix A**.

4.2.7 Volatile Organic Compounds

Volatile organic compounds (VOCs) and other non-methane hydrocarbons (NMHC) are formed during the combustion of MSW and are present in the flue gas. The principal mechanism to control these organic compounds is GCP. GCP includes proper design and operation of MWC unit to maximize the thermal destruction of VOCs and NMHC.

The maximum potential VOC emission rate from Unit 4 is 0.1 lb/ton. This emission factor was obtained from the Harrisonburg, VA Resource Recovery Facility and represents the lowest VOC emission factor found on the EPA BACT/LAER

Clearinghouse database. The estimated VOC emissions rates are based on Unit 4's maximum design waste capacity of 660 tpd. Emissions calculations are presented in **Appendix A**.

4.2.8 Ammonia

The new MWC unit will have a SNCR with FGR system to control NO_x emissions. As discussed in Section 3.6, SNCR uses ammonia as a reagent to reduce NO_x emissions in the post combustion flue gas stream. The SNCR/FGR system will be designed and operated in a manner to minimize ammonia slip, which will not exceed 50 ppm_{dv} corrected at 7 percent O₂. Emissions calculations are presented in **Appendix A**.

4.3 Pollutant Emission Estimates-Miscellaneous Sources

4.3.1 Lime Storage Silo

Unit 4 will use an SDA system to control acid gases and sulfur dioxide emissions. The use of the SDA system requires the receiving, storing, handling, and processing of pebble and dolomitic lime. Pebble and dolomitic lime are granular materials that are inherently dusty and capable of significant particulate emissions if not controlled. The Facility will incorporate highly effective controls to limit potential lime dust emissions.

The lime storage silos will be equipped with a FF system designed for an outlet grain loading of less than 0.015 gr/dscf and an air flow rate of approximately 1,200 scfm. These baghouses will control fugitive lime particulate emissions which are generated when delivery trucks are unloaded. Pressure drop monitoring across the FF systems will not be necessary. The inside volume of each silo will be approximately 2,900 cubic feet. Assuming that the pebble lime silo is filled every other day, the amount of air displaced out of the silo will be 2,900 dry standard cubic feet every other day. Therefore, the equivalent annual PM emission rate will be 5.67×10^{-4} tons/year based on this silo filling operation. Similarly, it is assumed that the dolomitic lime silo will be refilled every 30 days; therefore, the equivalent annual PM emission rate will be 3.78×10^{-5} tons/year. In actuality, the baghouses will be operated and emissions will occur only during filling operations. Emissions of this quantity are not considered excessive for these types of operations. The potential ambient impacts from these emissions sources are expected to be minimal.

4.3.2 Activated Carbon Storage Silo

Unit 4 will use a powdered ACI system for the control of mercury emissions. Operation of this system will require the installation of one silo for the storage of activated carbon before it is injected into the flue gas for mercury control. Powdered activated carbon will be delivered to the Facility by truck. Delivery of activated carbon will occur on a weekly basis. Emissions calculations are presented in **Appendix A**.

The activated carbon storage silo will be equipped with a FF system designed for an outlet grain loading of less than 0.015 gr/dscf and an air flow rate of approximately

1,200 scfm. This FF system will control fugitive powdered activated carbon particulate emissions which are generated when the delivery trucks are unloaded. Pressure drop monitoring across the FF system will not be necessary. The inside volume of the silo will be approximately 2,900 cubic feet. Because the silo is filled once a week, the amount of air displaced out of the silo will be 2,900 dry standard cubic feet per week. Based on this silo filling operation, the equivalent annual PM emission rate will be 1.62×10^{-4} tons/year. In actuality, the baghouse will be operated and emissions will occur only during filling operations. Emissions of this quantity are not considered excessive for this type of operation. The potential ambient impacts from these emissions are expected to be minimal. Emissions calculations are presented in **Appendix A**.

4.3.3 Cooling Tower Cell

Unit 4 will require a new cooling tower cell be installed at the Facility. It is anticipated that the annual emissions will be 0.42 tons/yr. An estimate of PM₁₀ emission rates has been made based on cooling tower cell's design information and a methodology provided in AP-42, Section 13.4 (EPA, 1995). The manufacturer provided water flow and recirculation rates and also measured total dissolved solids (TDS) from the existing cooling tower cells at the Facility (since the new cooling tower cells will be identical to the existing cells). The new cell will also be equipped with a drift eliminator that will reduce PM₁₀ emissions from the new cooling tower cell to 0.001 percent of the total potential PM₁₀ emissions. A recent conference paper presented a methodology for computing realistic PM₁₀ emissions from cooling tower cells with medium to high TDS levels (J. Reisman and G. Frisbee, 2000). Based on the measured TDS from the new cooling tower cell (3,500 ppm), the percentage of drift PM that evaporates to PM₁₀ is approximately 50 percent. Therefore for the new cooling tower, CDM assumed that the PM₁₀ emissions will be equal to 50 percent of the total PM emissions. Emissions calculations are presented in **Appendix A**.

4.3.4 Auxiliary Burners

Unit 4 will be equipped with two natural-gas-fired auxiliary burners, each with a rated heat input capacity of 50 MMBtu/hr for a total heat input capacity of 100 MMBtu/hr. These burners are necessary for firing the combustor during startups and shutdowns, and to maintain furnace temperatures when sustained low-Btu wastes are encountered. The County is requesting that emissions due to startup, shutdown, and malfunction periods be limited to 3 hours per occurrence, consistent with NSPS requirements (rather than 2 hours per day, as suggested at FAC 62-210.700). The duration of warm-up periods (i.e., when only natural gas is being combusted and no MSW is being introduced into the combustor) is not limited by the NSPS requirements. As discussed in Section 2, the County is requesting permit limits which restrict the annual use of natural gas to less than 10 percent of the total annual capacity for each unit so that the NSPS Subpart Db requirements for NO_x do not apply. The anticipated time for boiler warm-up is expected to be approximately 8 hours.

Section 5

Ambient Conditions

5.1 Terrain Description

The elevation of the Hillsborough County Resource Recovery Facility (Facility) is approximately 35 feet above mean sea level. The terrain in the area of the Facility is generally flat, with elevations ranging from 25 feet above mean sea level to 40 feet above sea level within one kilometer of the Facility. To the north and south, the terrain remains generally flat, with little to no variation in elevation. To the west toward the City of Tampa and Tampa Bay, the elevation approach sea level. Just east of the Facility, the terrain is also generally flat. However, there are areas approximately 3 kilometers east of the Facility with terrain as high as 80 to 90 feet above mean sea level.

5.2 Meteorology and Climate

The Tampa area (28.0°N, 82.5°W) can be classified as having a maritime tropical (mT) climate. Annual average daily temperatures range from about 62°F (min) to 81°F (max) and the area receives an average of about 50 inches per year of rainfall. Winds are predominantly out of the east (easterly trade winds), however, sea breeze effects are significant and are a common diurnal occurrence near the coastline. Although frozen precipitation effectively never occurs, violent storms (tornadoes, tropical storms, hurricanes) are a concern during the spring, summer and fall months.

The relatively good air quality of the region can be attributed to a number of climatic factors. The unstable air in the region is conducive to vertical mixing and thus assisting in the dispersion of ground-level pollutants. Frequent rainfall cleanses the air by scavenging particulate matter and other soluble pollutants and precipitating these pollutants to the ground.

Meteorological data used for air dispersion modeling analyses is discussed in more detail in Section 6.

5.3 Ambient Air Quality Standards/Attainment Status

According to Federal and Florida Prevention of Significant Deterioration (PSD) regulations 40 Code of Federal Regulations (CFR) 51.166 and 62-212.400 Florida Administrative Code (FAC), an applicant for a PSD permit is required to conduct an air quality analysis to demonstrate that the emissions from the Facility will not cause or contribute to a violation of any applicable ambient air quality standard or PSD increment. An assessment of existing air quality and a dispersion modeling analysis are used to determine compliance with the New Source Review (NSR) regulations. Because this project exceeds the PSD significant net emissions increase threshold for all criteria pollutants, except for lead, the air quality assessment is only required for those pollutants. However, a full analysis of all criteria pollutants is provided here for information purposes.

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for certain “criteria” pollutants, as mandated by the Clean Air Act (CAA) Amendments of 1970. These standards have been set at two levels. Primary NAAQS are designed to protect public health with an adequate margin of safety. Secondary NAAQS are designed to protect the public welfare, including property, materials, and plant and animal life. The State of Florida has adopted State AAQS (FAAQS) that are at least as stringent as the NAAQS and incorporate both the Federal Primary and Secondary standards (62-204.240 FAC). The sulfur dioxide FAAQS for annual and 24-hour averaging periods are more stringent (lower) than the NAAQS. These National and Federal ambient air quality standards are shown in **Table 5-1**. The six criteria pollutants with National and Florida ambient air quality standards are sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), fine particulate matter less than 10 micrometers in diameter (PM₁₀), lead (Pb), and ozone (O₃). The ambient air quality standards for PM₁₀ replaced the standards for total suspended particulates (TSP) in 1987 at the Federal level and in March 1996 at the State level.

Under Section 107 of the CAA, each state is required to develop an State Implementation Plan (SIP) which specifies how all areas within the state will achieve and maintain compliance with the NAAQS. For regulatory purposes under the SIP, all areas in the United States are designated as either attainment, non-attainment, or unclassifiable with the NAAQS for each criteria pollutant. Attainment areas are areas which are currently in compliance with the NAAQS, and continued compliance is expected under the SIP requirements. Non-attainment areas are areas which either do not comply with the NAAQS or which significantly contribute to nearby areas which do not comply with the NAAQS. Unclassifiable areas are areas where insufficient data exist to classify the area as either attainment or non-attainment and are generally presumed to be in attainment with NAAQS. In addition to attainment, non-attainment, and unclassifiable areas, certain areas are designated as “maintenance” areas. Maintenance areas are areas that have been re-designated from non-attainment to attainment or unclassifiable. Because they are transition areas, some non-attainment requirements continue to apply, particularly requirements for Reasonably Available Control Technology (RACT) for certain new and existing sources of emissions [FAC 62-204.320(1)(d)].

The County is part of the West Central Florida Intrastate Air Quality Control Region (AQCR), which also includes Citrus, Hardee, Hernando, Pinellas, Levy, Manatee, Pasco, Polk, and Sumter Counties (40 CAR 81.96). The attainment status of the project site for each criteria pollutant is shown in **Table 5-2**.

The project site and vicinity is considered to be in attainment with all NAAQS. There are no non-attainment areas in Florida for NAAQS. Maintenance areas for O₃, PM, and Pb exist in parts of Florida. The Facility is located within local maintenance areas for all three of these pollutants. These local maintenance areas are described in Table 5-2. The RACT requirements for these pollutants are discussed in Section 2.9.

**Table 5-1
National and Florida Ambient Air Quality Standards**

Pollutant	Avg. Time	Florida Standard ¹	National Primary Standard ²	National Secondary Standard ²	Significant Impact Level ³	PSD Increments ⁴	
						Class II	Class I
NO ₂ (μg/m ³)	Annual	100	100	100	1	25	2.5
SO ₂ (μg/m ³)	3-Hr	1300	-	1300	25	512	25
	24-Hr	260	365	-	5	91	5
	Annual	60	80	-	1	20	2
CO (μg/m ³)	1-Hr	40000	40000	-	2000	-	-
	8-Hr	10000	10000	-	500	-	-
Pb (μg/m ³)	Qtr	1.5	1.5	1.5	-	-	-
O ₃ (ppm)	1-Hr	0.12	0.12	0.12	-	-	-
	8-Hr	-	0.08	0.08	-	-	-
PM ₁₀ (μg/m ³)	24-Hr	150	150	150	5	30	8
	Annual	50	50	50	1	17	4
PM _{2.5} (μg/m ³)	24-Hr	-	65	65	-	-	-
	Annual	-	15	15	-	-	-

Notes:

All short-term (1-hour, 3-hour, and 24-hour) standards except ozone are not to be exceeded more than once per 12 month period. Annual standards are 12-month arithmetic means, never to be exceeded. Quarterly standards are also never to be exceeded. The 1-hour ozone standard should not be exceeded more than an average of one day per year over three years. The 8-hour primary and secondary ozone standards are based on the fourth-highest daily maximum 8-hour average ozone concentration. The National NO₂ standard is promulgated at 0.053 ppm.

1 ppm NO₂ = 1887 μg/m³ NO₂
1 ppm CO = 1140 μg/m³ CO
1 ppm O₃ = 1961 μg/m³ O₃

Sources:

- ¹ FAC62-204.240.
- ² 40 CFR 50.
- ³ 40 CFR 51.165(b)(2) for Class II Areas. Class I SILs are provided by the National Park Service/Fish and Wildlife Services.
- ⁴ 40 CFR 51.166(c)

Table 5-2
Attainment Status¹ for Areas Including the Hillsborough County Solid Waste Energy Recovery Facility

Pollutant	State Designation ²	Federal Designation ³
Total Suspended Particulate Matter (TSP)	Maintenance Area ⁴ (FAC 62-204.340(4)(b)1)	Cannot be classified ⁴
Particulate Matter with Diameter Less Than 10 Microns (PM ₁₀)	Unclassifiable (entire state FAC 62-204.340(3)(a))	Cannot be classified
Particulate Matter with Diameter Less Than 2.5 Microns (PM _{2.5})	--	Cannot be classified or attainment
Sulfur Dioxide (SO ₂)	Unclassifiable ⁵ (FAC 62-204.340(3)(b)3)	Cannot be classified or attainment
Nitrogen Dioxide (NO ₂)	Attainment (entire state FAC 62-204.340(1)(e))	Cannot be classified or attainment
Carbon Monoxide (CO)	Attainment (entire state FAC 62-204.340(4)(a)4.	Unclassifiable or attainment
Ozone (O ₃) (8-hour)	Maintenance Area ⁶ (FAC 62-204.340(4)(a)4)	Unclassifiable or attainment
Ozone (O ₃) (1-hour)	--	Unclassifiable or attainment
Lead (Pb)	Maintenance Area ⁷ (FAC 62-204.340(4)(c)) Unclassifiable (entire state FAC 62-204.340(3)(c))	Cannot be classified
Notes: ¹ Florida Administrative Code (FAC) Chapter 62-204 and Code of Federal Regulations (CFR) Title 40, Part 81.310. EPA defines Hillsborough County as part of the West Central Florida Intrastate Air Quality Control Region (40 CFR 81.96). ² As of March 13, 1996. ³ As of January 5, 2005. ⁴ That portion of Hillsborough County within 12 kilometers (km) of the intersection of US 41 South and State Road 60. ⁵ Local unclassifiable areas for SO ₂ include Hillsborough County and the southwest corner of Pasco County. ⁶ Local maintenance area for O ₃ includes Hillsborough and Pinellas Counties. ⁷ Areas within 5 km of UTM Zone 17 coordinates of 364.0 km east and 3093.5 km north		

5.4 Existing Air Quality

Existing air quality in the Facility vicinity can be evaluated by comparing monitored ambient pollutant concentrations to ambient air quality standards (AAQS). The Air Quality Division of the Hillsborough County Environmental Protection Commission operates a network of ambient air monitoring stations. Air quality data for these stations are available from the U.S. EPA's AIRDATA internet-based database. These monitoring sites are listed in **Table 5-3** along with their Universal Transverse Mercator (UTM) coordinates. **Table 5-4** identifies the pollutants monitored at each of the Hillsborough County monitoring stations. **Table 5-5** shows the maximum highest and second-highest short-term and maximum annual concentrations measured at the closest monitoring site to the Facility for each pollutant. Monitoring data available for the most recent three-year period (2001- 2003) are presented.

A comparison of ambient monitoring data is shown in Table 5-5. Recent data shows the air quality in the vicinity of the Facility is good and improving each year. Sulfur dioxide (SO₂) emissions are primarily produced by combustion of sulfur-containing fossil fuels. SO₂ emissions can contribute to the formation of atmospheric haze and acid rain. Maximum SO₂ concentrations measured at the nearest monitoring station during the past three years were about 24%, 24%, and 18% of the National or State AAQS for the 3-hour, 24-hour, and annual averages, respectively.

Nitrogen dioxide is also typically emitted by combustion sources. Nitrogen dioxide is a component in the formation of photochemical smog and a contributor to the formation of acid rain. Maximum NO₂ concentrations measured at the nearest monitoring station during the past three years were about 20% of the National and State AAQS for annual averages.

Localized CO concentrations tend to be associated with vehicle emissions. Maximum CO concentrations measured at the nearest CO monitoring station during the past three years were about 20% and 50% of the National and State AAQS for the 1-hour and 8-hour averages, respectively.

PM₁₀ and PM_{2.5}, or fine particulate matter, consists of soot, acidic particles, fine dusts and other aerosols. Maximum PM₁₀ concentrations measured at the nearest monitoring station during the last available three years were 73% and 58% of the National and State AAQS for the 24-hours and annual averages, respectively. Maximum PM_{2.5} concentrations measured during the last available three years were 55% and 91% of the National AAQS for the 24-hour and annual averages, respectively.

Lead (Pb) emissions have historically been associated primarily with motor vehicles using leaded gasoline. These emissions have greatly declined in recent years due to the use of unleaded fuel. A local Pb nonattainment area existed, until January 1996, around a battery recycling facility near McKay Bay in Tampa. This area has since been redesignated as unclassifiable. During the last three years, the maximum Pb level

measured at the nearest Pb monitor in Hillsborough County was about 33% of the National and State AAQS for quarterly averages.

Oxides of nitrogen and volatile organic compounds (VOCs) are primary precursors to ozone formation. Ozone is not emitted directly into the atmosphere but is formed in the troposphere through the photolysis. When photolysis occurs, sunlight causes NO₂ to split into NO and O. The atomic oxygen (O) product is highly reactive and readily combines with molecular oxygen (O₂) to form ozone (O₃). VOCs react with hydroxyl groups (–OH) in primary reactions to form the NO₂ to ultimately yield O₃. In urban areas, the primary source of NO_x is combustion-related sources such as motor vehicles and industrial sources as discussed earlier. VOCs are emitted from motor vehicles, combustion sources, consumer products, and industrial processes.

The highest and second-highest 1-hour ozone concentrations measured at the nearest O₃ monitor station during the last three years have been less than the National and State AAQS. In addition, there have been no exceedances of the 8-hour standard during the past three years. The 8-hour ozone standard is based on the fourth-highest daily maximum 8-hour average ozone concentration. Recent ambient ozone data for Hillsborough County indicate compliance with the 1-hour ozone NAAQS (*i.e.*, number of days with ambient measurements above the AAQS at any one location were less than or equal to 1.0 when averaged over a three year period).

The **BOLD** numbers in **Table 5-5** are those selected to be used as background concentrations to be added to the Facility's predicted concentrations in the dispersion modeling analysis for NO₂, SO₂, CO, PM₁₀ and PM_{2.5}. The selected concentrations are the annual average concentrations, and the maximum second-highest short-term concentration, over all three years. Since the air quality monitoring stations represented in **Table 5-4** are in more urban areas than is the Facility site, the selected values are conservative representations of background air pollutant concentrations near the Facility.

**Table 5-3
Locations of Ambient Pollutant Monitors
and Relative Distance to Stack Location at the
Hillsborough County Resource Recovery Facility**

Stack Location	UTME (km)	UTMN (KM)		
Ganon-5012 Causeway Blvd.	368.109	3092.890		
Monitor Locations – Hillsborough County				
Address	City/Town	UTME (km)	UTMN (km)	Distance from Stack (km)
6811 East 14 th Avenue	Tampa	364.317	3094.012	3.955
1700 North 66 th Street	Tampa	364.009	3093.400	4.132
2929 S. Kingsway Avenue	Brandon	374.239	3094.212	6.271
5012 Causeway Blvd Tampa Florida	Tampa	362.103	3089.236	7.030
Hwy 41 (Gibsonston)	Ruskin	362.095	3086.096	9.073
1167 North Dover Road	Plant City	378.978	3093.835	10.910
Gardinier Park U S 41 & Riverview Dr.	Tampa	363.697	3082.724	11.082
900 Harbour Island Blvd. (Athletic Club)	Tampa	357.443	3090.490	10.933
6700 Whiteway Drive Tampa	Tampa	364.558	3103.335	11.032
1105 E Kennedy Blvd	Tampa	356.641	3092.070	11.497
Coast Guard Station Davis Island	Tampa	356.862	3089.913	11.634
9851 Highway 41 South	Tampa	363.764	3081.892	11.825
4702 Central Ave. Seminole Adult Day Sch	Tampa	356.994	3096.498	11.686
Ballast Point Park Interbay Blvd.	Tampa	354.181	3085.328	15.848
3910 Morrison Ave.	Tampa	351.455	3090.409	16.838
Eisenhower Jr High School	Tampa	365.195	3074.797	18.326
5121 Gandy Blvd	Tampa	348.556	3086.043	20.717
One Raider Place Plant City, Fl	Plant City	389.292	3096.710	21.525
4013 Ragg Rd., Tampa	Tampa	352.261	3109.298	22.812
14063 County Road 39	S. Lithia	385.500	3073.259	26.226
E.G. Simmons County Park	Tampa	355.574	3069.060	26.926

Table 5-4 Pollutants Monitored at Hillsborough County Ambient Monitors (2002-2004)								
Monitor Address	City	NO ₂	SO ₂	CO	Pb	O ₃	PM ₁₀	PM _{2.5}
6811 East 14 th Avenue	Tampa				X			
1700 North 66 th Street	Tampa				X			
2929 S. Kingsway Avenue	Brandon						X	
5012 Causeway Blvd	Tampa		X				X	
Hwy 41 (Gibsonston)	Ruskin						X	
Gardinier Park U S 41 & Riverview Dr.	Tampa						X	
900 Harbour Island Blvd. (Athletic Club)	Tampa						X	
6700 Whiteway Drive	Tampa							X
1105 E Kennedy Blvd	Tampa						X	
Coast Guard Station Davis Island	Tampa		X			X	X	
9851 Highway 41 South	Tampa		X					
4702 Central Ave. Seminole Adult Day Sch	Tampa			X			X	
Ballast Point Park Interbay Blvd.	Tampa		X					
3910 Morrison Ave.	Tampa						X	X
Eisenhower Jr High School	Tampa						X	
5121 Gandy Blvd	Tampa	X	X			X		
One Raider Place	Plant City		X	X		X		
4013 Ragg Rd.	Tampa						X	
14063 County Road 39	S. Lithia					X		
E.G. Simmons County Park	Tampa	X	X			X		

Note: Ambient monitoring stations with bold X represent those monitors used to represent ambient conditions near the Facility.

**Table 5-5
Ambient Monitored Concentrations
at the Nearest Stations to the
Hillsborough County Resource Recovery Facility**

		2001		2002		2003		
Pollutant	Avg. Time	High	2nd High	High	2nd High	High	2nd High	AAQS ¹
NO ₂ (µg/m ³)	Annual	21	-	21	-	19	-	100
SO ₂ (µg/m ³)	3-Hr	317	309	288	253	200	189	1300
	24-Hr	61	59	51	48	48	32	260
	Annual	11	-	11	-	8	-	60
CO (ppm)	1-Hr	5.8	5.1	5.3	5.3	7.3	5.7	35
	8-Hr	3.1	3	4.5	3.8	3.6	3.3	9
Pb (µg/m ³)	Qtr	0.47	-	0.41	-	0.25	-	1.5
O ₃ (ppm) ²	1-Hr	0.126	0.11	0.091	0.087	0.108	0.107	0.12
	8-Hr	0.098	0.081	0.07	0.065	0.08	0.072	0.08
PM ₁₀ (µg/m ³)	24-Hr	109	103	37	35	42	41	150
	Annual	29	-	20	-	22	-	50
PM _{2.5} (µg/m ³)	24-Hr	35	31	35	33	36	34	65
	Annual	11.7	-	10.8	-	10.5	-	15

Concentrations reflect the closest monitors to the Facility for each pollutant. Locations are shown below. See Table 5-3 for actual distances to the HCSWERF stack.

NO_x - Tampa 5121 Gandy Blvd. (348.556 km UTM Easting, 3086.043 km UTM Northing)

SO₂ - Tampa 5012 Causeway Blvd. (362.103 km UTM Easting, 3089.236 km UTM Northing)

CO - Tampa 4702 Central Ave (356.994 km UTM Easting, 3096.498 km UTM Northing)

Pb - Tampa 6811 East 14th Avenue (364.317 km UTM Easting, 3094.012 km UTM Northing)

O₃ - Tampa Coast Guard Station Davis Island (356.862 km UTM Easting, 3089.913 km UTM Northing)

PM₁₀ - Brandon 2929 S. Kingsway (374.239 km UTM Easting, 3094.212 km UTM Northing)

PM_{2.5} - Tampa 6700 Whiteway Drive (364.558 km UTM Easting, 3103.335 km UTM Northing)

Note:

¹ The Ambient Air Quality Standards (AAQS) shown are the more stringent of the National primary or secondary AAQS or the state AAQS.

² The 8-hour ozone standard is based on the fourth-highest daily maximum 8-hour average ozone concentration.

Section 6

Air Quality Modeling Analyses

6.1 Overview

As discussed in Section 1, the County is proposing to install a new municipal solid waste (MSW) combustion unit at the Hillsborough County Resource Recovery Facility (Facility). The Facility currently operates three 400-ton-per-day MSW combustion units. The new 600-ton-per-day fourth unit is necessary to meet the County's growing solid waste disposal needs. The expansion will result in a net increase of actual emissions from the Facility for all criteria pollutants. The existing Facility is a "major" source of air emissions, and some of the proposed emission rate increases would be "significant," as defined in the Prevention of Significant Deterioration (PSD) rules. Therefore, the proposed project would be subject to the PSD requirements under 40 CFR 51.165, 40 CFR 51.166, and Chapter 62-212, F.A.C.

The PSD preconstruction permit program requires that dispersion modeling be conducted for pollutants that would be emitted at "significant" rates in order to demonstrate the project's compliance with National Ambient Air Quality Standards (NAAQS), Florida Ambient Air Quality Standards (FAAQS), and Prevention of Significant Deterioration (PSD) Increments. Additionally, the analysis is performed to examine the impact of emissions of the proposed project on any Class I areas.

Maximum increases from the new municipal waste combustor unit (MWC) (herein referred to as Unit 4) criteria pollutant impacts were determined for comparison to significant impact levels (SILs) as required by the regulations and modeling guidance. These maximum increases are less than the SILs, so no cumulative modeling analysis was required. Although not required by the modeling guidance, modeling analyses were conducted for all four MWC units to demonstrate that the Facility will continue to comply with all AAQS and PSD increments. In addition, a comparison of maximum increases in facility impacts to the de minimis monitoring levels is included for PSD pollutants. Finally, a comparison of maximum increases in facility impacts to Florida Ambient Reference Concentrations (ARCs) guidelines is included for non-criteria pollutants. As of March 1, 2000, FDEP ruled that the ARCs are not rules nor do they implement any statutory authority. Nonetheless, the ARCs are still useful in evaluating the magnitude of non-criteria pollutant impacts.

6.2 Model Selection and Options

Modeling analyses were performed in three stages: (1) a screening analysis to determine the worst-case operating condition, (2) refined air quality analyses to demonstrate compliance with PSD increments and NAAQS, and (3) a Class I impact analysis to demonstrate impacts to areas of special national or regional value from a natural, scenic, recreational, or historical perspective. Class I areas are often federally protected parks and wildlife areas. The approach for each modeling analysis is discussed below

6.2.1 Screening Analysis

The SCREEN3 dispersion model (Version 96043) was used to conduct a first-level screening analysis to initially determine the worst-case Unit 4 operating condition. The SCREEN3 dispersion model is an interactive Gaussian plume model capable of predicting worst-case impacts for a single source using a set of predetermined meteorological conditions. Inputs to the SCREEN3 model include:

- Source parameters - stack height and exit diameter, gas exit temperature and velocity, emission rate
- Receptor parameters - downwind distances, elevations, flagpole heights
- Control options (downwash parameters).

A unit emission rate (1 g/s) was used. The SCREEN3 model also calculates impacts in the cavity region, the area of plume recirculation adjacent to a structure.

The screening analysis examined eleven combinations of load and MSW heating value to determine the worst-case operating condition. This is defined as the operating condition which produces the highest ground-level air pollutant concentrations. The parameters for the worst operating condition were used in the subsequent analyses.

6.2.2 Refined Air Quality Analyses

The refined air quality analyses were performed with actual hourly meteorological data to evaluate compliance with PSD Increments and NAAQS. The first step is to compare predicted ground-level air pollutant concentrations for the new sources alone with significant impact levels (SIL) for each criteria pollutant. If modeled concentrations from the new sources alone exceed the SILs, then a cumulative dispersion modeling analysis would be performed of emissions from both the proposed sources and from the existing sources within the significant impact area.

Steady-state Gaussian plume models are valid for distances up to 50 km. The assumption is that the transport time is less than or equal to the averaging time, since the plume is instantaneously assumed to travel any distance downwind. The preferred model for near source impact assessments is the Industrial Source Complex – Short Term (ISCST3) dispersion model. The ISCST3 model is a steady-state Gaussian plume model used to assess pollutant impacts from a variety of sources. This model can account for the following:

- Settling and dry deposition of particles
- Downwash
- Area, line and volume sources

- Plume rise as a function of downwind distance
- Separation of point sources
- Limited terrain adjustment.

ISC3 operates in both long-term and short-term modes. Regulatory “default” options were set in the ISCST3 model. This option automatically selects the use of stack tip downwash, final plume rise, buoyancy induced dispersion, the vertical potential temperature gradient, a treatment for calms, the appropriate wind profile exponents, the appropriate value for pollutant half-life, and a revised building wake effects algorithm.

Currently, Version 02035 of ISCST3 is used. The graphical user interface, ISC-AERMOD View, created by Lakes Environmental was used to facilitate model setup and post processing. ISCST3 was used in “refined” mode, with full receptor grids and five years of meteorological data.

Since the Facility will be operating all four units simultaneously, the existing three units were included in the refined air quality analyses.

6.2.3 Class I Impact Analysis

The Class I impact analysis is performed to protect areas of significant natural resources within 100 kilometers of the source. Compliance with PSD increments must be achieved, in addition to demonstrating that there are no significant adverse impacts to any air quality related value (AQRV) in the area. AQRVs are defined by the U.S. Forest Service as “features or properties of a Class I area that make it worthy of designation as a wilderness and that could be adversely affected by air pollution.” Examples of AQRVs are visibility, odor, water, and flora and fauna. The evaluation of additional impacts in Class I areas is presented in Section 7.

When the averaging time (1-hour) is significantly less than the transport time to the Class I receptors, the steady-state premise of a Gaussian plume dispersion model fails. The Interagency Workgroup on Air Quality Modeling (IWAQM) and Florida DEP recommend the use of the CALPUFF modeling system for long range transport and impacts to Class I areas. CALPUFF is a multi-layer, multi-species non-steady-state puff dispersion modeling system that simulates the effects of time- and space-varying meteorological conditions on pollutant transport, transformation, and removal. CALPUFF is intended for use on scales from tens of meters from a source to hundreds of kilometers. It includes algorithms for near-field effects such as building downwash, transitional buoyant and momentum plume rise, partial plume penetration, subgrid scale terrain, coastal interactions effects, and terrain impingement as well as longer range effects such as pollutant removal due to wet scavenging and dry deposition, chemical transformation, vertical wind shear, overwater transport, plume fumigation, and visibility effects of particulate matter concentrations.

The most recent available version of CALPUFF (currently Version 5.7 dated 030402) was used to assess impacts in the Class I areas. The ISCST3 input files were converted to

CALPUFF input files using the ISC2PUF program, and were run with three years of CALMET/MM5 meteorological data. The CALPOST program was used to extract the required concentration information from the hourly binary concentration file produced by CALPUFF.

Only the proposed Unit 4 was included in the Class I area air quality impact analysis.

6.2.4 Chemical Transformations

Section 6.2.4 of Appendix W to 40 CFR Part 51 outlines the acceptable procedures to obtain nitrogen dioxide (NO₂) impacts from emissions of oxides of nitrogen (NO_x). The initial screen is to assume all NO_x is converted to NO₂. Should NAAQS or PSD increments be exceeded, a conversion factor of 0.75 can be assumed. Should regulatory thresholds still be exceeded, a locally specific conversion factor can be calculated or the “ozone limiting method” can be used. It is expected that the assumption of 100% conversion of NO_x to NO₂ will produce conservative results. It is assumed that for the Class II analyses, the remaining criteria pollutants undergo no chemical transformations.

For the Class I impact analyses, the MESOPUFF II chemical transformation scheme incorporated into the CALPUFF model was used. CALPUFF internally converts sulfur dioxide to sulfate (SO₂ to SO₄⁼) and nitrogen oxides to nitrate aerosol (NO_x to NO₃⁻). To perform the conversions of NO_x to NO₃⁻, CALPUFF requires input of background values of ozone (O₃) and ammonia (NH₃). Guidance (Earth Tech, 2001) recommends monthly values of O₃ and NH₃ be input; however, these monthly values are difficult to acquire. Thus, a single background O₃ value was used, and the CALPUFF model default NH₃ value was assumed.

6.2.5 Averaging Periods

The screening analysis produces 1-hour average concentrations, since the meteorological data is a 54-record statistical data set to be considered to produce “worst case” concentrations.

For the subsequent analyses, pollutant-specific averaging periods were selected based on applicable ambient air quality standards and PSD increments. Typically, the modeled averaging periods are 1-hour (for CO), 3-hours (SO₂), 8-hours (CO), 24-hours (SO₂ and PM) and annual (NO₂, SO₂ and PM). Although the Pb standard is based on a quarterly average, the maximum 24-hour concentration was used to conservatively determine compliance with the standard. Since the short term concentrations (3 to 24 hours) are not to be exceeded more than once per year, the highest of the second highest concentrations at each receptor (H2H) are requested from the models. For annual concentrations, the highest concentration is used as that is the only averaged concentration and there is no second highest at each receptor.

FDEP guidance for calculating the PM₁₀ 24-hour average is to use the highest of the second highest results over one year of meteorological data, or the highest of the sixth highest results over five years of meteorological data. (Cleve Holladay, FDEP, telephone conversation, January 7, 2005). Since five years of meteorological data were used, CDM

compared the highest annual mean over five years to the annual concentration specified in the NAAQS ($50 \mu\text{g}/\text{m}^3$), and compared the highest of the sixth highest concentrations over five years to the 24-hour PM_{10} NAAQS ($150 \mu\text{g}/\text{m}^3$).

6.3 Facility Layout and Surrounding Terrain

Figure 6-1 shows a U.S. Geological Survey map of the area and the vicinity of the Facility. **Figure 6-2** presents a detailed layout of the Facility with the location of the sources, the areas of the Facility structure, nearby retention ponds, parking lots, and roadways. The property line is also shown.

The stack is approximately 420 feet (128 meters) from the closest northern property line, 490 feet (150 meters) from the closest southern property line, 600 feet (183 meters) from the closest western property line and 1,130 feet (344 meters) from the closest eastern property line. The stack is the primary source of air pollutant emissions. The Facility also has several minor particulate matter (PM) emissions sources:

- Two lime storage silos (two more will be added);
- One activated carbon storage silo (one more will be added); and
- A two-cell forced draft cooling tower (a third cell will be added).

The cooling tower is located approximately 110 meters west southwest of the stack, while the silos are located between the stack and the ash handling building. There is also an existing vent with a baghouse on the ash handling system building, which will not be changed with the project.

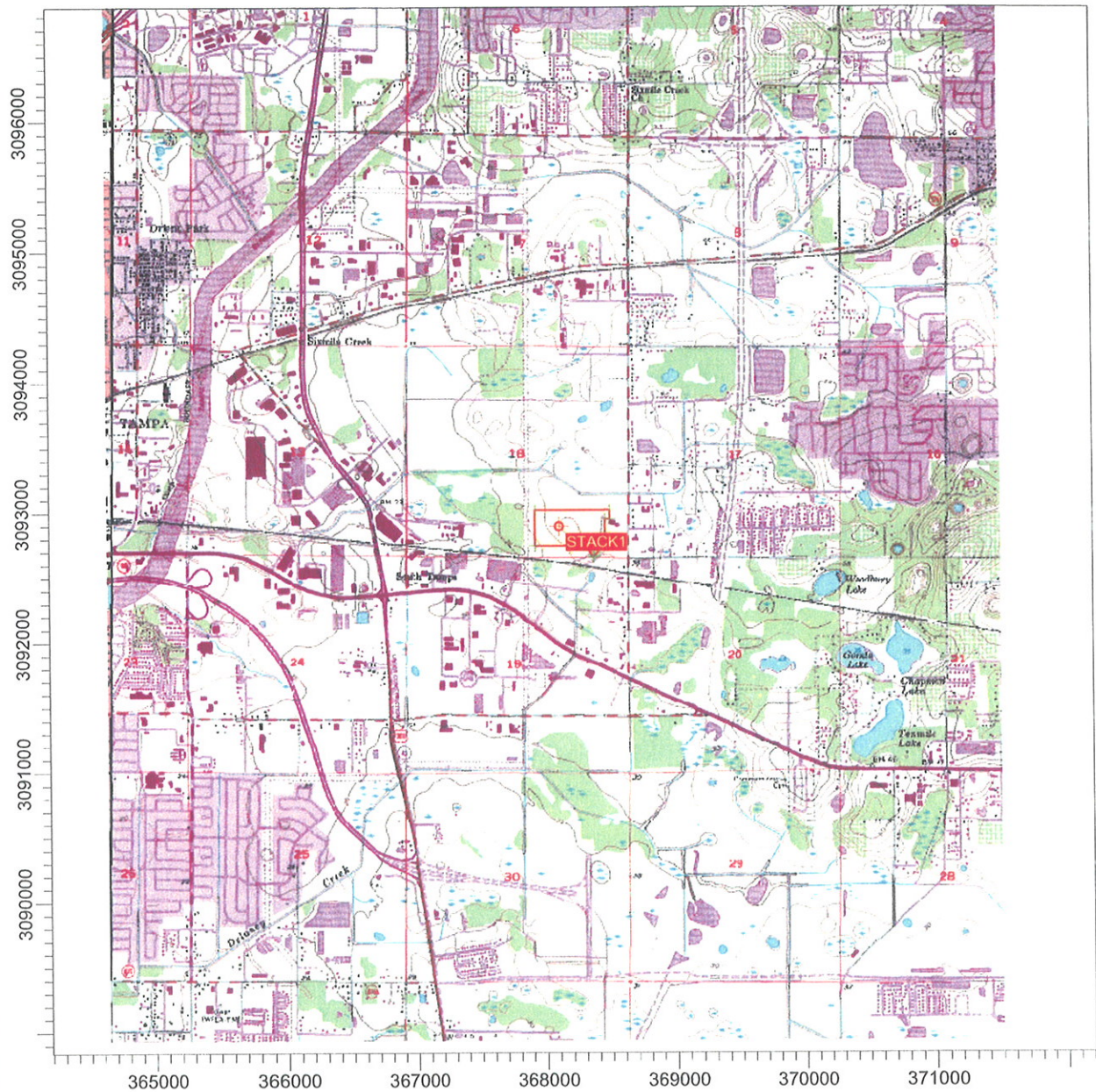
Although the terrain surrounding the facility is generally simple terrain (see discussion of terrain in Section 5) where there are areas to the east of the facility with elevations above stack base but below stack top (intermediate terrain). Thus, the option of using elevated terrain was used for the Class II modeling.

The Class I areas are approximately a minimum of 78 kilometers from the stack, and the general terrain of the Chassahowitzka Wildlife Refuge is approximately at sea level. The National Park Service has produced receptor files for this Class I area complete with terrain elevations. These terrain elevations were used in the Class I area modeling analysis.

The dispersion algorithms in the ISCST3 and SCREEN3 models are based on Pasquill-Gifford coefficients in rural areas and McElroy-Pooler coefficients in urban areas. Since CALPUFF was used in ISCST3 mode, this choice of dispersion coefficients also affected CALPUFF. Since more than 50% of the area within 3 km surrounding the stack can be classified as “rural”, the rural (Pasquill-Gifford) dispersion coefficients was used in each dispersion model. **Figure 6-3** presents the land use within the 3-km radius of the stack. The areas shaded in red indicate “urban” uses.

PROJECT TITLE:

**Hillsborough County Solid Waste Energy Recovery Facility
Unit 4 Prevention of Significant Deterioration Permit Application**



COMMENTS:

Figure 6-1

Locus Map

SOURCES :

1

COMPANY NAME:

CDM

RECEPTORS :

1656

MODELER:

Vincent R. Tino, CCM

0 1 km

DATE:

8/12/2004

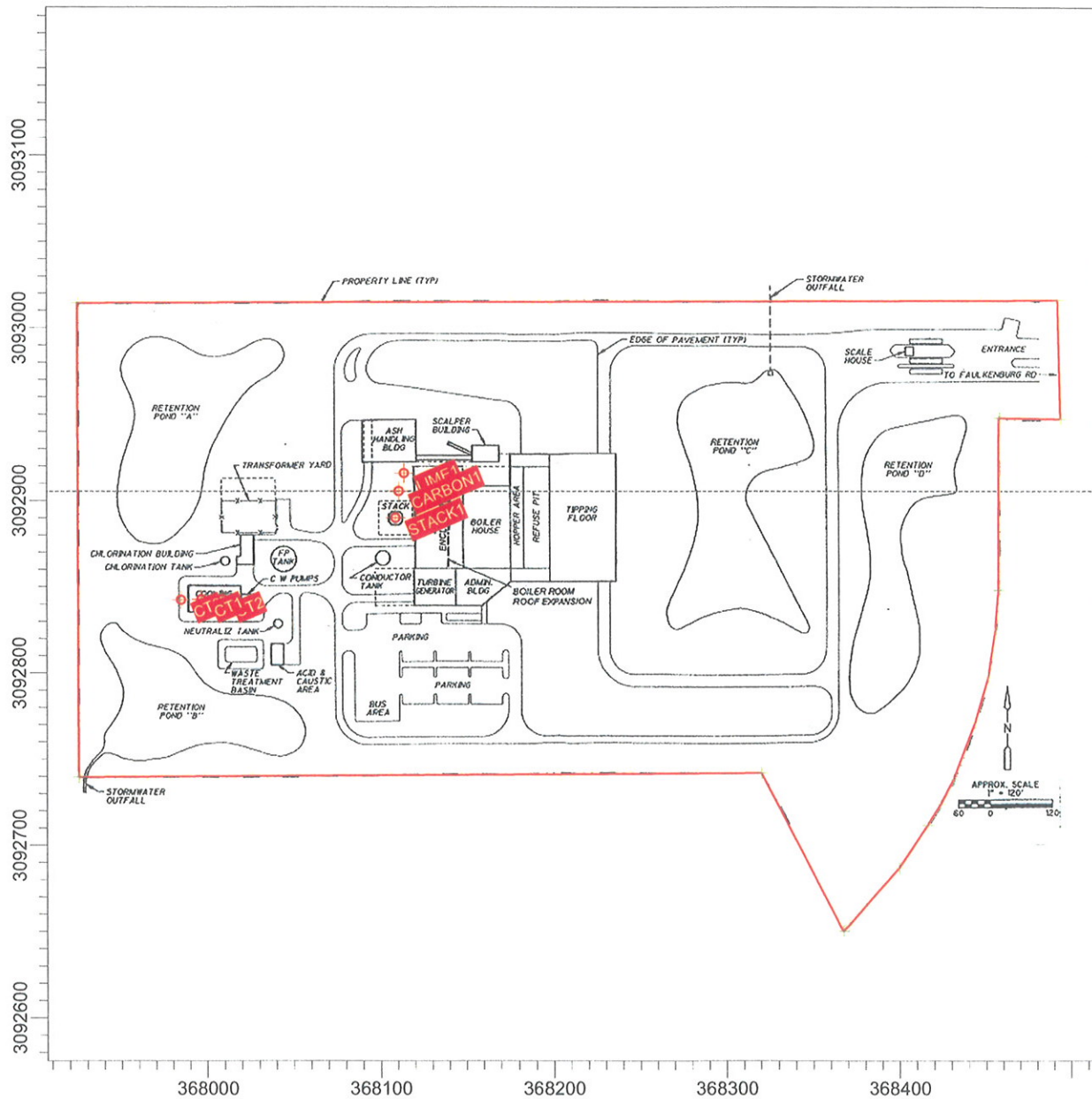
PROJECT NO.:

6033-40441-FE.PSD.MODEL

CDM

PROJECT TITLE:

**Hillsboro County Solid Waste Energy Recovery Facility
Unit 4 Prevention of Significant Deterioration Permit Application**



COMMENTS:

Figure 6-2
Site Plan Map

SOURCES :

6

COMPANY NAME:

CDM

RECEPTORS :

2557

MODELER:

Vincent R. Tino, CCM

0 0.1 km

DATE:

1/11/2005

PROJECT NO.:

6033-40441-FE.PSD.MODEL

CDM

**Hillsboro County Solid Waste Energy Recovery Facility
Unit 4 Prevention of Significant Deterioration Permit Application**

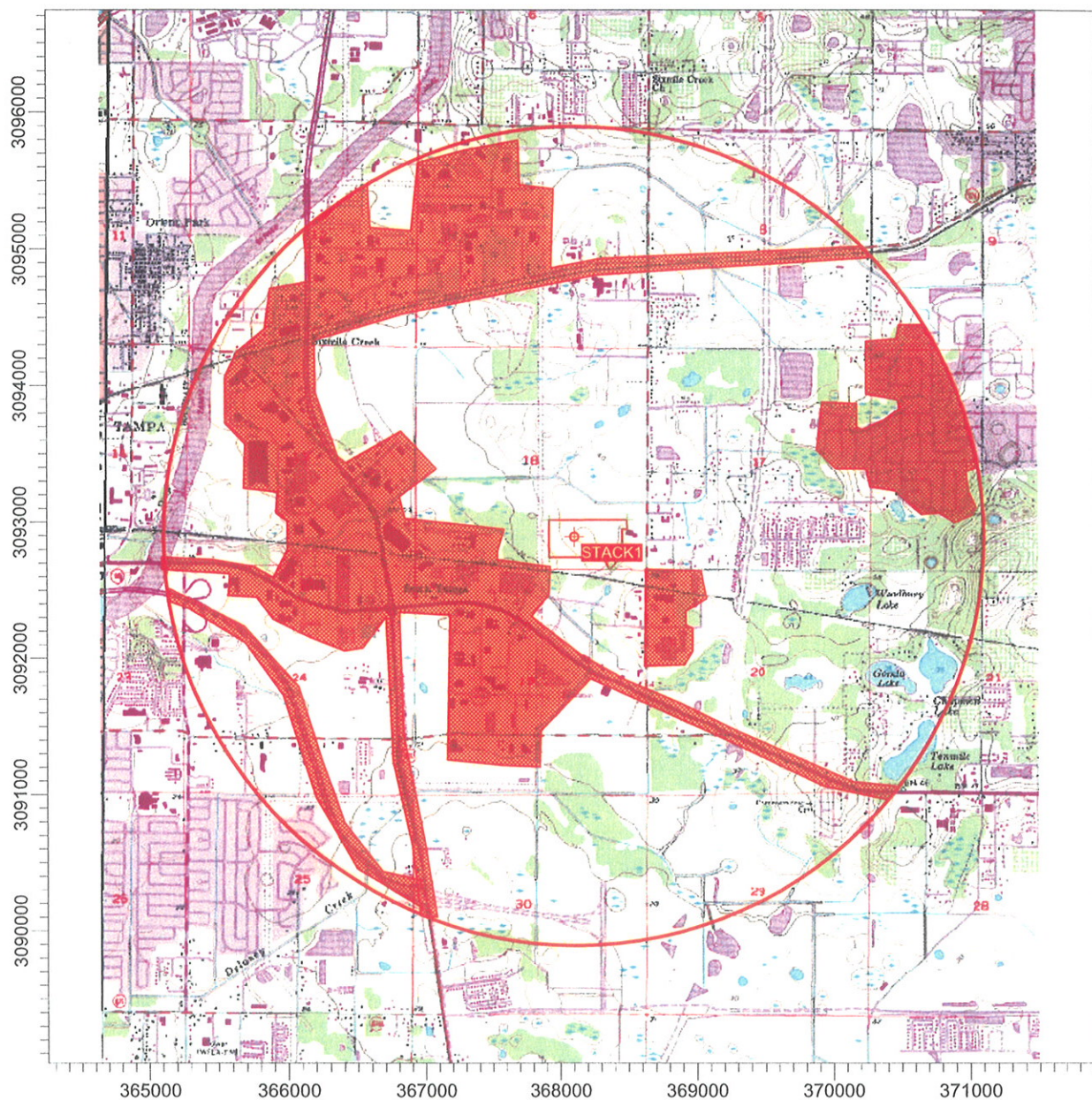


Figure 6-3

3-km Land Use Area

1

1656

CDM

Vincent R. Tino, CCM

A horizontal scale bar with a black bar between the '0' and '1 km' labels.

8/12/2004

CDM

6033-40441-FE.PSD.MODEL

6.4 Source Data

The primary emissions source at the facility is the boiler stack. The stack height is 67 meters (220 feet) and contains four flues. Three of the flues are connected to existing combustor units and have inside diameters of 1.651 meters (5 feet, 5 inches) each. The proposed fourth unit will be connected to an existing flue which will be flared to an inside diameter of 2.261 meters (7 feet, 5 inches) to accommodate the increased combustor size.

The stack parameters used in the screening analysis were obtained from Covanta. These include estimates of stack gas temperature and flow rate based on waste heating values, throughput, and boiler configuration. The proposed Unit 4 will be capable of operating under a range of thermal loads from 60 percent to 115 percent of a nominal 250 million British Thermal Units per hour (MMBtu/hr) gross heat input, and MSW throughputs from 60 percent to 110 percent of a nominal 600 tons per day, based on a range of possible MSW heat content from about 3,800 to 6,000 Btu per pound of MSW. This operating window is presented in **Figure 6-4**.

The eleven operating scenarios for Unit 4 are shown in **Table 6-1**. Operating scenarios 3, 6, and 8 are not considered viable, and were not evaluated. For the screening modeling analysis, a unitized emission rate of 1.0 grams per second (g/s) was used for the 100 percent of design heat input cases as shown Table 6-1. Because air pollutant emission rates are proportional to the heat input rate, the unitized emission rate used, for Cases 4 and 5 was 0.6 g/s, for Case 7, 0.77 g/s, and for Cases 10 and 11, 1.15 g/s.

Table 6-1 Municipal Waste Combustor Unit 4 Operating Window & Stack Parameters						
Operating Condition	Percent of Design Heat Input Rate	Waste Throughput (klbs/hr/unit)	Waste Heating Value (BTU/lb)	Heat Throughput (MMBTU/hr/unit)	Stack Gas Flow Rate (acfm)	Stack Gas Temp. (°F)
1	100	50.0	5,000	250.0	126,141	270°
2	100	41.7	6,000	250.0	125,421	270°
3	90	37.5	6,000	225.0	N/A	N/A
4	60	30.0	5,000	150.0	75,506	270°
5	60	42.9	3,500	150.0	76,258	270°
6	70	50.0	3,500	175.0	N/A	N/A
7	77	55.0	3,500	192.5	97,869	270°
8	80	55.0	3,636	200.0	N/A	N/A

Table 6-1 (Continued) Municipal Waste Combustor Unit 4 Operating Window & Stack Parameters						
Operating Condition	Percent of Design Heat Input Rate	Waste Throughput (klbs/hr/unit)	Waste Heating Value (BTU/lb)	Heat Throughput (MMBTU/hr/unit)	Stack Gas Flow Rate (acfm)	Stack Gas Temp. (°F)
9	100	55.0	4,545	250.0	125,578	270°
10	115	55.0	5,227	287.5	145,149	270°
11	115	47.9	6,000	287.5	144,234	270°

From Brian Bahor, Covanta Projects, Inc. to Jason Gorrie, CDM, October 18, 2004.

Hillsborough County used merge plume rise for modeling of the existing three units plus the new Unit No. 4. The calculated equivalent stack diameters and flow rates for modeling of merged plumes are shown in **Table 6-2**.

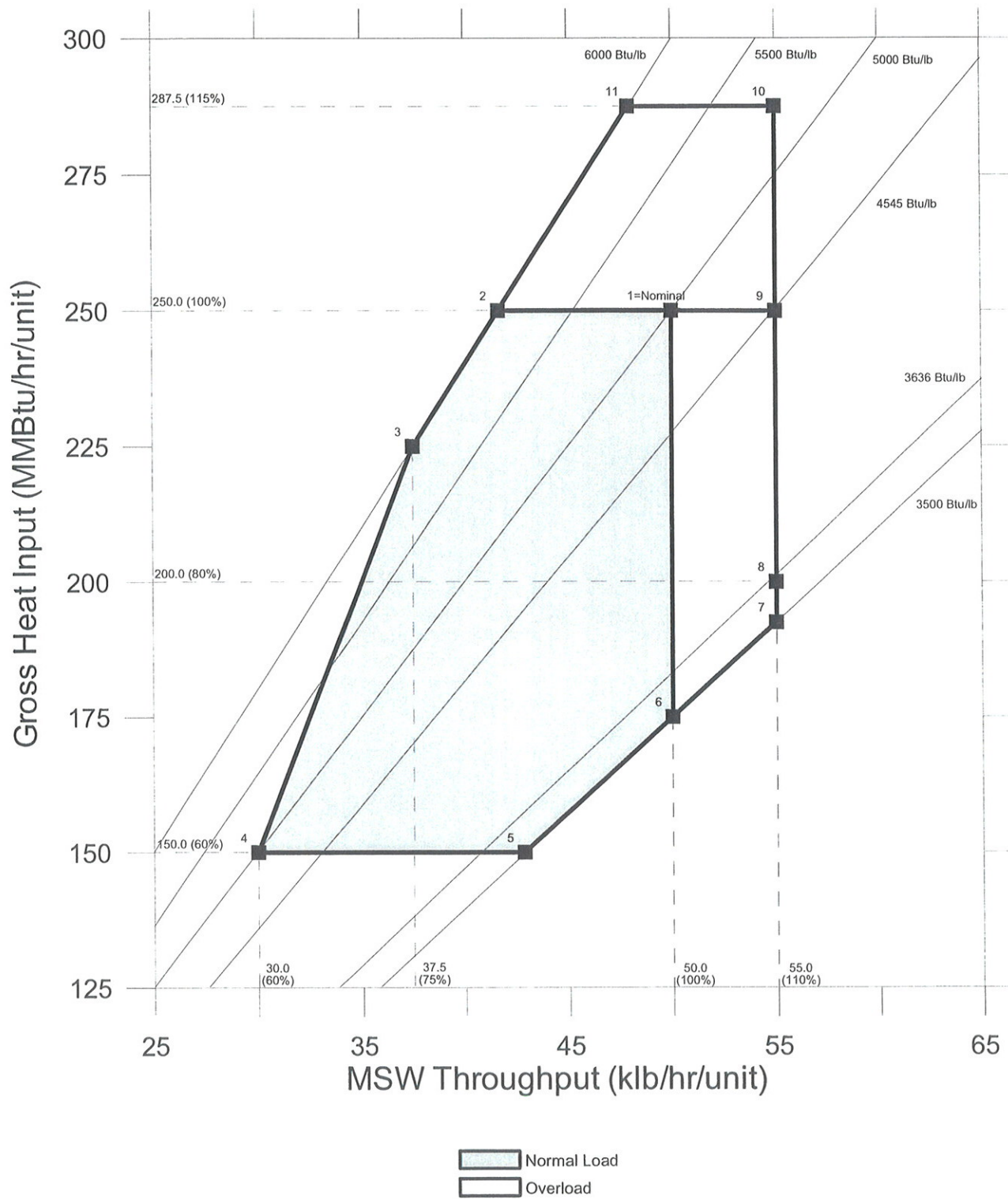


Figure 6-4
Hillsborough County Resource
Recovery Facility
Unit 4 Stoker Capacity Diagram

Table 6-2 Municipal Waste Combustor Existing Units' Stack Parameters			
Units Simultaneously Firing	Stack Gas Flow Rate (acfm)	Equivalent Stack Diameter (m)	Stack Gas Exit Temperature. (°F)
1	88,868	1.65	289
2	177,736	2.19	289
3	266,604	2.68	289
4	411,647	3.65	282

Based on modeling performed for the Air Pollution Control Retrofit Preconstruction Permit Application prepared in September, 1997.

A second of screening modeling was conducted to ensure that the worst-case operating condition was identified for the combined facility. Three additional model runs were conducted to evaluate when Unit 4 is operating with one, two and three existing units simultaneously.

In addition, particulate matter would be emitted from the cooling tower, ash handling facility, and air pollution control equipment storage silos (pelletized and dolomite lime and activated carbon). However, the storage silos were considered insignificant sources of particulate matter; therefore, only the new cooling tower cell was included in the refined modeling analyses.

6.4.1 Good Engineering Practice (GEP) Stack Height Analysis and Building Downwash

Building downwash occurs when structures influence the plume from a nearby stack. The Good Engineering Practice (GEP) stack height is defined for each nearby structure or combination of nearby structures, as the structure height plus 1.5 times the lesser of the projected structure height or width. The U.S. EPA has created computer software to calculate GEP stack height and building downwash parameters to be used in dispersion modeling. The Building Profile Input Program (BPIP) accounts for the locations and heights of nearby structures with respect to point sources and determines the structure which exerts the most significant aerodynamic influence.

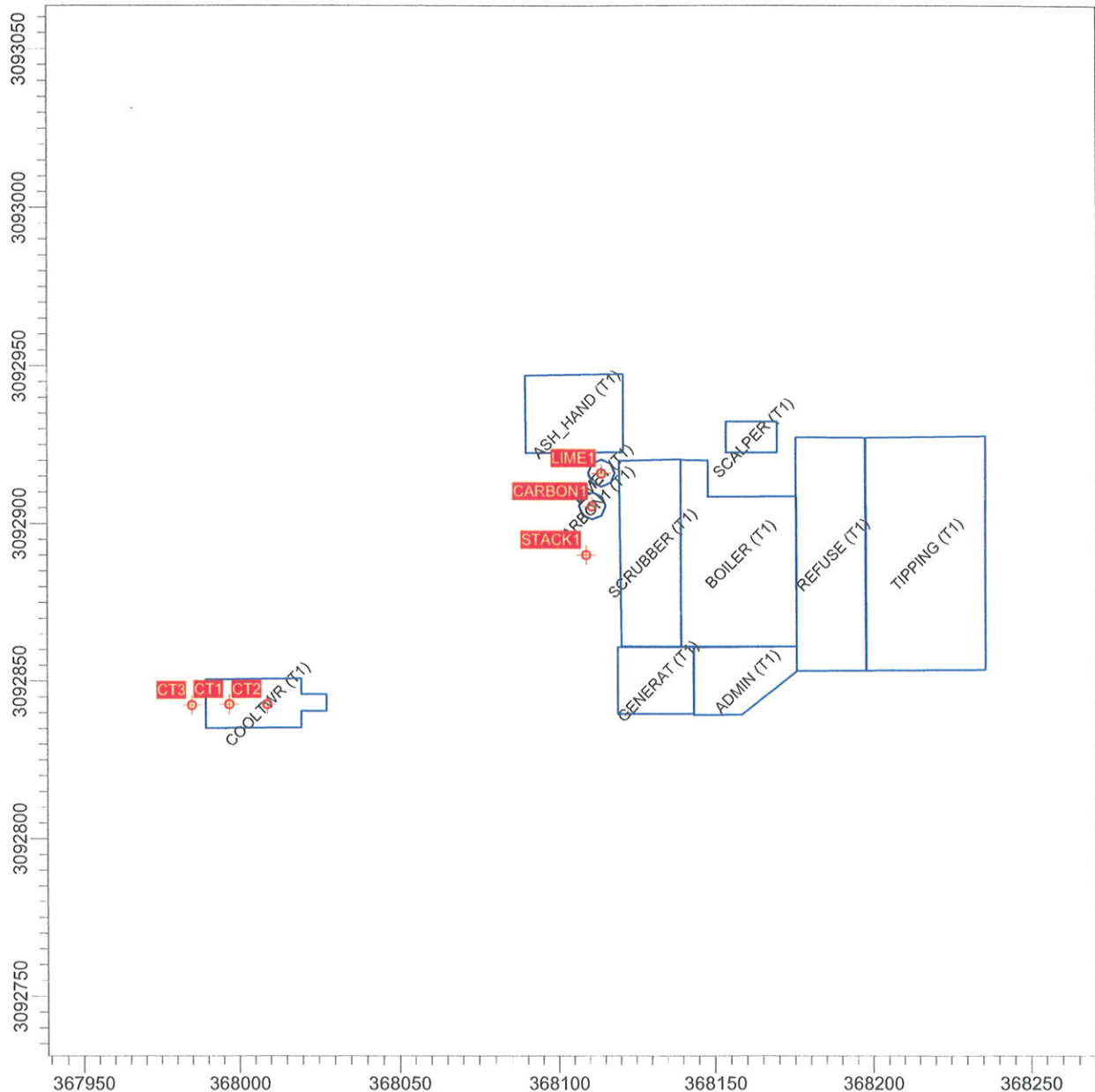
GEP analyses have been performed for this facility, showing that the existing 67 meter (220 feet) stack is within the area of influence of the main facility structure. The controlling structure or tier is the Boiler House with a tier height of 34 meters (111.5 feet). Thus, the calculated GEP stack height is 85 meters (279 feet). Therefore, the building downwash option was included in both the screening and refined modeling analyses.

The layout of the stack and buildings used in the GEP analysis are presented in **Figures 6-5** and **6-6**. The building tier heights are presented in **Table 6-3**.

Both the ISCST3 and CALPUFF dispersion models utilize the same 36 direction specific building parameters for downwash calculations. The SCREEN3 dispersion model uses the height, and the maximum and minimum projected widths of the dominant building for its downwash and cavity calculations. These values were taken from the output produced by BPIP.

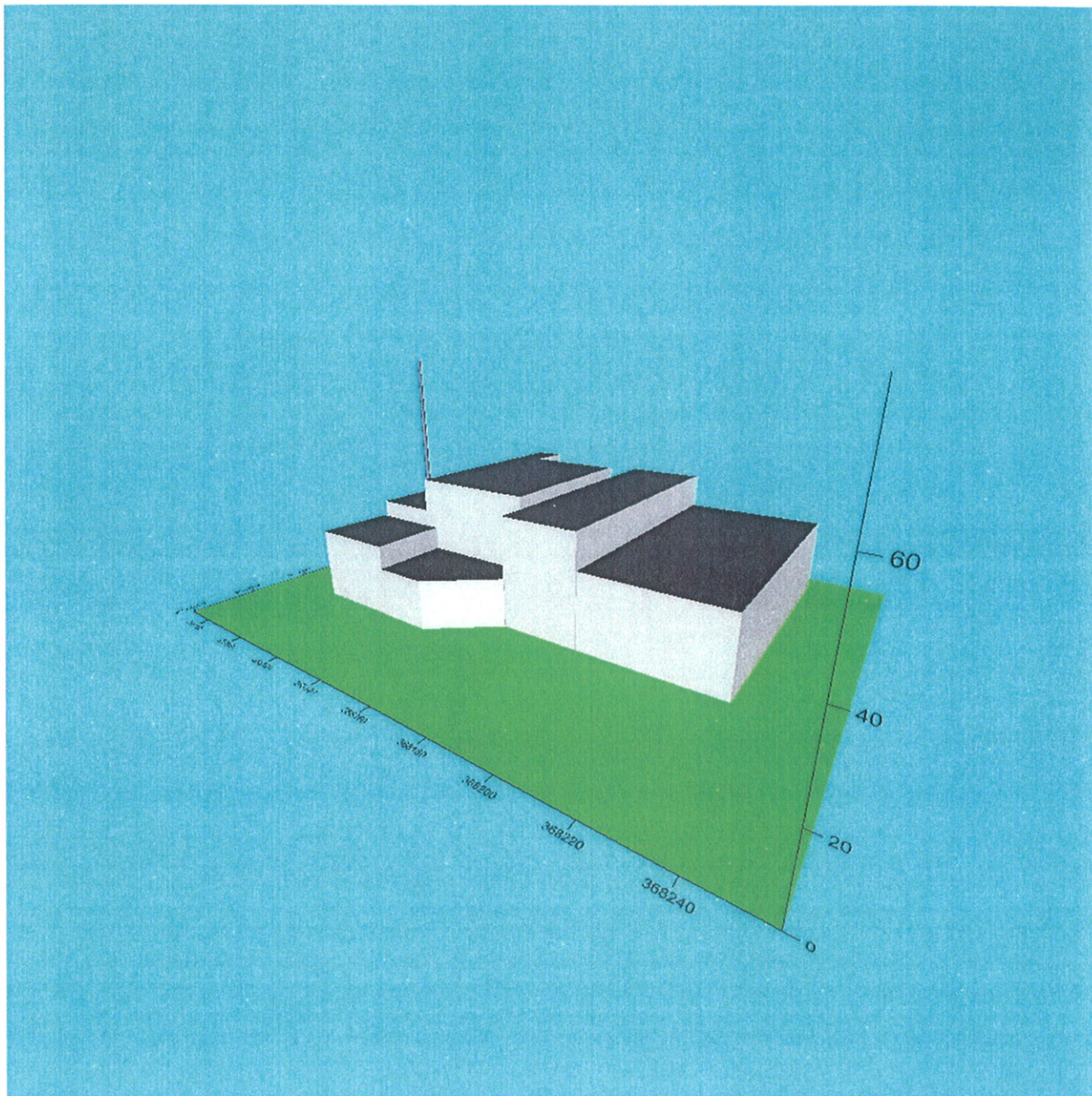
PROJECT TITLE:

**Hillsboro County Solid Waste Energy Recovery Facility
Unit 4 Prevention of Significant Deterioration Permit Application**



COMMENTS: Figure 6-5 GEP Stack Height Analysis Building Layout	BUILDINGS: 11		COMPANY NAME: CDM	
	SOURCES: 6		MODELER: Vincent R. Tino, CCM	
			0  0.05 km	
			DATE: 1/11/2005	PROJECT NO.: 6033-40441-FE.PSD.MODEL

Hillsboro County Solid Waste Energy Recovery Facility Building Downwash & GEP Analysis



GEP Stack Height Analysis 3-D Building Layout

Vincent Tino



6033-40441-FE.PSD.MODEL

Table 6-3 BPIP Building Tiers and Heights		
Tier Name	Roof Elevation (amsl)	Tier Height (m)
Ash handling	80 feet	12.5
Administration	84 feet	13.7
Refuse	140 feet	30.7
Tipping	108 feet	21.0
Scrubber	120 feet	24.7
Boiler/SCR	150 feet	34.0
Scalper	65 feet	7.9
Pelletized Lime Silo	108 feet	21
Dolomitic Lime Silo	82 feet	13
Activated Carbon Silo	101 feet	19
Cooling Tower	78 feet	12
Generator	105 feet	20

Ground elevation (amsl) is approximately 36-39 feet (11-12 meters).

6.5 Receptor Network

The screening analysis was performed solely to identify the worst facility operating condition. SCREEN3 allows the input of an automated distance array. The model accepts beginning and ending distances and automatically calculates downwind distances at discrete intervals. A beginning limit of 100 meters and an ending distance of 20 km was input. Flat terrain was assumed for this screening level analysis.

For the Class II refined modeling analyses, a Cartesian coordinate centered on the facility stack was used for the full modeling analysis to develop normalized pollutant concentration contour plots. The receptor grid spacing was 100 meters out to 10 kilometers. Since public access to the property is restricted, receptors located within plant boundaries were removed from the analysis. However, receptors were placed along the property boundary at a maximum spacing of 50 meters. A minimum of 1440 receptors were included in this grid.

It is U.S. EPA policy that major sources within 100 km of Class I areas show no significant adverse impacts to the Class I area. Sources at distances greater than 100 km may be required to show impacts if the reviewing agency deems that the proposed project “may affect” the Class I area. Receptors were placed in the Chassahowitzka Wildlife Refuge, located approximately 78 kilometers to the north-northwest of the facility. FDEP requires evaluating potential impacts to Class I areas located within 200 km of a facility. There are no formally designated Class I areas within 200 km of the Facility. The National Park Service has produced standard sets of receptors for Class I modeling analyses (National Park Service, 2004).

6.6 Meteorological Data

The SCREEN3 model used in the screening analysis contains 54 records of combinations of wind speed, Pasquill-Gifford stability class (A-F), and mixing height which are expected to produce the worst-case impacts from a source. Ten-meter wind speeds (u_{10}) range from 1 m/s to 20 m/s at varying increments. The six P-G stability classes are used, and mixing heights are set to $320u_{10}$. For stable conditions (E & F), mixing heights are set to 10,000 meters to represent unlimited mixing.

Meteorological data from the Tampa International Airport was used in the subsequent dispersion modeling analyses for Class II areas. The Tampa International Airport, approximately 6.7 miles (10.8 km) to the west of the Hillsborough County Facility, is the National Weather Service Station (WBAN Station No. 12842) closest to the site, and observed meteorological data is most representative of the site vicinity. Meteorological data needed for the ISCST3 model, and available from this station, include hourly readings of temperature, wind speed, wind direction, and total opaque cloud cover (atmospheric stability), as well as twice-daily measurements of upper air data used to calculate mixing heights. FDEP has provided most recent available five years of combined surface and upper air data (1991 through 1995) for use on this project. Because FDEP has already preprocessed these data (filling any data gaps), no further processing of this meteorological data was performed before using it in the ISCST3 model.

Although CALPUFF accepts meteorological data files in ISCST3 format, CALPUFF requires micrometeorological variables not present in the basic meteorological files used for ISCST3. Hourly values of friction velocity, Monin-Obukhov length, relative humidity, and solar radiation are not generally included in the ISCST3 format. However, CALPUFF is significantly more accurate when using gridded meteorological data fields produced by its meteorological preprocessor, CALMET. CALMET incorporates National Weather Service surface observations and sounding data, land use data, terrain data, and gridded mesoscale meteorological model (MM5) data to quantify hourly wind fields in both horizontal and vertical dimensions. According to discussions with the Division of Air Resource Management at the FDEP, CALPUFF with three years of CALMET/MM5 data is the requirement for long range/Class I areas. (Email Communication, Cleve Holladay, July 21, 2004). CDM obtained CALMET/MM5 data for 1990, 1992 and 1996 from FDEP. Since FDEP provided these data to the County, no additional preprocessing of these data was performed prior to using them in CALPUFF.

6.7 Screening Modeling Results

The SCREEN3 model was run according to the aforementioned methodology. A unit emission rate (1 g/s) was used to produce normalized concentrations ($\mu\text{g}/\text{m}^3$ per g/s). An ambient atmospheric temperature of 293 K (68°F) was input. In addition, SCREEN3 utilizes basic building dimensions to account for downwash. A maximum building height of 34 meters, a maximum projected building width of 69.39 meters, and a minimum projected building width of 29.9 meters were input. The results of the screening-level modeling are presented in **Table 6-4**.

Table 6-4 shows that Unit 4 only Operating Condition 10 to be the worst-case scenario, with a maximum normalized concentration of $4.101 \mu\text{g}/\text{m}^3$ at a downwind distance of 341 meters. The stack parameters associated with this operating condition were then used in all subsequent analyses. In addition, for each operating condition, concentrations predicted in the cavity region were set to 0.0 by the SCREEN3 model, since the calculated “critical wind speed” is greater than 20 m/s. The “critical wind speed” is defined as the wind speed that would calculate the plume centerline height equal to the calculated cavity height.

Screening modeling of Unit 4 plus the existing MWC units was conducted to determine which facility operating condition would generate the highest air quality impacts. The operating conditions evaluated were: one existing MWC unit plus Unit 4, two existing MWC units plus Unit 4, and all four units operating simultaneously. The results showed that all four units operating simultaneously produced the highest normalized concentration of $8.676 \mu\text{g}/\text{m}^3$. Therefore, refined modeling was conducted for Unit 4 only and combined facility (all four units operating) based on the screening modeling results.

6.8 Refined and Class I Area Modeling Results

Since Unit 4 will be operating in addition to the existing units, additional modeling was performed to determine the maximum increase in facility impacts as well as maximum impacts due to the combined facility (all four units). The stack characteristics for the existing facility are presented in Table 6-2. Based on the initial screening analysis, it was determined that Operating Condition #10 produced the worst-case results. The stack airflow associated with Condition #10 (145,149 acfm) combined with a stack flue diameter of 2.261 meters produced an effective stack gas velocity of 17.061 m/s based on a gas exit temperature of 405.4 °K. CDM calculated the merged plume parameters for all four MWC units operating simultaneously to determine the combined facility impacts. The stack airflow associated with a merged plume (411,647 acfm) combined with a stack flue diameter of 3.65 meters produced an effective stack gas velocity of 18.60 m/s. based on a gas exit temperature of 412 °K. **Table 6-5** presents the source parameters for the Unit 4, and the combination of all four MWC and the existing and new cooling tower cells.

Air dispersion modeling was performed for both the entire facility and Unit 4 separately. In addition to estimating facility impacts due to emissions from both the existing and proposed MWC units, modeling analyses were also conducted to determine the maximum increase in facility impacts due to the proposed MWC unit. Operation of

Table 6-4 Municipal Waste Combustor Screening Modeling Results					
Operating Condition	Stack Gas Flow Rate (acfm)	Stack Gas Temp. (°F)	Emission Rate (g/s)	Maximum Normalized Concentration (µg/m³)	Downwind Distance (m)
Unit 4 Only Operating Scenarios					
1	126,141	270 °	1.000	4.015	341
2	125,421	270 °	0.994	4.010	341
3	N/A	N/A	N/A	N/A	N/A
4	75,506	270 °	0.599	3.421	780
5	76,258	270 °	0.605	3.452	780
6	N/A	N/A	N/A	N/A	N/A
7	97,869	270 °	0.776	3.583	833
8	N/A	N/A	N/A	N/A	N/A
9	125,578	270 °	0.996	4.014	341
10	145,149	270 °	1.151	4.101	341
11	144,234	270 °	1.143	4.095	341
Existing Units + Unit 4 Operating Scenarios					
1 existing MWC Unit + Unit 4	234,048	277	2.291	6.128	341
2 existing MWC Units + Unit 4	322,956	281	3.431	7.235	340
3 existing MWC Units + Unit 4	411,647	282	4.571	8.676	340

Emissions for screening purposes are based on the ratio of the flow rate at each operating condition to the flow rate of the nominal condition (Operating Condition #1).

Table 6-5 Existing and New Sources Parameters					
Source	Source Type	Release Height (m)	Exit Velocity (m/s)	Exit Temperature (K)	Effective Release Diameter (m)
MWC Unit 4 (new)	Point	67	17.1	405	2.26
All MWC Units (combined)	Point	67	18.6	412	3.65
Cooling Tower Cell 1	Point	12	5.4	Ambient	8.5
Cooling Tower Cell 2	Point	12	5.4	Ambient	8.5
Cooling Tower (new third cell)	Point	12	5.4	Ambient	8.5

Unit 4 by itself would be expected to cause the largest increase in facility impacts. This is because plume rise for the three existing units would be enhanced by the addition of Unit 4. As shown in **Table 6-6**, the Unit 4 normalized impacts do cause the largest increase in facility impacts compared to the combined facility. The predicted normalized impacts for Unit 4 only are presented in contour plots to illustrate their distribution in the vicinity of the site. **Figures 6-7 through 6-11** show the normalized impacts predicted for the Unit 4 only for annual, 24-hour, 8-hour, 3-hour and 1-hour averaging periods, respectively. In each case, the distribution of impacts shown is based on the specific year in which the limiting impact (highest annual average concentration or H2H concentration) was predicted.

Table 6-6 Unit 4 and Facility Normalized Modeled Concentrations						
Averaging Period	Normalized Concentrations (($\mu\text{g}/\text{m}^3$)/(g/s))					
	1991	1992	1993	1994	1995	5-Year Max.
Unit 4 Only						
Annual High	0.04503	0.05214	0.04581	0.04329	0.04302	0.05214
1-hr High	3.30670	3.53275	3.64718	3.32593	3.73505	3.73505
1-hr H2H	3.18008	3.13700	3.13726	3.19354	3.29711	3.29711

Table 6-6 (Continued) Unit 4 and Facility Normalized Modeled Concentrations						
3-hr High	2.47986	2.44592	2.25742	2.23077	2.17294	2.47986
3-hr H2H	1.84781	1.99205	2.10032	1.72497	1.86379	2.10032
8-hr High	1.24763	1.33067	1.69073	1.25488	1.34639	1.69073
8-hr H2H	1.06371	1.12710	1.42975	1.05430	1.25842	1.42975
24-hr High	0.75597	0.70088	0.82471	0.80766	0.90107	0.90107
24-hr H2H	0.71808	0.60740	0.74011	0.62872	0.63998	0.74011
Facility (All Four Units)						
Annual High	0.01330	0.01770	0.01689	0.01356	0.01601	0.01770
1-hr High	1.98608	1.81704	2.15003	1.70709	2.67502	2.67502
1-hr H2H	1.52931	1.48275	1.62699	1.52726	1.56978	1.62699
3-hr High	1.14726	1.13094	1.42083	1.10535	0.95236	1.42083
3-hr H2H	0.94700	0.95827	1.04287	0.97907	0.84827	1.04287
8-hr High	0.65028	0.64520	0.72848	0.76927	0.80462	0.80462
8-hr H2H	0.50707	0.54506	0.53921	0.52163	0.65455	0.65455
24-hr High	0.40452	0.32780	0.37082	0.46055	0.50634	0.50634
24-hr H2H	0.36625	0.28986	0.30509	0.27618	0.32284	0.36625

H2H = Highest, Second-Highest.

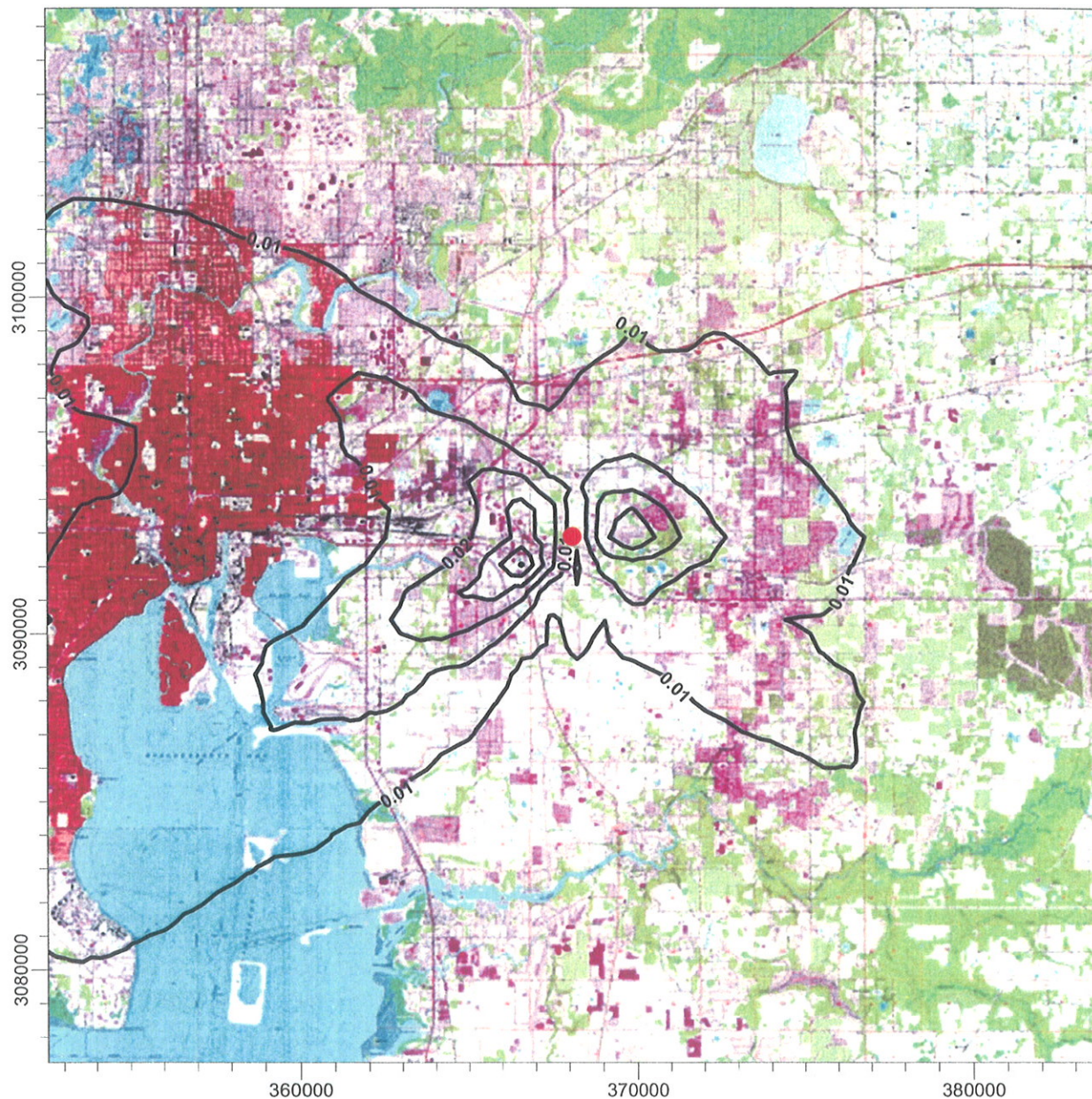
Unit 4 and combined facility emissions rates (in grams per second), presented in **Table 6-7**, were multiplied by the normalized concentrations, presented in Table 6-5, to calculate pollutant-specific concentrations for each averaging period as follows:

$$\text{Pollutant Conc. (ug/m}^3\text{)} = \text{Normalized Conc. (ug/m}^3\text{/g/s)} \times \text{Poll. Emiss. Rate (g/s)}$$

The pollutant-specific concentrations were compared to applicable increments and standards discussed below.

PROJECT TITLE:

**Hillsborough County Resource Recovery Facility
Unit 4 Prevention of Significant Deterioration Permit Application**



COMMENTS:

**Figure 6-7
Unit 4
Maximum Annual
Normalized Impacts**

MODELING OPTIONS:

CONC, RURAL, ELEV, HE>ZI

OUTPUT TYPE:

CONC

MAX:

0.05945

RECEPTORS:

42150

UNITS:

µg/m³

COMPANY NAME:

CDM

0 5 km

CDM

DATE:

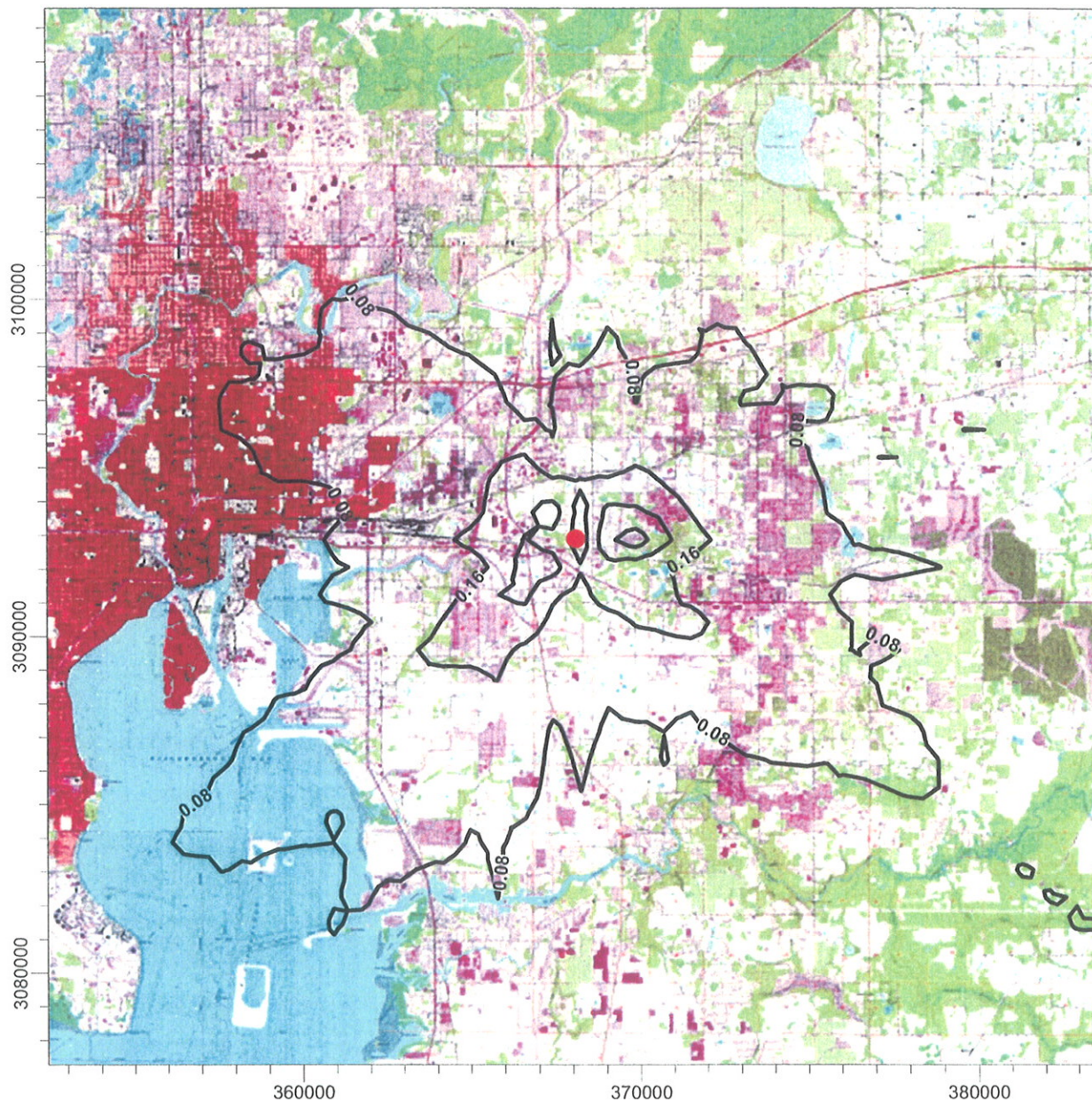
6/10/05

PROJECT NO.:

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PROJECT TITLE:

**Hillsborough County Resource Recovery Facility
Unit 4 Prevention of Significant Deterioration Permit Application**



COMMENTS:

**Figure 6-8
Unit 4
24-Hour High 2nd High
Normalized Impacts**

MODELING OPTIONS:

CONC, RURAL, ELEV, HE>ZI

OUTPUT TYPE:

CONC

MAX:

0.7424

RECEPTORS:

42150

UNITS:

$\mu\text{g}/\text{m}^3$

COMPANY NAME:

CDM

0 5 km

DATE:

6/10/05

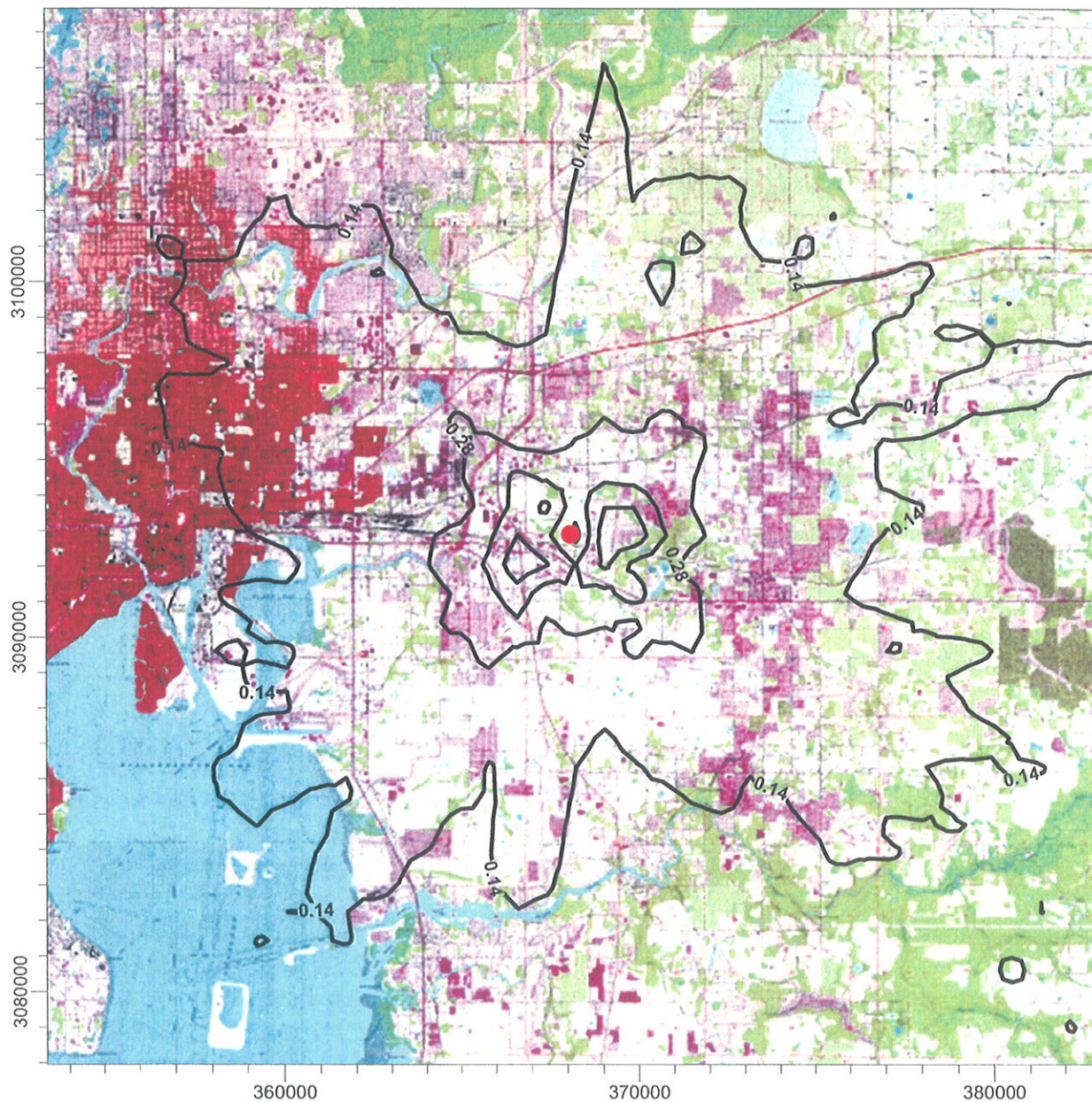
CDM

PROJECT NO.:

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PROJECT TITLE:

**Hillsborough County Resource Recovery Facility
Unit 4 Prevention of Significant Deterioration Permit Application**



COMMENTS:

**Figure 6-9
Unit 4
8-Hour High 2nd High
Normalized Impacts**

MODELING OPTIONS:

CONC, RURAL, ELEV, HE>ZI

OUTPUT TYPE:

CONC

MAX:

1.25842

RECEPTORS:

42150

UNITS:

µg/m³

COMPANY NAME:

CDM

0 5 km

DATE:

6/10/05

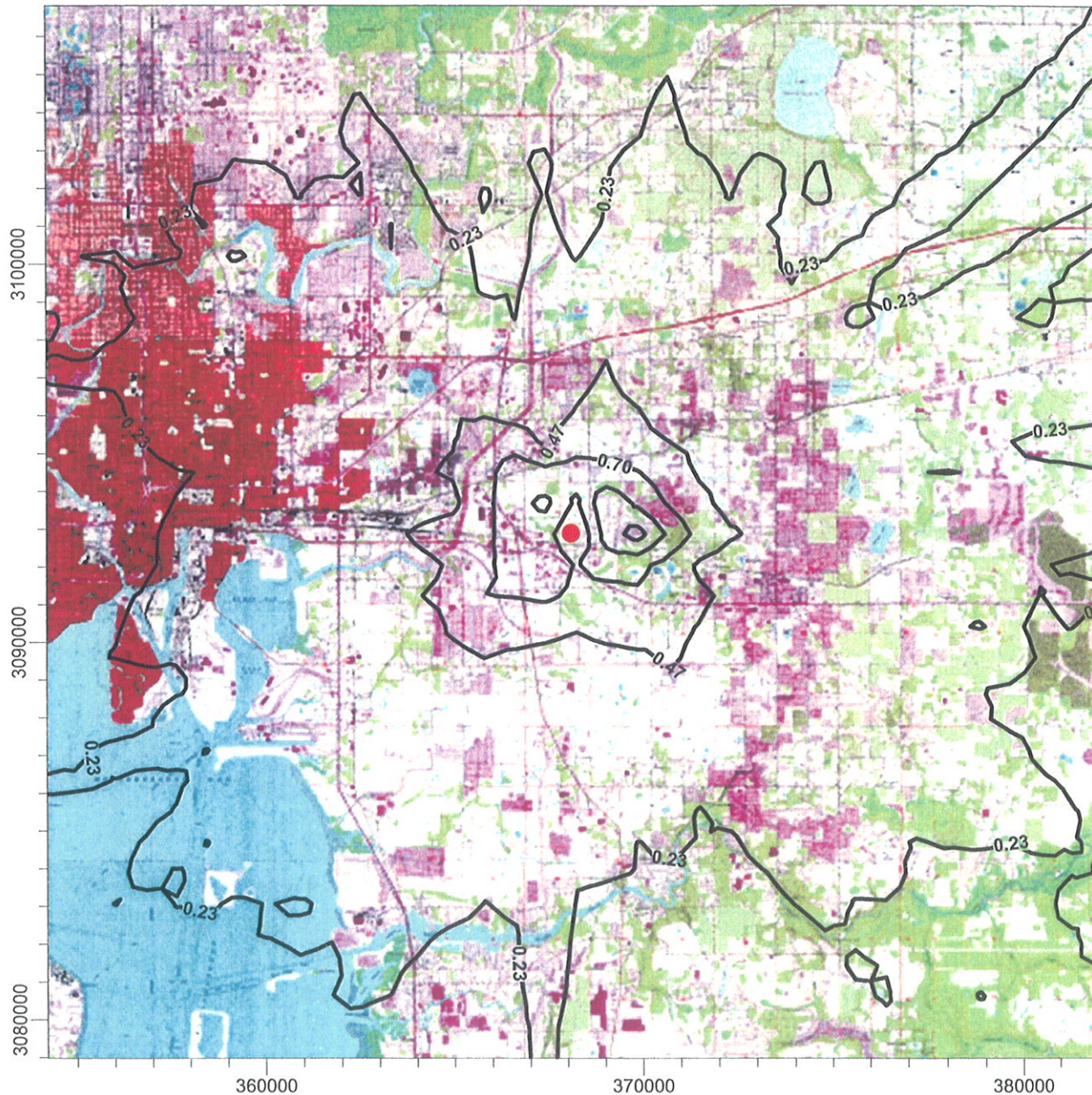
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PROJECT TITLE:

**Hillsborough County Resource Recovery Facility
Unit 4 Prevention of Significant Deterioration Permit Application**



COMMENTS:

**Figure 6-10
Unit 4
3-Hour High 2nd High
Normalized Impacts**

MODELING OPTIONS:

CONC, RURAL, ELEV, HE>ZI

COMPANY NAME:

CDM

OUTPUT TYPE:

CONC

RECEPTORS:

42150

MAX:

2.10032

UNITS:

µg/m³

DATE:

6/10/05

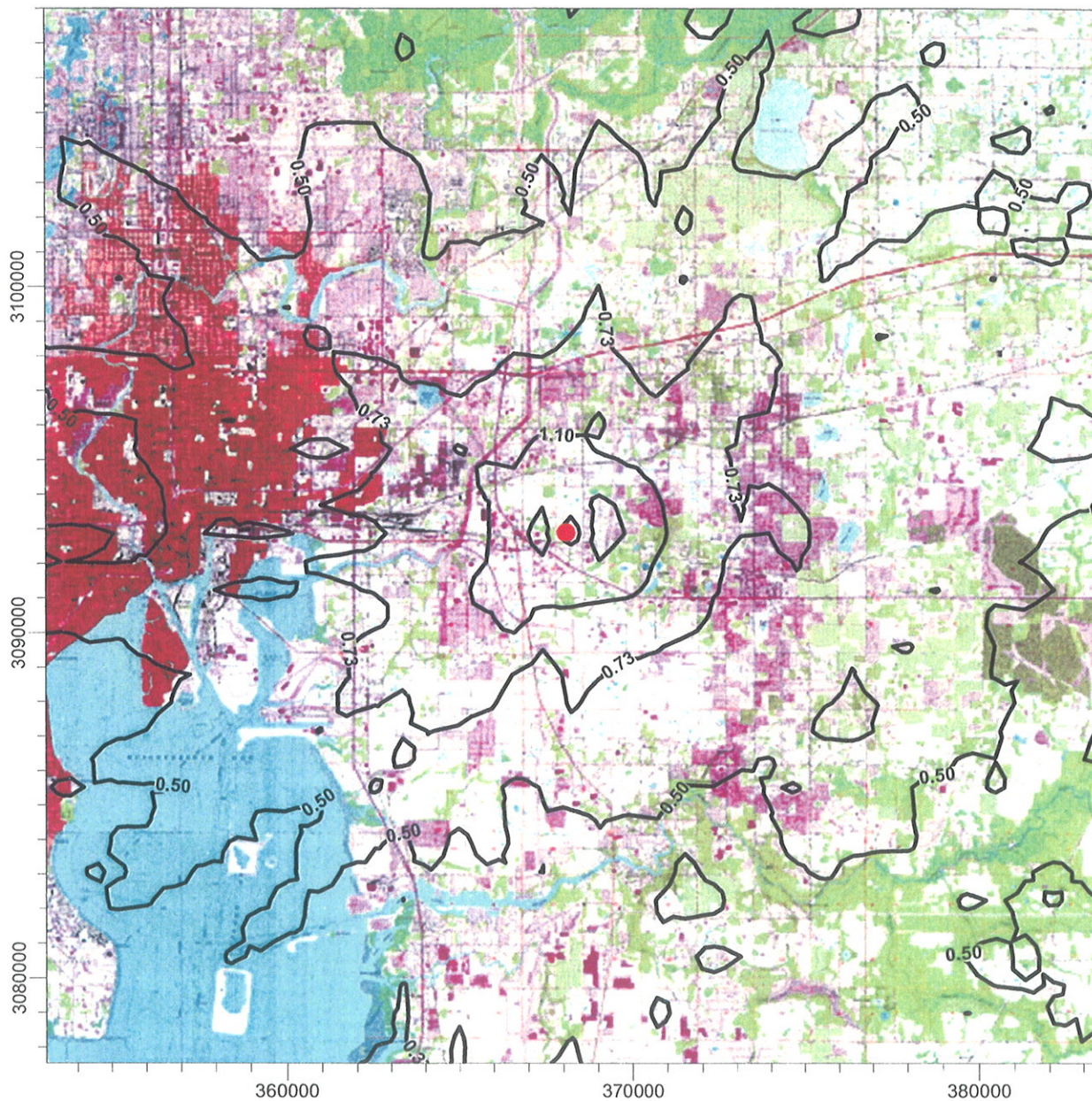
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PROJECT NO.:

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PROJECT TITLE:

**Hillsborough County Resource Recovery Facility
Unit 4 Prevention of Significant Deterioration Permit Application**



COMMENTS:

**Figure 6-11
1-Hour High 2nd High
Normalized Impacts**

MODELING OPTIONS:

CONC, RURAL, ELEV, HE>ZI

COMPANY NAME:

CDM

OUTPUT TYPE:

CONC

RECEPTORS:

42150

MAX:

3.29711

UNITS:

$\mu\text{g}/\text{m}^3$

DATE:

6/10/05

PROJECT NO.:

0 5 km

CDM

6.8.1 Significant Impact Levels and De Minimis Monitoring Levels

Maximum increases in facility impacts due to Unit 4 are compared to the Class II Significant Impact Levels (SILs) in **Table 6-8**. Maximum impacts due to Unit 4 are less than Class II SILs for all criteria pollutants (SO₂, NO_x, CO, PM₁₀ and Pb). Impacts are less than 25 percent of the SILs for CO, PM₁₀ and Pb, 44 percent of less of the SILs for SO₂ and 38 percent of the SIL for NO_x. SILs are concentrations below which a facility would not be considered to cause or contribute to a violation of the NAAQS (40 CFR 51.165(b)(2)). For pollutant/averaging periods with predicted impacts below the SIL, no further analysis is required.

Table 6-7 Existing Facility and Unit 4 Modeling Emissions Rates					
Pollutant	Emission Rates (g/s)				
	Existing Facility			New	Total
	Unit 1	Unit 2	Unit 3	Unit 4	
Sulfur Dioxide (SO ₂)	4.14	4.14	4.14	2.42	14.85
Nitrogen Oxides (NO _x)	7.39	7.39	7.39	7.37	29.53
Carbon Monoxide (CO)	2.19	2.19	2.19	3.26	9.84
Particulate Matter (PM)	0.52	0.52	0.52	0.72	2.27
Dioxin	5.67E-07	5.67E-07	5.67E-07	4.55E-07	2.16E-06
Mercury (Hg)	2.52E-03	2.52E-03	2.52E-03	4.67E-03	1.22E-02
Cadmium (Cd)	7.56E-04	7.56E-04	7.56E-04	7.00E-04	2.97E-03
Lead (Pb)	8.19E-03	8.19E-03	8.19E-03	7.00E-03	3.16E-02
Hydrogen Chloride (HCl)	2.14	2.14	2.14	3.20	9.62
Hydrogen Fluoride (HF)	0.13	0.13	0.13	0.10	0.48
Volatile Organic Compounds (VOCs)	--	--	--	2.14	2.14
Sulfuric Acid Mist (SAM)	--	--	--	0.72	0.72
Metals (as PM)	--	--	--	1.24	1.24
Ammonia (NH ₃)	--	--	--	1.90	14.32

Table 6-8 Unit 4 Only Comparison of Unit 4 Only Maximum Impacts to SILs								
Pollutant	Unit 4 Maximum Impacts (ug/m ³)						SIL (ug/m ³)	Percent of SIL
	1991	1992	1993	1994	1995	5- Year Max.		
NO _x Annual	0.33	0.38	0.34	0.32	0.32	0.38	1	38%
CO 1-hr	10.79	11.52	11.90	10.85	12.18	12.18	2000	1%
CO 8-hr	4.07	4.34	5.51	4.09	4.39	5.51	500	1%
SO ₂ 3-hr	6.01	5.93	5.47	5.41	5.27	6.01	25	24%
SO ₂ 24-hr	1.83	1.70	2.00	1.96	2.18	2.18	5	44%
SO ₂ Annual	0.109	0.13	0.11	0.10	0.10	0.13	1	13%
PM ₁₀ 24-hr	0.60	0.53	0.46	0.68	0.72	0.72	5	14%
PM ₁₀ Annual	0.24	0.06	0.05	0.06	0.06	0.24	1	24%
Pb Quarter	0.005	0.005	0.006	0.006	0.006	0.006	0.03	21%

The maximum 24-hour modeled concentrations were used to conservatively determine compliance with quarterly value.

The purpose of comparing facility impacts to de minimis monitoring levels is to determine if ambient air quality monitoring will be required to define background air quality prior to submitting the air permit application. A proposed facility that is considered a major source under the PSD regulations is required to evaluate ambient air quality levels in the vicinity of the facility. Maximum increases in facility impacts due to Unit 4 are compared to de minimis monitoring levels in **Table 6-9**. Maximum impacts due to Unit 4 are less than the de minimis monitoring levels for all pollutants. Therefore, the County is requesting that Unit 4 be exempt from preconstruction ambient monitoring under the PSD regulations.

Table 6-9 Comparison of Unit 4 Maximum Impacts to De Minimis Monitoring Levels			
Pollutant	Unit 4 Maximum Conc. (ug/m ³)	Percent of De Minimis	De Minimis Monitoring Level (ug/m ³)
NO _x Annual	0.38	2.74%	14
CO 8-hr	5.51	0.96%	575
SO ₂ 24-hr	2.18	16.80%	13
PM ₁₀ 24-hr	0.72	7.15%	10
Lead (Pb)	6.31E-03	6.31%	0.1
Mercury (Hg) 24-hr	4.21E-03	1.68%	0.25
Hydrogen Flouride (HF) 24-hr	0.09	36.75%	0.25
Vinyl Chloride (VC) 24-hr	No Emissions are Expected from Existing or Proposed Units		15
Total Reduced Sulfur (TRS) 1-hr	No Emissions are Expected from Existing or Proposed Units		10
Reduced Sulfur Compounds 1-hr	No Emissions are Expected from Existing or Proposed Units		10
Hydrogen Sulfide (H ₂ S) 1-hr	No Emissions are Expected from Existing or Proposed Units		0.2

6.8.2 PSD Increment Analysis Results

As part of the 1977 Clean Air Act (CAA) amendments established PSD in attainment areas. Attainment areas are put into one of three classes and the amount of deterioration allowed is determined by the class. Class I areas include National Parks and Wilderness Areas, and almost no increase in pollution is allowed. Moderate deterioration is allowed in Class II areas, and even greater amounts are allowed in Class III areas. However, no Class III areas have been designated in the United States. Therefore, the remainder of the United States, including the project area is defined as a Class II area.

There is only one formally designated Class I areas (40 CFR 52.21(e)) within 200 km of the Facility (<http://www2.nature.nps.gov/air/maps/index.htm>). The Chassahowitzka National Wildlife Refuge, about 78 km from the Facility, is the closest Class I area. This location was included in the Class I area evaluation.

Presented below are the results of modeling analysis for both the Class II and Class I areas.

Class II Area

The modeling analysis demonstrated that NO_x, SO₂ and PM₁₀ emissions from Unit 4 and the combined facility resulted in concentrations less than the PSD Class II increments. As a major source of NO_x, SO₂ and PM₁₀, the Unit 4 and the combined Facility were considered to consume PSD increment for the pollutant-specific averaging periods presented in **Table 6-10**. The PSD increments established the maximum allowable increase in pollutant concentrations above some assumed baseline level.

The refined modeling analyses showed that no PSD Class II increments would be exceeded for either Unit 4 or the combined facility. Unit 4 maximum impacts consumes less than 2 percent of its PSD Class II increment for each pollutant, and the combined facility maximum impacts are less than 12 percent of the same increment for each pollutant. Therefore, pollutant impacts for all four MWC units represent only a small percentage of the total Class II PSD increments in the project area.

Table 6-10 Comparison of Unit 4 and Facility Maximum Impacts to PSD Class II Increments					
Pollutant	Unit 4 Max. Conc. (ug/m³)	Percent of Class II	Facility Max. Conc. (ug/m³)	Percent of Class II	PSD Class II Increment (ug/m³)
Annual NO _x	0.38	1.54%	0.52	2.09%	25
3-hr SO ₂	5.09	0.99%	15.48	3.02%	512
24-hr SO ₂	1.79	1.97%	5.44	5.97%	91
Annual SO ₂	0.13	0.63%	0.26	1.31%	20
24-hr PM ₁₀	0.58	1.94%	3.49	11.62%	30
Annual PM ₁₀	0.24	1.41%	0.70	4.12%	17

Class I Area

The results of the refined modeling analysis for the Chassahowitzka National Wildlife Refuge were compared to the National Park Services (NPS) SILs and PSD Class I increments, as shown in **Table 6-11**. Maximum concentrations for Unit 4 are predicted not to exceed the NPS SILs or the PSD Class I increments for each pollutant. Therefore, no additional analyses were required.

6.8.3 National Ambient Air Quality Standards

Although a cumulative impact analysis is not required for this project, total predicted project impacts for both Unit 4 and the combined facility were compared to NAAQS for informational purposes.

Table 6-11 Comparison of Maximum Class I Impacts to Significant Impact Levels and PSD Increments					
Pollutant	Unit 4 Max. Conc. (ug/m³)	NPS Class I SILs (ug/m³)	Percent of Class I	PSD Class I Increment (ug/m³)	Percent of Class I
Annual NO _x	2.68E-03	0.03	8.94%	2.5	0.11%
3-hr SO ₂	1.23E-01	0.48	25.57%	25	0.49%
24-hr SO ₂	3.02E-02	0.07	43.07%	5	0.60%
Annual SO ₂	1.81E-03	0.03	6.05%	2	0.09%
24-hr PM ₁₀	9.00E-03	0.27	3.33%	8	0.11%
Annual PM ₁₀	6.47E-04	0.08	0.81%	4	0.016%

NAAQS have been established by EPA at two levels: primary and secondary. Primary standards are required to be set at levels that will protect public health and include an “adequate margin of safety.” Secondary standards are meant to be more stringent than primary standards. Secondary standards are established to protect public welfare (e.g., structures, crops, animals, etc.). The purpose of this analysis is to demonstrate that the proposed Unit 4 and the combined Facility will not cause or contribute to an exceedance of an AAQS. Where Unit 4 did not exceed an SIL for a given pollutant, compliance with an AAQS is demonstrated by adding Unit 4 impact to the ambient background concentration for that pollutant and averaging period. Similarly, the combined Facility impacts were added to the ambient background concentration and compared to the AAQS to determine compliance.

The short-term and maximum annual impacts from Unit 4 and the Combined Facility were compared to the NAAQS in **Table 6-12**. Maximum concentrations from Unit 4 are less than 1 percent of the AAQS and when added to ambient background levels determined in Section 5, it is still in compliance with NAAQS by a significant margin. Unit 4 maximum impacts plus background levels range from 19 percent (SO₂ annual) to 73 percent (PM₁₀ 24 -hour). Similarly, the maximum concentrations from the combined facility impacts are less than 3 percent of the NAAQS and when added to ambient background levels, the combined facility impacts are well below the NAAQS. Combined facility maximum impacts plus background levels range from 19 percent (SO₂ annual) to 75 percent (PM₁₀ 24 -hour). Therefore, no NAAQS are at risk of exceeding their applicable NAAQS. As discussed above, Unit 4 maximum impacts are less than the SILs in all Class II areas. Therefore, the Unit 4 and the combined facility will not cause NAAQS violations.

6.8.4 Ambient Reference Concentrations

The Florida Air Toxics Working Group developed a list of Ambient Reference Concentrations (ARCs) for a number of non-criteria pollutants. However, as of March 1, 2000, FDEP ruled that the ARCs are not rules nor do they implement any statutory authority (March 1, 2000 DARM-PER-28). Nonetheless, the ARCs are still useful in evaluating the magnitude of non-criteria pollutant impacts. **Table 6-13** compares both Unit 4 and the combined facility non-criteria pollutant impacts to the applicable ARC.

Table 6-12 Comparison of Unit 4 and Combined Facility Maximum Impacts to NAAQS											
Pollutant	Baseline (ug/m ³)	Unit 4/Combined Facility Maximum Impacts (ug/m ³)						Percent of AAQS	Background+ Unit 4 /Facility (ug/m ³)	Percent of AAQS	AAQS (ug/m ³)
		1991	1992	1993	1994	1995	Max. Conc.				
Unit 4 Only											
NO _x Annual	21	0.33	0.38	0.34	0.32	0.32	0.38	0.38%	21.38	21.38%	100
CO 1-hr	8,360	10.37	10.23	10.23	10.42	10.75	10.75	0.03%	8,371	20.93%	40,000
CO 8-hr	5,153	3.47	3.68	4.66	3.44	4.10	4.66	0.05%	5,158	51.58%	10,000
SO ₂ 3-hr	317	3.52	3.79	4.00	3.28	3.55	4.00	0.31%	321.00	24.69%	1,300
SO2 24-hr	61	1.37	1.16	1.41	1.20	1.22	1.41	0.54%	62.41	24.00%	260
SO ₂ Annual	11	0.09	0.10	0.09	0.08	0.08	0.10	0.17%	11.10	18.50%	60
PM ₁₀ 24-hr	109	--	--	--	--	--	0.58	0.39%	109.58	73.06%	150
PM ₁₀ Annual	29	0.24	0.06	0.05	0.06	0.06	0.24	0.48%	29.24	58.48%	50
Lead (Pb)	0.47	5.03E-03	4.25E-03	5.18E-03	4.40E-03	4.48E-03	5.18E-03	0.35%	0.48	31.68%	1.5
Combined Facility (All Four Units)											
NO _x Annual	21	0.39	0.52	0.50	0.40	0.47	0.52	0.52%	21.52	21.52%	100
CO 1-hr	8,360	15.05	14.59	16.01	15.03	15.44	16.01	0.04%	8,376	20.94%	40,000
CO 8-hr	5,153	4.99	5.36	5.31	5.13	6.44	6.44	0.06%	5,160	51.60%	10,000
SO ₂ 3-hr	317	13.56	13.73	14.94	14.02	12.15	14.94	1.15%	331.94	25.53%	1,300
SO2 24-hr	61	5.25	4.15	4.37	3.96	4.62	5.25	2.02%	66.25	25.48%	260
SO ₂ Annual	11	0.19	0.25	0.24	0.19	0.23	0.25	0.42%	11.25	18.76%	60
PM ₁₀ 24-hr	109	--	--	--	--	--	3.49	2.32%	112.49	74.99%	150
PM ₁₀ Annual	29	0.70	0.22	0.21	0.24	0.25	0.70	1.40%	29.70	59.40%	50
Lead (Pb)	0.47	0.01	0.01	0.01	0.01	0.01	0.012	0.77%	0.48	32.10%	1.5

The P₁₀ 24-hour maximum impacts for both Unit 4 and combined facility are based on the highest-sixth highest concentration over five years.

Maximum impacts from Unit 4 for all pollutants are less than 37 percent of the ARC, except for SAM, which is at about 80 percent of the 24-hour ARC. The combined facility maximum impacts for all pollutants are well below ARC, except for SAM. The SAM concentration for both Unit 4 and combined facility are the same because there were no SAM emissions projected for the existing MWC units. Because the ARCs are based on conservative safety factors to protect public health, the refined modeling results for both Unit 4 and the combined facility demonstrate there would be no significant impact to human health. A more detailed human health and ecological risk assessment is contained in the Power Plant Siting Act (PPSA) application for Unit 4.

Table 6-13
Comparison of Unit 4 and Facility Maximum Impacts to
Ambient Reference Concentrations¹

Pollutant	Unit 4 Max. Conc. (ug/m ³)	Percent of ARC	Facility Max. Conc. (ug/m ³)	Percent of ARC	ARCs (ug/m ³)
HCl 8-hr	5.40	7.7%	7.74	11.1%	70
HCl 24-hr	2.88	16.9%	4.87	28.7%	17
HCl Annual	0.17	2.4%	0.17	2.4%	7
Cd 8-hr	1.18E-03	5.9%	2.39E-03	11.9%	0.02
Cd 24-hr	6.31E-04	12.6%	1.50E-03	30.1%	5.00E-03
Cd Annual	3.65E-05	6.5%	5.25E-05	9.4%	5.60E-04
Pb 8-hr	1.18E-02	2.4%	2.54E-02	5.1%	0.5
Pb 24-hr	6.31E-03	6.3%	1.60E-02	16.0%	0.1
Pb Annual	3.65E-04	0.4%	5.59E-04	0.6%	0.09
Hg 8-hr	7.90E-03	7.90%	9.84E-03	9.8%	0.1
Hg 24-hr	4.21E-03	21.1%	6.19E-03	31.0%	0.02
Hg Annual	2.44E-04	0.08%	2.17E-04	0.07%	0.3
Dioxin Annual ²	2.37E-08	2.0%	3.82E-08	3.2%	1.21E-06
HF 8-hr	0.17	0.66%	0.39	1.5%	26
HF 24-hr	0.09	1.5%	0.24	3.9%	6.2
SAM 8-hr	3.62	36.2%	3.62	36.2%	10
SAM 24-hr	1.93	80.4%	1.93	80.4%	2.4
NH ₃ 8-hr	2.09	1.23%	2.09	1.23%	170
NH ₃ 24-hr	1.11	2.7%	1.11	2.7%	41
NH ₃ Annual	0.06	0.06%	0.06	0.06%	100

Notes:

¹ FDEP, June 1995, Working List of "Ambient Reference Concentrations" for Hazardous Air Pollutants, Version 4.0.

² The ARC for dioxin is expressed as toxic equivalent 2,3,7,8-TCDD. Because the impacts analysis for total dioxins and furans, the ARC was converted to total dioxins and furans by multiplying by 55. The conversion factor is from 60 FR 65395, December 19, 1995, Table 1.

Section 7

Additional Impact Analysis

This section describes the analysis performed to assess the impact of the addition of a fourth MWC unit (herein referred to as Unit 4) at the Hillsborough County Resource Recovery Facility (Facility) on air quality related values (AQRVs) for nearby Class I areas, as required under the Prevention of Significant Deterioration (PSD) regulations. The values assessed are:

- Visibility in Class I areas within 100 km of The Facility or as advised by Florida Department of Environmental Protection (FDEP);
- Impacts from growth indirectly related to Unit 4; and
- The potential for impacts to soil and vegetation.

The Chassahowitzka Wildlife Refuge is the closest Class I area, located approximately 78 km from the Facility, therefore, additional Class I impact analyses were required.

Because the sensitive areas are over 50 kilometers from the source, U.S. Environmental Protection Agency (EPA) guidance recommends the use of the CALPUFF model to analyze concentrations, visibility and deposition impacts (40 Code of Federal Regulations (CFR) 51, Appendix W, Guideline on Air Quality Models). Modeling parameters as described in Section 6.2.3 were used for the analyses. The most recent available version of CALPUFF (currently Version 5.7 dated 030402) was used to assess deposition and visibility impacts in the Chassahowitzka Wildlife Refuge. The ISCST3 input files were converted to CALPUFF input files using the ISC2PUF program, and were run with three years of CALMET/MM5 meteorological data (1990, 1992 and 1996) obtained from FDEP. The CALPOST and POSTUTIL programs were used to extract the required deposition and visibility information from the hourly binary concentration file produced by CALPUFF. The CALPUFF post-processor, CALPOST, was used to calculate haze/visibility parameters as well as convert deposition flux to kg/(hectare*year).

7.1 Visibility

Visibility impairment can be quantified by determining the spectral light intensity at a given location in the atmosphere with known aerosol and pollutant concentrations. Visibility impairment includes such things as the reduction of visual range, the perceptibility of plume shapes and haze layers, atmospheric discoloration, and plume-modified visual contrast of distant objects. These effects are caused by changes in light intensity as a result of the scattering and absorption of light (radiation) by particles and/or atmospheric aerosols. When the physical and chemical properties of the plume are known, the impact on visibility can be estimated (Latimer and Ireason, 1980).

Calculation of impacts to visibility are only required at Class I areas. Per the National Park Service (NPS) guidance, the CALPUFF model was used to assess visibility

impacts at the Chassahowitzka Wildlife Refuge using methods outlined by IWAQM (EPA 1998). However, a visibility analysis was also conducted for sensitive Class II areas within 100 km of the Facility for informational purposes only. CDM identified 30 sensitive Class II areas designated under the Florida Scenic Highways Program, Florida State Parks, and the Florida Fish and Wildlife Refuges (CDM, 2005).

CALPUFF was used to predict concentrations of sulfates and nitrates. Resulting concentrations of SO_4^{2-} , NO_3^- , and HNO_3 were used to calculate 24-hour averaged extinction coefficients and compute the percent change in extinction. The light extinction coefficient includes both scattering and absorption components, and is a measure of light attenuation over a unit distance.

CALPUFF was set to create concentration data files that were used as input files for the CALPOST post-processor. Parameters used in the CALPOST post-processor are listed below:

- Modeled Species: Sulfates and Nitrates
- Computation Method: Compute extinction from speciated PM measurements (CALPOST, Method 2).
 - RH adjustment applied to observed and modeled sulfate and nitrate
 - RH factor is capped at Maximum Relative Humidity (RHMAX).
- RHMAX: 95%
- Extinction Efficiency:
 - Ammonium Sulfate: 3 Mm^{-1} per $\mu\text{g}/\text{m}^3$
 - Ammonium Nitrate: 3 Mm^{-1} per $\mu\text{g}/\text{m}^3$
- Background concentration for computing background extinction coefficients
 - Ammonium Sulfate: $0.2 \mu\text{g}/\text{m}^3$
 - Ammonium Nitrate: $0.1 \mu\text{g}/\text{m}^3$
 - Soil: $0.5 \mu\text{g}/\text{m}^3$
 - Coarse Particulates: $3.0 \mu\text{g}/\text{m}^3$
- Extinction due to Rayleigh Scattering: 22.0 Mm^{-1}
- Averaging time: 24-hour
- Visibility units: Mm^{-1}

Natural background estimates for the visibility reference level at the Chassahowitzka Wildlife Refuge were obtained from information in the Federal Land Managers' Air Quality Related Values Workgroup (FLAG), guidance, December 2000.

In accordance with guidance, the change in the 24-hour light extinction was predicted to be slightly above 5 percent (5.4 percent) when compared to natural conditions. The predicted exceedance occurred in the 1992 meteorological year. This exceedance only occurred one day in three years or less than 0.1 percent of the time. Therefore, CDM is recommending that no further visibility analysis is required. Results are shown in **Table 7-1** for each year of meteorological data.

The results of the sensitive Class II area modeling is presented in **Table 7-2**. The highest change in 24-hour light extinction (75.54 percent) occurred at the Ybor City Museum State Park in Tampa in 1990. This state park is located approximately 22 km from The Facility.

Table 7-1 Class I Visibility Modeling Results				
Class I - Chassahowitzka Wildlife Refuge, 24-hr Average				
	1990	1992	1996	Threshold
Largest Change in Extinction, Db_{ext}	2.55%	5.43%	0.00%	5%
Largest Delta-Deciview, DDV	0.252	0.529	0.000	
Maximum Extinction, (Mm^{-1})	25.373	25.329	27.196	

CALPOST was used to calculate visibility parameters using S and N concentrations calculated using the CALPUFF dispersion model.

Table 7-2 Class II Visibility Modeling Results			
Class II - Scenic Areas, 24-hr Average			
	1990	1992	1996
Largest Change in Extinction, Db_{ext}	75.54%	39.97%	48.90%
Largest Delta-Deciview, DDV	5.627	3.363	3.981
Maximum Extinction, (Mm^{-1})	21.922	22.445	22.465

CALPOST was used to calculate visibility parameters using S and N concentrations calculated using the CALPUFF dispersion model.

7.2 Minor Source Growth

Minor source growth impacts from the project are required under 40 CFR 51.166(o) and Rule 62-212.400(5). They require an analysis of population growth and other factors to qualitatively assess the amount of PSD consumption by minor sources since August 7, 1977, as defined in 40 CFR 51.166(n)(3)(ii).

Section 6, Tables 6-10 and 6-11 show that the proposed Unit 4 modeled air quality impacts would be well below PSD Class II Area and Class I Area Significant Impact Levels. Therefore, there would be no Significant Impact Area. In other words, there would be no "area the facility or modification would affect." Nonetheless, an evaluation of additional impacts from the proposed Unit 4 is presented below.

Hillsborough County has experienced substantial growth since 1980. **Table 7-3** shows that the population of Hillsborough County has grown by 42 percent since 1980. However, in spite of this population growth, air pollutant concentrations have not generally increased over the same period, as shown in **Figure 7-1**. This figure shows historical air pollutant concentrations taken at the monitoring stations nearest to the Facility, as listed in Section 5, Table 5-4. Air quality in Hillsborough County has remained good in this 20-year period. As shown in Section 5, Table 5-5, the County is in attainment of all of the National and Florida Ambient Air Quality Standards, and air pollutant concentrations are all well below the standards. Therefore, the population growth has not had a detrimental effect on air quality in Hillsborough County.

Table 7-3 Population Change for Hillsborough County, 1980 to 2004 ¹							
	Population				Percent Change		
County	2004	2000	1990	1980	2000-2004	1990-2000	1980-1990
Hillsborough	1,108,435	998,948	834,054	646,939	9.9%	16.5%	22.4%

Source: ¹ Bureau of Business and Economic Research, Florida Estimates of Population, April 2004.

Unit 4 air pollutant emissions rates are summarized in **Table 7-4**. As shown in this table, these annual emissions rates would represent less than 0.25 percent of the Hillsborough County totals for 1999 (the most recent year available from the U.S. EPA's AirData website). These emissions comparison and detailed dispersion modeling analyses presented in Section 6 and 7 show that Unit 4 would have an insignificant effect on Hillsborough County air quality.

Table 7-4 Comparison of Unit 4 and Hillsborough County Air Pollutant Emission Rates					
	CO (tons/yr)	NO_x (tons/yr)	PM₁₀ (tons/yr)	SO₂ (tons/yr)	VOC (tons/yr)
Unit 4	113.4	256.1	25.5	66.1	12.0
Hillsborough County	313,918	111,237	34,817	166,516	52,205
Unit 4 Percent of Total	0.04%	0.23%	0.07%	0.04%	0.02%

Source: U.S. EPA AirData, <http://www.epa.gov/air/data/reports.html>.

7.2.1 Employment

Employment figures for Hillsborough County, according to the Florida Labor Market Statistics published in 2004 (<http://www.labormarketinfo.com>), show 740,336 persons employed. This number is anticipated to grow at a rate of approximately 2.51 percent a year through 2012, bringing the total number of employed people to 888,914 in 2012. Once Unit 4 is operational, it will employ approximately eight additional people, for a total of 50 employees. The proposed Unit 4 will be managed by Covanta's current staff. It is anticipated that the majority of these personnel requirements will be filled from within the local labor force. Significant in-migration to the area is therefore not anticipated. As a result, no increase in population in the area attributable to the addition of Unit 4 is expected to occur.

The project does not require the destruction, relocation or alteration of any residential property in the area. In addition, since no net migration to the area is anticipated, there will be no change in demand for housing units in the area.

The construction and operation of the Unit 4 will have a minor positive net effect on industrial and commercial development. It is not anticipated that this effect will be significant when considered on a regional basis.

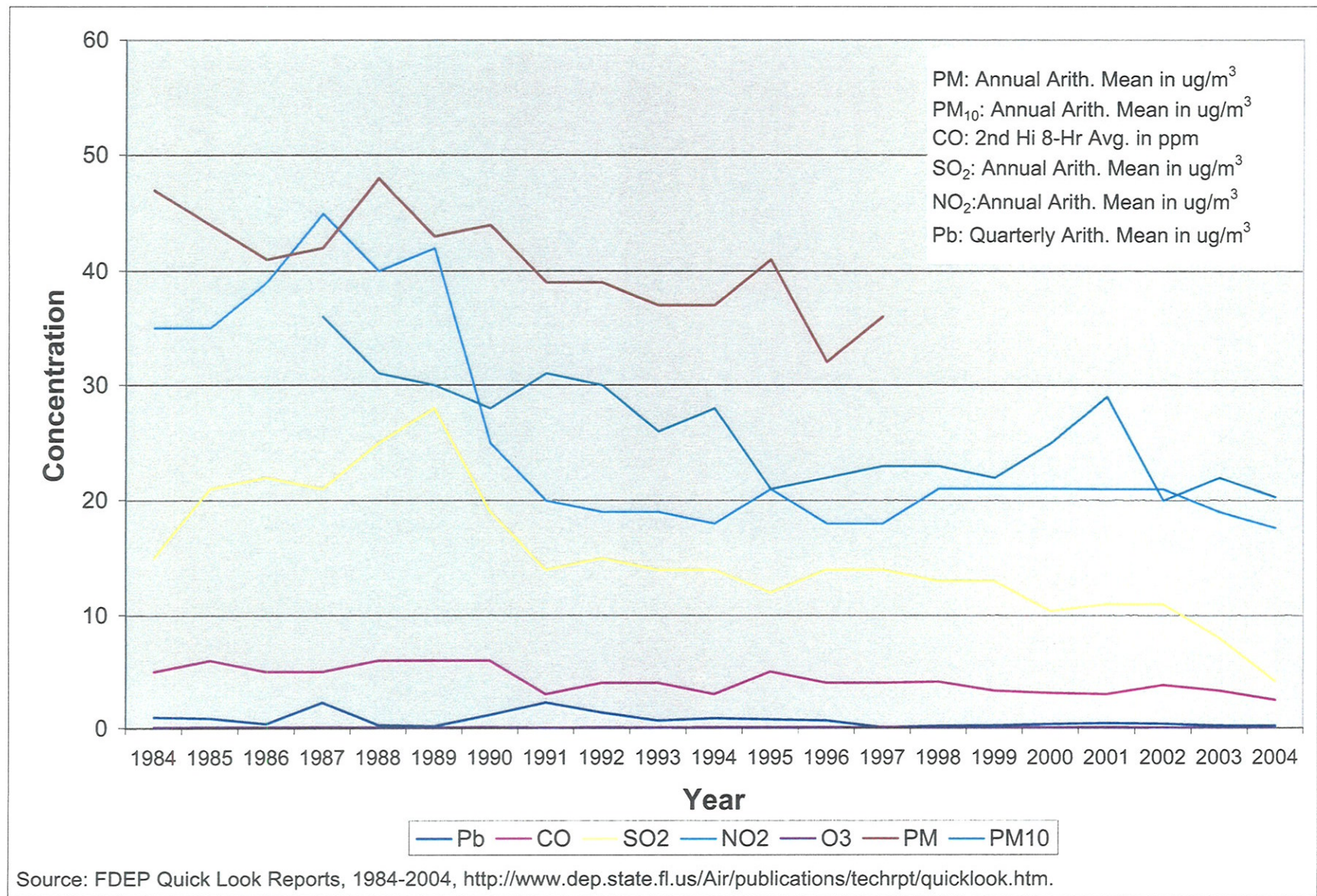
The growth analysis indicates that no net significant change in employment, populations, housing, or commercial/industrial development will be associated with the project. As a result, there will not be any significant increases in pollutant emissions indirectly associated with Unit 4.

7.3 Vegetation and Soils

Federal and Florida regulations require that an assessment be undertaken of the potential impacts of emissions from a proposed facility on soils and vegetation of commercial or recreational value (40 CFR 51.166(o)(1) and 62-212.400(5)(e)1.a Florida Administrative Code [FAC]). Pollutant emissions from Unit 4 were used to compute

potential impacts on soils and vegetation. Vegetative impacts from airborne pollutants may result from deposition on leaf surfaces as particulate matter (dry deposition), from solutions in rainfall (wet deposition), or by gaseous exchange. Airborne components may also enter vegetation through roots following deposition to soils. Accumulation of airborne pollutants in soil can also lead to changes in soil characteristics.

Total nitrogen and total sulfur deposition modeling was conducted using the CALPUFF model, to assess any potential impacts at the Chassahowitzka Wildlife Refuge. Deposition estimates, in units of $\text{g}/(\text{m}^2 \cdot \text{s})$, needed to be adjusted to compare modeling results with the limit of $0.1 \text{ kg}/(\text{ha} \cdot \text{yr})$ of elemental sulfur (S) and nitrogen (N), as required by NPS. The CALPUFF results for each pollutant were individually converted to kg/ha using the CALPOST post-processor. Molecular weight differences between S or N and a specific pollutant were corrected using the multipliers presented in Tables 7-5 and 7-6.



7.3.1 Total Sulfur Deposition

Sulfuric acid (H_2SO_4) is formed when gaseous SO_3 produced by a source reacts with water droplets. The acidified water vapor can result in acidic precipitation (acid rain). Plant sensitivity to sulfur dioxide (SO_2) appears to vary not only with the climate of an area, but also with the duration of exposure.

Wet and dry deposition fluxes of SO_2 and SO_4^{2-} were calculated for Unit 4. Deposition results were converted to $\text{kg}/(\text{ha}\cdot\text{yr})$ and normalized for S deposition using the multipliers listed in Table 7-5. The maximum annual average from all receptors modeled was used for the comparison. As Table 7-4 shows, total S deposition resulting from Unit 4 does not exceed NPS's $0.1 \text{ kg}/(\text{ha}\cdot\text{yr})$ threshold.

7.3.2 Total Nitrogen Deposition

Nitrogen dioxide (NO_2) can be beneficial to vegetation in small amounts. Uptake of NO_2 varies with a number of factors such as nutrient supply in the soil, fertilization, and rainfall. NO_2 can also be converted to nitric acid (HNO_3) and contribute to acid precipitation.

The dry deposition fluxes of nitrogen oxides (NO_x), HNO_3 , and NO_3^- , as well as the wet deposition flux of HNO_3 were calculated for the Unit 4. Deposition results were converted to $\text{kg}/(\text{ha}\cdot\text{yr})$ and normalized for N deposition using the multipliers listed in Table 7-6. The maximum annual average from all receptors modeled was used for the comparison. As Table 7-5 shows, total N deposition resulting from Unit 4 does not exceed NPS's $0.1 \text{ kg}/(\text{ha}\cdot\text{yr})$ threshold.

Table 7-5 Total Sulfur Deposition Results							
Class 1 – Chassahowitzka Wildlife Refuge, Annual Average S Deposition (kg/ha*yr)							
	1990, 1996	1992					
	Multiplier*	Multiplier*	1990	1992	1996		
SO ₂ , Dry Deposition	157680000	155088000	4.12E-04	5.59E-04	3.29E-04		
SO ₂ , Wet Deposition	157680000	155088000	4.54E-04	4.47E-04	4.55E-04		
SO ₄ ²⁻ , Dry Deposition	105118949	103390966	1.12E-05	1.18E-05	1.20E-05		
SO ₄ ²⁻ , Wet Deposition	105118949	103390966	5.87E-04	5.90E-04	6.00E-04		
Total S Deposition:			1.46E-03	1.61E-03	1.40E-03		
* Multiplier is applied using CALPOST to convert from the pollutant specific (ug/m ² *s) values in the wet and dry deposition CALPUFF output files, to sulfur deposition values (in kg/ha*yr) for comparison with the NPS limit of 0.1 (kg/ha*yr)							
Deposition of	Year	Ratio of MW of Pollutant to S	g to kg	m2 to ha	sec to hr	hr to year	Multiplier
S from SO2	1990, 1996	0.5	0.001	10000	3600	8760	157680000
S from SO4	1990, 1996	0.33333	0.001	10000	3600	8760	105118949
S from SO2	1992	0.5	0.001	10000	3600	8616	155088000
S from SO4	1992	0.33333	0.001	10000	3600	8616	103390966

Pg. 40 of IWAQM Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts, EPA-454/R-98-019, December, 1998.

Table 7-6 Total Nitrogen Deposition Results						
Class 1 - Chassahowitzka Wildlife Refuge, Annual Average N Deposition (kg/ha*yr)						
	1990, 1996	1992				
	Multiplier*	Multiplier*	1990	1992	1996	
NO _x , Dry Deposition	95979816	94402066	1.40E-04	2.71E-04	1.80E-04	
HNO ₃ , Dry Deposition	70079299	68927311	1.74E-04	1.87E-04	7.18E-05	
HNO ₃ , Wet Deposition	70079299	68927311	2.23E-04	2.43E-04	1.40E-04	
NO ₃ ⁻ , Dry Deposition	71211442	70040843	2.14E-06	3.60E-06	3.21E-06	
NO ₃ ⁻ , Wet Deposition	71211442	70040843	1.02E-04	2.83E-04	1.90E-04	
Total N Deposition:			6.41E-04	9.88E-04	5.86E-04	

* Multiplier is applied using CALPOST to convert from the pollutant specific (ug/m²*s) values in the wet and dry deposition CALPUFF output files, to sulfur deposition values (in kg/ha*yr) for comparison with the NPS limit of 0.1 (kg/ha*yr)

Deposition of	Year	Ratio of MW of Pollutant to N	g to kg	m2 to ha	sec to hr	hr to year	Multiplier
N from NO _x	1990, 1996	0.30435	1.00E-03	10000	3600	8760	95979816
N from HNO ₃	1990, 1996	0.22222	1.00E-03	10000	3600	8760	70079299
N from NO ₃ ⁻	1990, 1996	0.22581	1.00E-03	10000	3600	8760	71211442
N from NO _x	1992	0.30435	1.00E-03	10000	3600	8616	94402066
N from HNO ₃	1992	0.22222	1.00E-03	10000	3600	8616	68927311
N from NO ₃ ⁻	1992	0.22581	1.00E-03	10000	3600	8616	70040843

Pg. 40 of IWAQM Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts, EPA-454/R-98-019, December, 1998.

Section 8

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Appendix A

Hillsborough County Resource Recovery Facility Emissions Calculations Tables

The tables in this Appendix include the emission calculations for the Hillsborough County Resource Recovery Facility PSD permit modification, along with the existing facility MWC units permit emissions limits.

Table Number	Table Name	Description
A-1	Estimated Maximum Potential Emission Rates	Summary of emission factors and emission rates for PSD pollutants emitted from the new MWC unit, lime and carbon silos, cooling tower.
A-2	Estimated Emission Rates for the New MWC Unit	Calculation of the new MWC unit emissions based Best Available Control Technology (BACT) emissions limits.
A-3	Estimated PM Emission Rates for New Lime and Carbon Silos	Calculation of PM/PM ₁₀ emissions from the proposed lime and carbon silos, based on silo design information and baghouse PM emission limits.
A-4	Estimated PM Emission Rates for New Cooling Tower Cell	Calculation of PM emissions from the cooling tower based on known design parameters and AP-42 estimates.
A-5	Existing Facility Emissions Limits	Summary of permitted emission rates for PSD pollutants emitted from the existing MWC units, lime and carbon silos.

Table A-1
Hillsborough County Resource Recovery Facility New MWC
Estimated Maximum Potential Emission Rates

Source	Emissions, by Air Pollutant																			
	Particulate Matter				Nitrogen Oxides				Carbon Monoxide				Sulfur Dioxide				Hydrogen Chloride			
	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year
600 tpd MWC unit ¹	0.009	gr/dscf @ 7% O ₂	5.72	25.1	110.0	ppmv @ 7% O ₂	58.47	256.1	80.0	ppmv @ 7% O ₂	25.89	113.4	26.0	ppmv @ 7% O ₂	19.25	84.3	60.2	ppmv @ 7% O ₂	25.36	111.1
Cooling Tower	0.005	gr/dscf @ 7% O ₂	9.62E-02	0.42	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lime Silos (2 silos) ²	0.015	gr/dscf actual	1.38E-04	6.05E-04	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Carbon Silo ²	0.015	gr/dscf actual	3.70E-05	1.6E-04	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility	---	---	---	25.5	---	---	---	256.1	---	---	---	113.4	---	---	---	84.3	---	---	---	111.1
Emission Thresholds																				
PSD Significant Increase (Major Modification)				25 (15 PM ₁₀)	40				100				40				40			

Source	Emissions, by Air Pollutant																			
	Hydrogen Fluoride				Sulfuric Acid Mist				Dioxins and Furans				Mercury				Cadmium			
	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year
600 tpd MWC unit ¹	3.5	ppmv @ 7% O ₂	0.81	3.5	15.0	ppmv @ 7% O ₂	17.00	74.4	13.0	ng/dscm @ 7% O ₂	3.61E-06	1.58E-05	0.134	mg/dscm @ 7% O ₂	3.71E-02	1.63E-01	0.020	mg/dscm @ 7% O ₂	5.56E-03	2.43E-02
Cooling Tower	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lime Silos (2 silos) ²	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Carbon Silo ²	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility	---	---	---	3.5	---	---	---	74.4	---	---	---	1.6E-05	---	---	---	1.6E-01	---	---	---	2.4E-02
Emission Thresholds																				
PSD Significant Increase (Major Modification)				3	7				3.50E-06				0.1				15			

Source	Emissions, by Air Pollutant															
	Lead				Metals				Ammonia				Volatile Organic Compounds			
	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year
600 tpd MWC unit ¹	0.20	mg/dscm @ 7% O ₂	5.56E-02	0.24	0.009	gr/dscf @ 7% O ₂	5.72	25.1	50.00	ppmv @ 7% O ₂	9.82	43.0	0.10	lbs/ton	2.75	12.0
Cooling Tower	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lime Silos (2 silos) ²	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Carbon Silo ²	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility	---	---	---	0.24	---	---	---	25.1	---	---	---	43.0	---	---	---	12.0
Emission Thresholds																
PSD Significant Increase (Major Modification)				0.6	15				--				40			

Bold Text denotes an exceedence of the PSD threshold

Notes:

¹ Emissions based on vendor information, dated _____, 2004, attached. BACT emission rate for NO_x based on selective non-catalytic reduction and flue gas recirculation (SNCR & FGR).

² Emissions factors calculated based on estimated baghouse emission rate of 0.015 gr/dscf.

Table A-2
Hillsborough County Resource Recovery Facility
Estimated Emission Rates for the New MWC Unit

Flue gas flow at stack exit	74,188 dscfm, with	7% O ₂ conc.
PM Concentration ¹	0.009 gr/dscf of PM	7% O ₂ conc.
NO _x Concentration ²	110 ppmv, corrected to	7% O ₂ conc.
CO Concentration ¹	80 ppmv, corrected to	7% O ₂ conc.
SO ₂ Concentration ¹	26 ppmv, corrected to	7% O ₂ conc.
HCl Concentration ^{1,3}	1204 ppmv, corrected to	7% O ₂ conc. (uncontrolled)
HF Concentration ¹	3.5 ppmv, corrected to	7% O ₂ conc.
SAM Concentration ¹	15 ppmv, corrected to	7% O ₂ conc.
PCDD/PCDF Concentration ^{1,4}	13 ng/dscm, corrected to	7% O ₂ conc.
Hg Concentration ^{1,3}	0.89 mg/dscm, corrected to	7% O ₂ conc. (uncontrolled)
Cd Concentration ^{1,4}	0.02 mg/dscm, corrected to	7% O ₂ conc.
Pb Concentration ^{1,4}	0.2 mg/dscm, corrected to	7% O ₂ conc.
Metals Concentration ¹	0.009 gr/dscf of PM	7% O ₂ conc.
NH ₃ Concentration ¹	50 ppmv, corrected to	7% O ₂ conc.
VOC Concentration ⁵	0.1 lb/ton	

PM Emissions

Calculate PM emission rate:

$$\frac{0.009 \text{ grains}}{1 \text{ dscf}} \cdot \frac{74,188 \text{ dscf}}{1 \text{ min}} \cdot \frac{1 \text{ g}}{15.43 \text{ grain}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \boxed{0.72 \frac{\text{g}}{\text{sec}}}$$

Calculated PM annual emission rate:

$$\frac{0.72 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{25.07 \frac{\text{ton}}{\text{year}}}$$

Nitrogen Oxide Emissions

Dry volumetric flow rate:

$$\frac{74,188 \text{ dscfm}}{\text{@ } 7\% \text{ O}_2} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \frac{35.02 \text{ dscm}}{1 \text{ sec}}$$

Calculated NO_x emission rate:

$$\frac{110.00 \text{ mol NO}_2}{1.E+06 \text{ moles}} \cdot \frac{41.57 \text{ moles}}{1 \text{ dscm}} \cdot \frac{46.01 \text{ g}}{1 \text{ mole}} = \frac{0.210 \text{ g}}{\text{dscm}}$$

$$\frac{0.210 \text{ g}}{\text{dscm}} \cdot \frac{35.02 \text{ dscm}}{1 \text{ sec}} = \boxed{7.37 \frac{\text{g}}{\text{sec}}}$$

Calculated NO_x annual emission rate:

$$\frac{7.37 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{256.10 \frac{\text{ton}}{\text{year}}}$$

Carbon Monoxide Emissions

Dry volumetric flow rate:

$$\frac{74,188 \text{ dscfm}}{\text{@ } 7\% \text{ O}_2} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \frac{35.02 \text{ dscm}}{1 \text{ sec}}$$

Calculated CO emission rate:

$$\frac{80.00 \text{ mol CO}}{1.E+06 \text{ moles}} \cdot \frac{41.57 \text{ moles}}{1 \text{ dscm}} \cdot \frac{28.01 \text{ g}}{1 \text{ mole}} = \frac{0.093 \text{ g}}{\text{dscm}}$$

$$\frac{0.093 \text{ g}}{\text{dscm}} \cdot \frac{35.02 \text{ dscm}}{1 \text{ sec}} = \boxed{3.26 \frac{\text{g}}{\text{sec}}}$$

Calculated CO annual emission rate:

$$\frac{3.26 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{113.39 \frac{\text{ton}}{\text{year}}}$$

Table A-2
Hillsborough County Resource Recovery Facility
Estimated Emission Rates for the New MWC Unit

Sulfur Dioxide Emissions

volumetric flow rate:

$$74,188 \frac{\text{dscfm}}{\text{min}} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 35.02 \frac{\text{dscm}}{\text{sec}}$$

Calculated SO₂ emission rate:

$$\frac{26.00 \text{ mol SO}_2}{1.E+06 \text{ moles}} \cdot \frac{41.57 \text{ moles}}{1 \text{ dscm}} \cdot \frac{64.07 \text{ g}}{1 \text{ mole}} = 0.069 \frac{\text{g}}{\text{dscm}}$$

$$\frac{0.069 \text{ g}}{\text{dscm}} \cdot \frac{35.02 \text{ dscm}}{1 \text{ sec}} = \boxed{2.42 \frac{\text{g}}{\text{sec}}}$$

Calculated SO₂ annual emission rate:

$$\frac{2.42 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{84.29 \frac{\text{ton}}{\text{year}}}$$

Hydrogen Chloride Emissions

Dry volumetric flow rate:

$$74,188 \frac{\text{dscfm}}{\text{min}} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 35.02 \frac{\text{dscm}}{\text{sec}}$$

Calculated HCl emission rate:

$$\frac{1204.00 \text{ mol HCl}}{1.E+06 \text{ moles}} \cdot \frac{41.57 \text{ moles}}{1 \text{ dscm}} \cdot \frac{36.46 \text{ g}}{1 \text{ mole}} = 1.825 \frac{\text{g}}{\text{dscm}}$$

$$\frac{1.825 \text{ g}}{\text{dscm}} \cdot \frac{35.02 \text{ dscm}}{1 \text{ sec}} \cdot (100\%-95\%) = \boxed{3.20 \frac{\text{g}}{\text{sec}}}$$

Calculated HCl annual emission rate:

$$\frac{3.20 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{111.07 \frac{\text{ton}}{\text{year}}}$$

Hydrogen Fluoride Emissions

Dry volumetric flow rate:

$$74,188 \frac{\text{dscfm}}{\text{min}} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 35.02 \frac{\text{dscm}}{\text{sec}}$$

Calculated HF emission rate:

$$\frac{3.50 \text{ mol HF}}{1.E+06 \text{ moles}} \cdot \frac{41.57 \text{ moles}}{1 \text{ dscm}} \cdot \frac{20.01 \text{ g}}{1 \text{ mole}} = 0.003 \frac{\text{g}}{\text{dscm}}$$

$$\frac{0.003 \text{ g}}{\text{dscm}} \cdot \frac{35.02 \text{ dscm}}{1 \text{ sec}} = \boxed{0.102 \frac{\text{g}}{\text{sec}}}$$

Calculated HF annual emission rate:

$$\frac{0.102 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{3.54 \frac{\text{ton}}{\text{year}}}$$

Sulfuric Acid Mist (SAM) Emissions

Dry volumetric flow rate:

$$74,188 \frac{\text{dscfm}}{\text{min}} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 35.02 \frac{\text{dscm}}{\text{sec}}$$

Calculated SAM emission rate:

$$\frac{15.00 \text{ mol SAM}}{1.E+06 \text{ moles}} \cdot \frac{41.57 \text{ moles}}{1 \text{ dscm}} \cdot \frac{98.08 \text{ g}}{1 \text{ mole}} = 0.061 \frac{\text{g}}{\text{dscm}}$$

$$\frac{0.061 \text{ g}}{\text{dscm}} \cdot \frac{35.02 \text{ dscm}}{1 \text{ sec}} = \boxed{2.14 \frac{\text{g}}{\text{sec}}}$$

Calculated SAM annual emission rate:

$$\frac{2.142 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{74.45 \frac{\text{ton}}{\text{year}}}$$

Table A-2
Hillsborough County Resource Recovery Facility
Estimated Emission Rates for the New MWC Unit

Dioxins/Furans (PCDD/PCDF) Emissions

Isolated PCDD/PCDF emission rate:

$$\frac{13 \text{ ng}}{1 \text{ dscm}} \cdot \frac{74,188 \text{ dscf}}{1 \text{ min}} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{1 \text{ g}}{1.E+09 \text{ ng}} = \boxed{4.55E-07 \frac{\text{g}}{\text{sec}}}$$

Calculated PCDD/PCDF annual emission rate:

$$\frac{4.6E-07 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{1.58E-05 \frac{\text{ton}}{\text{year}}}$$

Mercury Emissions

Calculated Hg emission rate:

$$\frac{0.89 \text{ mg}}{1 \text{ dscm}} \cdot \frac{74,188 \text{ dscf}}{1 \text{ min}} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{1 \text{ g}}{1.E+03 \text{ mg}} \cdot (100\%-85\%) = \boxed{4.67E-03 \frac{\text{g}}{\text{sec}}}$$

Calculated Hg annual emission rate:

$$\frac{4.7E-03 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{1.63E-01 \frac{\text{ton}}{\text{year}}}$$

Cadmium Emissions

Calculated Cd emission rate:

$$\frac{0.02 \text{ mg}}{1 \text{ dscm}} \cdot \frac{74,188 \text{ dscf}}{1 \text{ min}} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{1 \text{ g}}{1.E+03 \text{ mg}} = \boxed{7.0E-04 \frac{\text{g}}{\text{sec}}}$$

Calculated Cd annual emission rate:

$$\frac{7.0E-04 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{2.43E-02 \frac{\text{ton}}{\text{year}}}$$

Lead Emissions

Calculated Pb emission rate:

$$\frac{0.2 \text{ mg}}{1 \text{ dscm}} \cdot \frac{74,188 \text{ dscf}}{1 \text{ min}} \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{1 \text{ g}}{1.E+03 \text{ mg}} = \boxed{7.00E-03 \frac{\text{g}}{\text{sec}}}$$

Calculated Pb annual emission rate:

$$\frac{7.0E-03 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{2.43E-01 \frac{\text{ton}}{\text{year}}}$$

Metals Emissions

Calculated Metals emission rate:

$$\frac{0.009 \text{ grains}}{1 \text{ dscf}} \cdot \frac{74,188 \text{ dscf}}{1 \text{ min}} \cdot \frac{1 \text{ g}}{15.43 \text{ grain}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \boxed{0.72 \frac{\text{g}}{\text{sec}}}$$

Calculated Metals annual emission rate:

$$\frac{0.72 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{25.07 \frac{\text{ton}}{\text{year}}}$$

Table A-2
Hillsborough County Resource Recovery Facility
Estimated Emission Rates for the New MWC Unit

Ammonia Emissions

volumetric flow rate:

$$74,188 \frac{\text{dscfm}}{\text{min}} @ 7\% \text{ O}_2 \cdot \frac{1 \text{ dscm}}{35.31 \text{ dscf}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \frac{35.02 \text{ dscm}}{1 \text{ sec}}$$

Calculated NH₃ emission rate:

$$\frac{50.00 \text{ mol NH}_3}{1.E+06 \text{ moles}} \cdot \frac{41.57 \text{ moles}}{1 \text{ dscm}} \cdot \frac{17 \text{ g}}{1 \text{ mole}} = \frac{0.035 \text{ g}}{\text{dscm}}$$

$$\frac{0.035 \text{ g}}{\text{dscm}} \cdot \frac{35.02 \text{ dscm}}{1 \text{ sec}} = \boxed{1.24 \frac{\text{g}}{\text{sec}}}$$

Calculated NH₃ annual emission rate:

$$\frac{1.24 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{43.01 \frac{\text{ton}}{\text{year}}}$$

VOC Emissions

Calculated VOC emission rate:

$$\frac{0.10 \text{ lbs}}{\text{ton}} \cdot \frac{660 \text{ tons}}{1 \text{ day}} \cdot \frac{1 \text{ day}}{24 \text{ hrs}} \cdot \frac{1 \text{ hr}}{3600 \text{ sec}} \cdot \frac{453.59 \text{ g}}{1 \text{ lbs}} = \boxed{0.35 \frac{\text{g}}{\text{sec}}}$$

Calculated VOC annual emission rate:

$$\frac{0.35 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \boxed{12.04 \frac{\text{ton}}{\text{year}}}$$

Sources:

¹ Lee County Energy Recovery Facility Prevention of Significant Deterioration Air Permit Application, February 2003 and Lee County Resource Recovery Facility Air Construction Permit 0710119-002-AC, PSD-FL-151C, October 13, 2003.

² Upperbound NO_x concentration limit of 110 ppmv @ 7% O₂ for the selective non-catalytic reduction (SNCR) with flue gas circulation system.

³ Uncontrolled concentration is based on 95% confidence interval of 2000-2002 stack test results for the existing Hillsborough County RRF MWC Units 1-3 multiplied by a factor of 1.5 (660 lpd/440 lpd) to account for increase capacity of the proposed Unit 4.

⁴ 40 CFR 60, Subpart Eb New Source Performance Standards for New Municipal Waste Combustors.

⁵ Based on Harrisonburg, VA Resource Recovery Facility VOC emission limit of 0.1 lb/ton.

Table A-3
Hillsborough County Resource Recovery Facility
Estimated PM Emission Rates for New Lime and Carbon Silos

Pebble Lime Storage Silo

PM Concentration	0.015 gr/dscf of PM
Volume of each Silo	2900 dscf
Airflow Throughput Rate	2900 dscf/2 days (based on silo refill every 2 days)
Amount of air displaced	1450 dscf/day

Calculated PM emission rate:

$$\frac{0.015 \text{ grains}}{1 \text{ dscf}} \cdot \frac{1450.0 \text{ dscf}}{1 \text{ day}} \cdot \frac{1 \text{ g}}{15.43 \text{ grain}} \cdot \frac{1 \text{ day}}{24 \text{ hour}} \cdot \frac{1 \text{ hour}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ second}} = \frac{1.6\text{E-}05 \text{ g}}{\text{sec}}$$

Calculated PM annual emission rate:

$$\frac{1.63\text{E-}05 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \frac{5.67\text{E-}04 \text{ ton}}{\text{year}}$$

Dolomitic Lime Storage Silo

PM Concentration	0.015 gr/dscf of PM
Volume of each Silo	2900 dscf
Airflow Throughput Rate	2900 dscf/30 days (based on silo refill once per month)
Amount of air displaced	96.67 dscf/day

Calculated PM emission rate:

$$\frac{0.015 \text{ grains}}{1 \text{ dscf}} \cdot \frac{96.7 \text{ dscf}}{1 \text{ day}} \cdot \frac{1 \text{ g}}{15.43 \text{ grain}} \cdot \frac{1 \text{ day}}{24 \text{ hour}} \cdot \frac{1 \text{ hour}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ second}} = \frac{1.1\text{E-}06 \text{ g}}{\text{sec}}$$

Calculated PM annual emission rate:

$$\frac{1.09\text{E-}06 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \frac{3.78\text{E-}05 \text{ ton}}{\text{year}}$$

Carbon Storage Silos

PM Concentration	0.015 gr/dscf of PM
Volume of each Silo	2900 dscf
Airflow Throughput Rate	2900 dscf/7 days (based on silo refill once per week)
Amount of air displaced	414.3 dscf/day

Calculated PM emission rate:

$$\frac{0.015 \text{ grains}}{1 \text{ dscf}} \cdot \frac{414.3 \text{ dscf}}{1 \text{ day}} \cdot \frac{1 \text{ g}}{15.43 \text{ grain}} \cdot \frac{1 \text{ day}}{24 \text{ hour}} \cdot \frac{1 \text{ hour}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ second}} = \frac{4.7\text{E-}06 \text{ g}}{\text{sec}}$$

Calculated PM annual emission rate:

$$\frac{4.66\text{E-}06 \text{ g}}{\text{sec}} \cdot \frac{1 \text{ ton}}{907200 \text{ g}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{24 \text{ hour}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ year}} = \frac{1.62\text{E-}04 \text{ ton}}{\text{year}}$$

Table A-4
Hillsborough County Resource Recovery Facility
Estimated PM Emission Rates for New Cooling Tower Cell

A. Flow Rate Across Cooling Tower Cell	11000	gal/min
B. Total Dissolved Solids ¹	3,500	ppm
C. Drift as a Percentage of Recirculating Rate	0.001%	Vendor information
D. Density of Water	8.330	lb/gal
E. Percentage of Drift PM that Evaporates to PM ₁₀ ²	50%	
F. Total PM ₁₀ Emissions within Drift ($A*B*C/10^6*D*60$)	9.62E-02	lbs/hour
G. Hours of Operations	8760	hours/year
H. Annual PM ₁₀ Emissions for tower ($E*F/2000$)	4.21E-01	tons/yr
I. Modeling Emission Rate (g/s)	1.21E-02	g/s

Sources:

¹ ChemTreat, Inc. Cooling Water Conductivity and Total Dissolved Solids (TDS) of Hillsborough County Resource Recovery Facility Cooling Tower, 5/12/05.

² J. Reisman and G. Frisbie, Calculating Realistic PM₁₀ Emissions from Cooling Towers, Presented at Air & Waste Management Association Annual Conference.

Table A-5
Hillsborough County Resource Recovery Facility
Existing Facility Emission Limits

<i>Pollutant</i>	<i>Existing Facility Emissions Permit Limits per MWC Unit</i>			
	<i>Flue Gas Concentration Limit @ 7% O₂</i>	<i>Hourly Emission Limit (lb/hr)</i>	<i>Annual Emission Limit (tons/year)</i>	<i>Air Modeling Emission Rate (g/s)</i>
Sulfur Dioxide (SO ₂)	29 ppmdv 75% reduction ³	32.86	143.9	4.14
Nitrogen Oxides (NO _x)	205 ppmdv	58.63	256.0	7.39
Carbon Monoxide (CO)	100 ppmdv	17.4	76.26	2.19
Particulate Matter (PM) ¹	27 mg/dscm	4.1	17.96	0.52
Dioxin ²	30 ng/dscm	4.50E-06	1.96E-05	5.67E-07
Mercury (Hg)	0.07 mg/dscm ⁴ or 85% reduction ³	0.02	0.087	2.52E-03
Cadmium (Cd)	0.04 mg/dscm	6.00E-03	0.026	7.56E-04
Lead (Pb)	0.44 mg/dscm	0.065	0.288	8.19E-03
Hydrogen Chloride (HCl)	29 ppmdv 95% reduction ³	17	74.43	2.14
Hydrogen Fluoride (HF)	6.74 mg/dscm	1.0	4.43	0.13
Volatile Organic Compounds (VOCs)	0.01 gr/dscf ⁵ 0.2 lb/ton ⁶	-- ⁷	-- ⁷	--
Sulfuric Acid Mist (SAM)	0.072 gr/dscf ⁹	-- ⁷	-- ⁷	--

Notes:

¹ For purposes of analysis, PM10 is equivalent to PM.

² Total tetra through octa PCDD and PCDF.

³ Whichever is less stringent.

⁴ The Florida Mercury Rule concentration standard of 0.070 mg/dscm @ 7% O₂ is more stringent than Subpart Eb concentration standard of 0.080 mg/dscm @ 7% O₂. However the removal requirement of 80% is less stringent than the 85% removal required in Subpart Eb; therefore, a mix of both regulations would apply (i.e., 0.070 mg/dscm @ 7% O₂, or 85% removal, whichever is less stringent).

⁵ Corrected at 12% CO₂.

⁶ Whichever is more restrictive.

⁷ To be demonstrated during initial compliance test only.

<i>Source</i>	<i>Existing Facility - Supporting Equipment Particulate Matter Emissions Limits</i>			
	<i>Flue Gas Concentration Limit</i>	<i>Hourly Emission Limit (lb/hr)</i>	<i>Annual Emission Limit (tons/year)</i>	<i>Air Modeling Emission Rate (g/s)</i>
Ash Building and Handling System ¹	-- 5% opacity	1.63	7.1	0.89
Lime Silo	0.015 gr/dscf 5% opacity	--	--	--
Dolomitic Lime Silo	-- 20% opacity	6.32	0.39	0.80
Carbon Silo	0.015 gr/dscf 5% opacity	--	--	--

Notes:

¹ No visible emissions in excess of 5% of the observation period.



RILEYPower
A Babcock Power Inc. Company

Dennis M. Malone
Proposal Manager

July 29, 2005

Mr. Frank C. Sapienza
CAMP DRESSER & McKEE INC
50 Hampshire Street
Cambridge, MA 02139

REFERENCE: Request for Selective Catalytic Reduction Information

Dear Mr. Sapienza:

Per your request to Richard Abrams, Riley Power Inc (RPI) is pleased to furnish a budget proposal to CAMP DRESSER & McKEE INC for a cold end SCR system to be located in Hillsborough Florida. The indicative proposal for this unit has the following equipment to reduce the emissions from 270 ppm to 50 ppm with a NH3 slip of 15 ppm and a catalyst life of 24,000 hours:

- SCR Inlet Duct
- SCR System start-up Bypass Duct (around the GAS to GAS heat exchanger)
- SCR Outlet Duct
- Gas to Gas heat exchanger
- Bypass and Isolation Dampers with Seal Air Systems as required
- Gas duct burners for flue gas temperature control
- RPI Delta Wing® flue gas and reagent mixers
- Reactor Casing and internals
- Catalyst
- Foundation information (loads) for all equipment furnished
- Structural steel including all stairs, platforms, railing and ladders
- Catalyst handling system of hoists, monorail system and loading carts
- Solid Modeling for flue gas flow analysis
- Aqua ammonia storage system including two storage tanks, each with the capacity of holding one truck volume (one for system operation and one for truck unloading, with truck unloading connections.
- Ammonia delivery system from the tank farm to the SCR inlet duct utilizing skid mounted pumps and direct injection nozzles.
- Complete controls system including engineering for draft controls for the SCR Bypass Damper system
- Complete Field Instruments for control on the reactor including inlet NOx Analyzers. Final NOx control will be by the CEMS monitor on the stack.
- Training program for operators and Maintenance Personnel
- Ammonia leak detectors in the ammonia storage facility and the direct injection control valve locations
- RPI will furnish electrical loads, compressed air, water, steam, and auxiliary fuel requirements at the battery limits



RILEY Power

A Babcock Power Inc. Company

Items not included in material pricing

Ductwork from the boiler to the Gas heat exchanger isolation and bypass dampers; and from the gas heater isolation dampers to the ID fan inlet.

Labor and erection equipment for the installation of the proposed equipment and any modifications to existing structures.

Foundations and all Civil work

Electrical equipment including switchgear, MCC's, wire, conduit, cable trays, etc.

Upgrades to existing station's systems and services for utilities Fire protection equipment

Safety equipment,

Building or enclosure

Wind load design into SCR, support steel and equipment. (Wind loads are to be handled by building enclosure and support steel separate from equipment support steel)

The footprint for this SCR will be approximately 30 feet square and approximately 50 feet high. This arrangement is based on the SCR directly above the gas to gas heat exchanger for a compact footprint.

The Indicative Material Price for the design, and supply of the SCR system as described above is Six Million Five Hundred Thousand Dollars (\$6,500,000). This estimate is conservative and with additional data and the scope further defined, RPI expects the estimate to be reduced. As this project develops and a firm price will be provided, RPI will assist you in obtaining a construction estimate.

The other information you requested in your letter will be sent to you early next week.

We look forward to a successful project working with CAMP DRESSER & McKEE to expand the facilities at the Hillsborough County Facility. If any additional questions arise during the review of the above, please feel free to contact me at (508) 854-3850, Fax(508) 854-3800 email: DMALONE@Babcockpower.COM or Richard Abrams at (508) 854-1140 email: RABRAMS@babcockpower.COM.

Sincerely,

Dennis M. Malone
Proposal Manager

Attachments:

Cc: Richard Abrams, Director, Proposals, Environmental Technology

Sapienza, Frank

From: Dirk_Eeraerts@keppelseghers.com
Sent: Wednesday, July 13, 2005 5:39 PM
To: Sapienza, Frank
Subject: Re: FW: SCR for Hillsborough County

Dear Frank,

The revised budget estimate for the Hillsborough SCR system is US\$ 5.9 million. This takes into account the capacity increase of approx. 15% and leaves out the installation. The scope is therefore reduced to equipment supply (all equipment + ducts + stairs and gangways) + supervision services during erection, commissioning and acceptance test. If we take out installation, we have to take out piping and cabling as well. For piping and cabling, supply and installation is part of one subcontract so I cannot separate installation only. Civil works are not included (were not included in the initial estimate).

Best Regards,
Dirk Eeraerts
Keppel Seghers Inc
1235 F Kennestone Circle, Marietta, Georgia 30066, USA
Tel: 770 421 1181 (ext 234), Fax: 770 421 8611

"Sapienza, Frank"
<SapienzaFC@cdm.c
<Dirk_Eeraerts@segherskeppel.com>
om>

To:

cc:

Subject: FW: SCR for Hillsborough

County

07/10/2005 09:24
PM

Dirk,

I have one correction to make in our request for an SCR system. The flue gas flow to the SCR system I previously gave you was 126,141 acfm at 270 degrees F.

This flow is the nominal or normal operating condition. However, the SCR system will have to be designed for the maximum flow condition of

145,149 acfm at 270 degrees F. Thanks,

ok forward to hearing from you.

Frank Sapienza

Sapienza, Frank

From: Dirk_Eeraerts@segherskeppel.com
Sent: Wednesday, February 16, 2005 6:35 PM
To: Sapienza, Frank
Cc: Ann_Raveel@segherskeppel.com; ivan_christiaens@segherskeppel.com; Stephane_Poellaer@segherskeppel.com; Wallace, Marc
Subject: RE: Hillsborough County SCR information

Frank,

Hereafter the SCR information:

1. Contact person at the Ivago facility in Gent, Belgium is Karel Matthys, phone: +32 9 2408159, e-mail: karel.matthijs@ivago.be

2. Budget estimate

We have based our budget estimate on the following design data :

Flue gas flow and analysis as per your letter dated November 30, 2004

NOx Concentration : inlet: 270 ppm_{dv} @ 7% oxygen (396 mg/Nm³ dry 11%O₂); stack: 70 mg/Nm³ dry 11%O₂

Required Ammonia Limit : 15 ppm_{dv} @ 7% oxygen (8.13 mg/Nm³ dry 11%O₂) based on CEM quarterly average

SO₂ max: 26 ppm_{dv} at 7% oxygen (or 38 mg/Nm³ dry at 11% O₂)

Flue gas temperature: 270 F (132 C)

Operating temperature: 230 - 250 C

We have based our budget estimate on the following scope:

re-heat based on combination of heat exchanger (flue gas / flue gas) and steam

out door installation, no civil works included in budget

ID fan only sized for pressure drop of SCR; main ID fan not included in budget

analyzers at inlet of SCR are included, stack analyzing equipment not included

No burners for regeneration (selected operating temperature avoids regeneration)

ducting, piping, insulation, stair, gangways, painting, electrical system are included

PLC based control system included

including construction, testing and commissioning, training of operators.

air compressor not included

spare parts not included

Total budget estimate for the above: US\$ 7.4 million

Best Regards,
Dirk Eeraerts

SEGHERS Keppel Technology Inc
1235 F Kennestone Circle, Marietta, Georgia 30066, USA
Tel: 770 421 1181 (ext 234), Fax: 770 421 8611

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Please visit our site at <http://www.segherskeppel.com>.



CDM
One Cambridge Place,
50 Hampshire Street
Cambridge, Massachusetts 02139

December 22, 2004

Attn: Mr. Frank C. Sapienza

Dear Frank:

Mr. Flemming Hansen of Haldor Topsoe has passed along your request for Selective Catalytic Reduction Information on Municipal Solid Waste Systems and we would like to take this opportunity to introduce ourselves to you and your client Hillsborough County. Previously we were the US arm of Balcke-Dürr GmbH (a member of the Deutsche Babcock group) located in Oberhausen, Germany and a designer and supplier of various systems and equipment to the Utility, Industrial and Petrochemical markets. Balcke-Dürr has undertaken a number of projects involving the addition of SCR units to MSW plants in Germany and other locations in Europe. Unfortunately in 2002 Deutsche Babcock became insolvent and various parts of the company were sold. The Energy group, which was responsible for the design and supply of the clean side SCR systems, was sold to GEA another large German Engineering Company and the US group became BD Heat Recovery.

The Compact DeNOx system was developed for use in the German waste to energy plants to remove NOx, dioxins and furans from low temperature gas streams. These selective catalytic systems are installed behind wet scrubbers and are designed to reheat the dirty gases prior to entering the catalyst. One advantage of the Compact DeNOx system is the low operating cost due to the high efficiency heat exchanger incorporated into the overall system.

In a typical waste to energy plant in Germany, the dirty flue gases enter the Compact DeNOx system (from the wet scrubber) at around 180°F. These gases are normally saturated and are therefore preheated (usually with a small steam coil) up to about 230°F prior to entering the heat exchanger. Exiting from the high efficiency heat exchanger at approximately 600°F the dirty gases are increased to 650°F with a direct-fired burner (or steam coil) prior to the direct injection of aqueous ammonia (NH₄OH). Please note for dioxin and furan removal only, ammonia injection is not required.

To ensure full and complete mixing and homogenizing of the ammonia and NOx we utilize our propriety Static Gas Mixers this produces even gas distribution and temperature to the catalyst beds. The mixed flue gases flow through the catalyst where the NOx, dioxins and furans are converted.

The hot clean gases are then used by the high efficiency heat exchanger to preheat the cold dirty gases. The clean gases then exit to the atmosphere at around 240°F.

The proper distribution and mixing of the dirty gases is essential to the optimum performance of the catalyst and in the case of NOx removal greatly assists in keeping ammonia slip to a minimum. Our experience has shown that it is virtually impossible to flow model these systems using computer simulation, consequently we always produce a scale model to design and position the static gas mixers and homogenizers. This also allows our clients to become assured that the system will perform as expected before it is even constructed.

In the US we have supplied eight of these systems (although not on MSW plants) two units are operating in downtown Boston at the Distrigas LNG facility (5 ppm NOx and 5 ppm ammonia slip), four units removing Dioxins from VCM plants for Oxychem (two in Corpus Christie and two in Deer Park, Texas). Two units are in the process of commissioning and start-up at the Clean Harbors hazardous waste facility in Deer Park, Texas. In all these US plants we have used Haldor Topsoe catalyst, the same catalyst is used for NOx and Dioxin removal however significantly more catalyst is required for the Dioxin.

Attached to this E-mail are the references for our SCR systems together with a separate excel sheet showing the flows, flue gas analysis and removal rates. Please note that most of the systems remove NOx and Dioxin but not all of them. We have also attached information showing some of the details of our system and other pertinent information.

With regard to the second part of your request we will be happy to provide you with some budgetary information however before we can proceed with this item we will need to know if a scrubber or wet ESP is expected to be part of the system. The design of the system will change based on the inlet temperature and saturation condition of the dirty gases. If the gases are saturated then we will need to provide a preheat section and a two stage heat exchanger with the cold end section usually manufactured from Hastalloy to resist the chloride corrosion found in MSW plants.

If the dirty gases are at a higher temperature and not saturated then typically a preheat section is not required and a single stage heat exchanger can generally meet the required efficiency while the materials of construction would normally be carbon steel.

We trust the enclosed information meets your immediate requirements and look forward to discussing our significant operating experience with you in the near future.

Sincerely Yours,

David Hawkins



Sapienza, Frank

From: Dave Hawkins [djh@bdheat.com]
It: Wednesday, December 22, 2004 5:29 PM
To: Sapienza, Frank
Subject: Fw: SCR Systems for Waste to Energy Plants

----- Original Message -----

From: Dave Hawkins
To: Frank C. Sapienza
Cc: Tom Ryan ; Flemming Hansen ; Mark Wallace
Sent: Wednesday, December 22, 2004 4:18 PM
Subject: SCR Systems for Waste to Energy Plants

Dear Frank:

Flemming Hansen of Haldor Topsoe forwarded your request for information on SCR systems operating with MSW plants. Please find attached a letter of Introduction plus product literature, references and operating details. For further information please see our website www.bdheat.com

Please note we will be closed for the Holidays from December 24 and reopen January 3, 2005

Best Regards

Dave Hawkins

Waste Heat Recovery Div.

Phone 727-392-0492
Fax 727-391-9289
E-mail djh@bdheat.com

1/20/2005

BD Heat Recovery Division Inc.
7800 - 113th Street North, Suite 202
Seminole, FL. 33772



Phone 727-392-0492
Fax 727-391-9289

February 25, 2005

Mr. Frank C. Sapienza
Camp Dresser & McKee, Inc.
50 Hampshire Street
Cambridge, MA. 02139

Dear Frank:

Please find enclosed our budgetary proposal for the supply of One Compact DeNOx Systems for the proposed Covanta 600 TPD Waste to Energy Plant in Hillsborough County, Florida.

We have based the design on a stack NOx emission of 27-ppmdv @ 7% O₂, which is a reduction of 90% compared to the inlet operating conditions of 270-ppmdv @ 7% O₂ with a maximum of 15-ppm ammonia slip.

The inlet gas temperature is high enough that we would not expect corrosion to be an issue with the heat exchanger however it is possible that ammonia bisulfate and/or ammonia sulfate could form on the heating surfaces. Should this be the case then off-line water washing would be required to clean the surfaces, depending on the frequency of washing corrosion could occur if carbon steel is used for the plate material.

We have assumed that the NOx measuring equipment would be in our scope, however this can be omitted should this be the preferred situation. However, the NOx inlet and outlet information is required to calculate the amount of ammonia injection. We have therefore assumed that this programming information supplied by BD Heat would be placed in the clients DCS system.

We trust the enclosed information meets your immediate requirements, but should you need any additional information or clarification, please do not hesitate to contact us.

Sincerely Yours,

David Hawkins

I. Introduction

With over a hundred years of experience in the industrial and power markets, BD Heat Recovery Division in combination with GEA Ecoflex has the stability, ingenuity and resources to handle the most challenging gas-to-gas heat exchanger applications.

The Compact DeNOx system utilizes the beneficial characteristics of separate and uncontaminated gas streams. This combined with its highly efficient counter flow heat exchanger design; make it ideal for solving the problems associated with NOx removal from low temperature gases

II. A. Product Description

The Compact DeNOx system is a clean side SCR (Selective Catalytic Reduction) system specifically designed to allow the removal of NOx from cold gases while using a minimum of energy to reheat the gases to the optimum catalyst temperature.

A newly installed induced draft fan (supplied by others) transmits the cold dirty flue gases from the fabric filter system to the Compact DeNOx system. The High Efficiency Heat Exchanger (HEHE) is a single-stage counter flow plate-type recuperator. The heating surface consists of shaped plates, which are welded together and assembled into heat exchanger modules.

The hot and cold gases flow over the plates in counter flow to one another, producing a smooth temperature curve and eliminating the typical diagonal profiles occurring in cross flow exchangers. The welded shaped plates guarantee a high thermal efficiency, while maintaining the gases separate from each other, ensuring uncontaminated and leak free operation.

The heat transfer plates are manufactured out of various steels, selected based on the gas constituents and temperature range. The types of fuel being fired and the expected operating conditions determine the plate gap and profile.

Heat transfer plates are welded together to form plate packs. These plate packs are assembled into modules, which when assembled on site produce the HEHE.

The dirty gases after leaving the heat exchanger at around 600°F are mixed by a static gas mixer with additional heat supplied by a burner installed in the Compact DeNOx systems casing. The gas temperature is increased to approximately 650°F, which is an optimum temperature for the catalyst to operate.

A 19% ammonia solution (NH₄OH) is injected into the hot dirty gas stream and homogenized with an additional SGM prior to turning through 180° and entering the SCR DeNOx catalyst where the NOx reacts with the ammonia and the catalyst to form water and nitrogen.



The clean hot gases then pass downward through the High Efficiency Heat Exchanger and heat the dirty cold gases. The cooled clean gases are then discharged to the atmosphere via a stack.

B. Control Philosophy

Prior to the ammonia injection point additional heat will be added via a burner to increase the dirty flue gases from approximately 600°F to 650°F. Temperature indicators will monitor the dirty flue gas temperature prior to the HEHE and catalyst and will adjust the burner-firing rate to maintain the inlet temperature to the catalyst.

The NO_x content of the flue gases prior to entering the catalyst is monitored, this value in conjunction with the flue gas flow (input supplied from a flow meter) will then control the amount of NH₄OH injected into the dirty flue gas stream. Additionally the NO_x content of the clean flue gas is measured and this value provides a feedback loop to the ammonia injection control valve.

Ammonia slip at the flue gas outlet can be monitored however this will not be used for control. Experience indicates that the accuracy of these devices at the levels required is unreliable and should not be used for control purposes. Typically the slip is calculated using the outlet NO_x compared with the amount of ammonia injection and comparing these two values with the calculated injection rates.

C. Start-Up

It is envisioned that the Compact DeNO_x system will be started using fresh air supplied by the induced draft fan. Heat will be added to the system by the natural gas burners installed in the system, once the Compact DeNO_x system is at the operating temperature then the dirty gas will be slowly admitted to the system at a rate that will maintain the catalyst temperature in the normal operating range.

D. Haldor Topsoe Catalyst Information

Parameter	15 ppm slip
Catalyst Type	DNX-930
Volume per Unit (m ³)	18.46
Number of Layers	1 + 1 spare
Number of Modules per layer	108
Nominal Module Size (mm) HxWxL	586x466x466
Module Arrangement	12 x 9
Reactor Dimensions (ft) W x L	18.5 x 13.8
Weight of each F type Module (lbs)	120
Total Weight (lbs)	12,960



System Operating Costs

The single-stage heat exchanger produces an approach temperature (hot gas - cold gas) of 50°F. At the design load this requires a natural gas usage of approximately 9,800 SCFH. Assuming a fuel cost of US \$5.50/million Btu and a yearly operation of 8,000 hours the operating cost for one unit would be: $8.8 \times 5.50 \times 8,000 = \$387,200$.

III. Scope of Supply

A. Compact DeNOx System

BD Heat Recovery will supply One (1) Compact DeNOx Systems each incorporating a high efficiency heat exchanger size C-6-6.5-2978-S-6W. The system will consist of: -

- * Engineering including P&ID and logic diagrams, design and flow modeling of Compact DeNOx System
- * Heat transfer plates manufactured from carbon steel
- * All casings manufactured from 1/4" carbon steel
- * Lower & upper distribution hood manufactured from Carbon Steel
- * Fabric expansion joint by Papco or equal with 1000I Texflex material
- * Static Gas Mixers and necessary guide vanes
- * Ammonia Injection lances and nozzles complete with manual adjustment valves and flow meters for the aqueous ammonia and atomizing air
- * SCR Catalyst housing from 1/4" carbon steel
- * SCR Catalyst
- * Galvanized structural steel from grade level up to the Compact DeNox integral support structure
- * Platforms, ladders and handrails to provide operating and maintenance access
- * Factory assembly of heat exchanger into three modules.
- * Assembly of system casings into road transportable sections
- * Burner heating System (see details below)
- * Delivery to Hillsborough County Job Site, Florida

B. Burner System

Shell - The heater shell is a 1/4" stainless steel 304 shell with structural stiffeners. The shell features three (3) wall mounted main burners and pilot peepsight, reinforced valve train mounts, elevated ignition transformer mount and terminal enclosure, downstream pressure taps with cocks and hose barbs and flanged inlet and outlet duct connections.

Burners – Each is an Eclipse-Winnox gun style burner and features an integral pilot that assures reliable light off by spark ignition and flame monitoring by UV scanner. The burner is complete with valve train and electric spark ignition.



Combustion Blower - is an industrial duty New York Blower Co. centrifugal fan. The fan is constructed of painted carbon steel and is complete with filter; TEFC motor; belt; shaft and bearing guards; clean out door and drain. Brake horsepower of fan is approximately 100 hp.

Valve Train - the gas valve train features

- Inlet gas cock
- Main gas pressure regulator
- Pressure gauge
- High gas pressure switch
- Low gas pressure switch
- Dual safety shutoff valves with actuators
- Vent valve
- Air/Gas control valve with pneumatic actuator, valve modulation is by a 4 -20mA control signal

The gas train is prepiped and prewired to a terminal strip mounted in a NEMA 4 enclosure.

Control Panel - is a NEMA 4 enclosure featuring:

- Three (3) Honeywell series flame relay with annunciator and door-mounted display
- Appropriate relays and breakers
- Start/stop buttons
- Indicator lights
- One (1) high temperature alarm
- One (1) temperature controller.

All electrical components are heavy-duty industrial quality of the Square D / Allen Bradley genre. Wire is THHN and conduit is rigid and seal tight. All wires are numbered to match the wiring diagram line numbers and all terminals are numbered.

Ratings:

Burner Maximum Input	28.0×10^6 Btu/hr
Burner Design Input	8.8×10^6 Btu/hr
Burner Min Input	3×10^6 Btu/hr
Estimated NO _x	<30 ppm corrected to 3% O ₂
Maximum CO	<100 ppm corrected to 3% O ₂
Valve Train	IRI
Local Enclosure	NEMA 4
Remote Enclosure	NEMA 4

The burners are designed to permit the flue gas temperature going to the catalyst to be increased by 100°F to permit the removal of any ammonia bisulfate that maybe formed in the catalyst. The over-fire condition will also allow the unit to be brought on-line in a shorter time frame.



C. Assembly

Each heat exchanger would be delivered to site as four modules, each weighing approximately 98,000 lbs. The rest of the equipment would be shipped to site in large road transportable pieces.

D. Instrumentation & NOx Analyzers

- * Instrumentation as follows designed to class 1, division II
 - J type thermocouples by Omega or equal
 - Pressure indicators and transmitters by Omega or equal
 - Local dial pressure gauges by Shelby Jones or equal
- * Chemiluminescence NOx and NH₃ (outlet only) Analyzers located at the dirty gas inlet and the clean gas outlet designed to class 1 division II.

The analyzer system will contain the following equipment:

Thermoelectric water condenser complete with a dual-headed peristaltic pump for continuous drain and moisture sensor to indicate carryover.

Multi-stage filtration

Stainless steel sample transportation pump

The following component manufacturers have been used in preparing this quotation, however we reserve the right to change suppliers:

Sample Probe / Filter - Rosemount or equal

Ball valves - Grove

Glass fiber filters - Porous media, Balston or equal

Solenoid valves - Parker, Asco or equal

Fittings - Gyrolok

Diaphragm pumps - Air Dimensions or equal

Flow meters - Matheson, Aalborg or equal

Sample coolers/condensers - Universal Analyzers or equal

- * The analyzers and sample handling equipment will be fully mounted, piped and wired in a free standing NEMA 7 enclosure.
- * Oxygen Analyzer
- * Local flow meters by Omega on individual ammonia nozzle lines

E. Leakage

The welded design of the heat transfer plates maintains the gas and air streams separate and leak free. Every individual plate pack is tested with compressed air prior to leaving the fabrication shop in Germany. The plate packs are guaranteed with a leakage rate during testing of 0.1% (gaskets used during testing allow a small amount of leakage).



After erection of the Compact DeNO_x system a florescent dust test (as detailed below) should be carried out over the entire system to ensure that there are no leaks in the sealing welds separating the clean and dirty gases.

- 1) Prior to start-up of the blower at low speed the completed Compact DeNO_x system should be thoroughly cleaned and inspected.
- 2) Blanking materials will be installed at the clean gas inlet to the lower distribution hood to prevent the passage of florescent dust.
- 3) The blower is started a minimum speed/pressure and the powder (DayGlo T 11 Synthetic Organic Colorant) is added to the suction side. If the use of the blower is not available or desirable than a temporary fan should be installed in the ducting.
- 4) All joints and seal welds are inspected using a black light particularly the seal welds around the high efficiency heat exchanger to ensure zero leaks between the clean and dirty gases.
- 5) Areas need repair are clearly visible under the black light and are marked for repair.

F. Codes

The High Efficiency Heat Exchanger is a low-pressure exchanger and will not comply with any pressure vessel codes.

Except for pressure related items covered by ASME pressure codes our selected fabricators will provide welding Procedure Specifications (WPS) and Welder Qualifications (WQ).

Welding procedures and welders will be qualified per the requirements of AWS D1.1 for the materials and positions required. Visual inspection of welds shall comply with AWS B1.11.

Welding in Germany will be as follows:

Qualifications Din 8560

Weld Filler material Din 18800/1

Materials will comply with the following:

- 1) Carbon Steel to ASTM A36
- 2) Corten Steel to ASTM A588
- 3) Stainless Steel to ASTM A240

G. Surface Preparation & Painting

All external module and distribution casing surfaces and structural steel beams will be sand blasted per SSPC-SP6 and primed with one coat of Carbo zinc 11 primer 2-3 mils thick. All casing surfaces are covered with insulation and no additional painting is required on site.



H. Exclusions

The Scope of supply does not include the following items, unless specifically included in our proposal:

- Support structures other than specified
- Cleaning equipment
- Site Work and Erection
- Site Insulation
- Anchor bolts
- Federal or local sales or usage tax

- Equipment Required by Customer for NOx Analyzers
 - Clean and dry location for the NOx Analyzers
 - 120 VAC, 50/60 Hz single phase power
 - Zero and span calibration gas cylinders and regulators
 - Heat-traced sample line, fittings, cable and conduit required for installation of the system
 - Clean dry instrument air at 80 -100 psig to blow-back sample port
 - Cylinder of ozonator air for NOx analyzer
 - Atmospheric vent location for system exhaust

IV. Commercial Terms

The prices quoted for our Scope of Supply as defined in section III are budgetary.

A.1 Price For One (1) Compact DeNOx Systems

Price as detailed in our scope of supply section III F.O.B. Hillsborough County, Job Site, Florida:

US \$3,100,000 (Three million one hundred thousand US Dollars)

A.2 Commissioning & Start-Up Service

BD Heat Recovery can provide commissioning and start-up assistance and training by qualified field personnel at a daily rate of US \$950 per 8-hour day plus travel time at \$70/hr and expenses. Assistance and travel on Saturdays and over 8 hr. days billable at time and a half. Assistance and travel on Sundays, holidays, over 8 hours on Saturdays and over 16 hours on weekdays are charged at double time. Living expenses include lodging, meals, plane tickets, rental cars and personal vehicle use (\$0.35/mile).



B. Typical Payment Schedule for Equipment Supply

5% on submittal of General Arrangement Drawings
20% on receipt of heat exchanger plate materials at fabrication shop
25% on completion of plate packs for the heat exchanger
45% on notification of readiness for delivery for the balance of the equipment for the first system (excluding catalyst)
5% on delivery of catalyst to job site

All Payments are net 30 days

C. Validity

The prices quoted are budgetary and non-binding.

D. Terms and Conditions

To be negotiated

E. Delivery

Our normal delivery would be 44 weeks from receipt of purchase order.

The catalyst would be delivered later after the erection of the equipment is completed.

The following time frames from date of order (unless otherwise specified) apply to the delivery of Drawings and Documentation:

G.A. drawings	5 weeks
Preliminary Fabrication Schedule	5 weeks
P & ID Diagram	12 weeks
Shop Fabrication Drawings	12 weeks
Structural Steel Drawings	12 weeks
Installation Erection Drawings	24 weeks
Material Test Certificates (Plates)	4 weeks after completion of plate packs
Other applicable material Test Certificates	During manufacture
Inspection Procedures	6 weeks
Operating manual	2 weeks prior to delivery
Recommended Operating Spares List	20 weeks
Packing & Shipping List	At time of shipment
Erection and Installation Procedures	24 weeks



H. Guarantees (Typical)

Based on the following dirty flue gas conditions and as per detailed in the specification:

Base Case	
Fuel	As per specification
Gas Flow	390,880 lbs/hr
Gas Temperature	270°F
Pressure	-20"WC
Inlet NO _x	270 ppmvd @ 7% O ₂
O ₂	5.57% wet vol.
H ₂ O	28.01% wet vol.
CO ₂	8.89% wet vol.
N ₂	56.83% wet vol.
Inlet SO _x	26 ppmvd @ 7% O ₂

Table 1 Flue Gas Data

It is assumed that 2 - 5% of the inlet NO_x is present as NO₂ and 10% of the SO_x is present as SO₃.

Based on the above assumptions, the dew point of the ammonia bisulfate (ABS) in the catalyst is approximately 500°F, and it is therefore not feasible to continuously operate below this temperature. Should ammonia bisulfate precipitate out on the catalyst this can be removed by operating above the dew point for a period of time.

BD Heat Recovery will Guarantee the following outlet conditions based on an hourly average (assumes BD Heat Recovery purchases the Catalyst).

	Base Case
NH ₃ Slip, ppmvd @ 15% O ₂	15
NO _x Outlet @ 7% O ₂	27 ppmdv
SO ₂ Oxidation, %	0.5
NH ₃ Consumption per Unit, (19% Aqueous NH ₃)	260 lbs/hr

Table 2

The SCR catalyst volumes are designed for maximum NH₃ slip as specified above and during steady state conditions is achievable. However, during sudden load changes minor over-shooting may occur.



Expected Catalyst Lifetime

Based on the operating conditions no less favorable than those listed in Table 1 BD Heat Recovery will guarantee the performance as listed in Table 2 for a period of 18,000 hours of operation, but no longer than 60 months from date of delivery.

System Pressure Drop

Based on operating conditions as outlined in Table 1 (base design) with a dirty gas inlet temperature of 270°F; BD Heat recovery will guarantee a pressure drop across the system from the inlet flange of our scope of supply to the outlet flange of 12" WC.

All guarantees are based on a performance test to be conducted by the owner and witnessed (without cost to the owner) by BD Heat Recovery Div. All other costs associated with this performance test are solely the obligation of the owner.

I. Limitations / Catalyst Poisons

The guarantees offered are subject to the catalyst being loaded and operated in accordance with the manufacturers recommendations.

There are several potential poisons to the SCR catalyst. In a natural gas application there is normally no poisoning of any significance however, there could be various contaminants that could shorten the life of the catalyst. These poisons would primarily be metals such as sodium, potassium, arsenic, and phosphate. Additionally any washing of the catalyst could be detrimental.



COMPACT De NO DATA SHEET

Exchanger Size C-6-6.5-2978-S-6W

Design

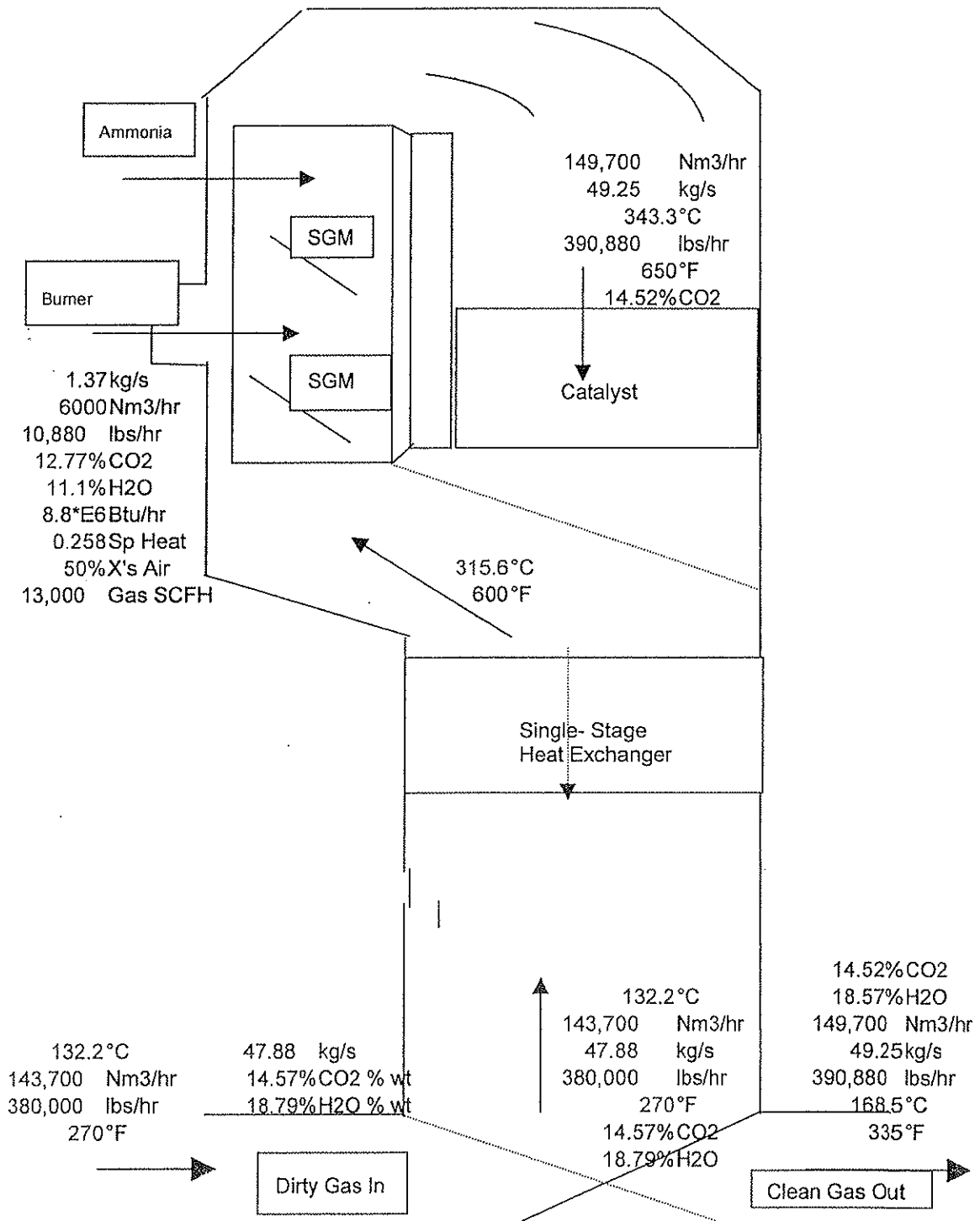
Clean Gas Flow (lb./hr)	390,880
Clean Gas Inlet Temperature (°F)	650
Clean Gas Outlet Temperature (°F)	335
Dirty Gas Flow (lb./hr)	380,000
Dirty Gas Inlet Temperature (°F)	270
Dirty Gas Outlet Temperature (°F)	600
Burner Flue Gas Flow (lbs./hr)	10,880
Gas Temperature to Catalyst	600
Burner Heat Input (Btu/hr x 10 ⁶)	8.8
Overall System Pressure Drop	12
Heat Exchanged (Btu/hr x 10 ⁶)	36.0
Heating Surface (ft ²)	193,880

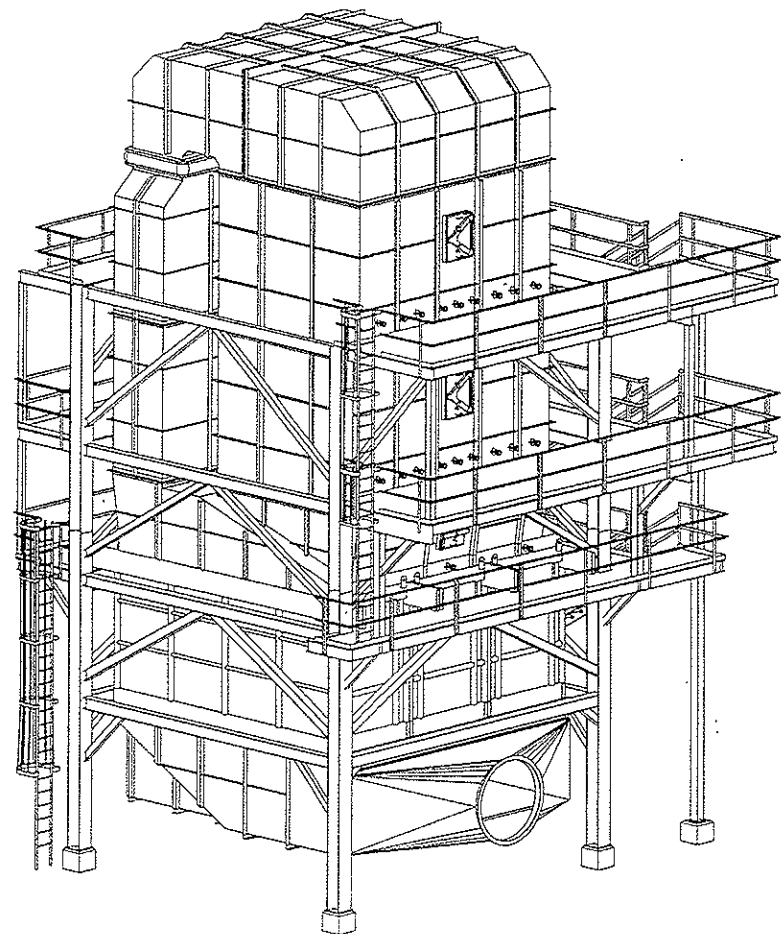
Mechanical Data

Plate Height (mm)	2978
Plate Thickness (mm)	0.8
Plate Gap (mm)	6.0
Plate Material	Carbon Steel
Estimated System Weight (Tons)	180



Base Design





										COMPACT DENDX SYSTEM C-0-6.5-2978-S-6W CDM FOR HILLSBOROUGH COUNTY HILLSBOROUGH COUNTY										BD HEAT RECOVERY DIV., INC. PROPOSED GENERAL ARRANGEMENT ISOMETRIC VIEWS DRAWN: JAC DATE: 02/17/05 CHECKED BY: DATE: 02/17/05 APPROVED: JAC DATE: 02/17/05 SCALE: AS SHOWN 1"=2'-0"									
NO. DATE BY APPR. REVISION										NO. DATE BY APPR. REVISION										ISSUED FOR: DATE: BY: ISSUED FOR: DATE: BY: BD HEAT RECOVERY DIV., INC. 05-1005									



Power

Environmental Control Systems Division

February 28, 2005

Camp Dresser & McKee Inc.
50 Hampshire Street
Cambridge, MA 02139

Attn: Mr. Frank Sapienza
Principle Engineer

Subject: Request for Selective Catalytic Reduction Information

Dear Mr. Sapienza:

ALSTOM is please to respond to your inquiry for an SCR in support of the Hillsborough County WTE permitting process. We would like to start by addressing the questions which you have.

- Guaranteed NOx Emission Limit (to be confirmed in performance test) @ 525 degrees F. > 90% NOx reduction
- Ammonia slip > 15 ppmvd @ 7% Oxygen
- Catalyst volume > 13.90 cubic meters
- Expected catalyst life > 40,000 hours +
- Catalyst composition and minimum temperature required to achieve stated NOx reduction > Vanadium based catalyst operating at 525 degrees F. due to sulfur content
- Catalyst material used to control NH3 emissions > Vanadium based catalyst operating at 525 degrees F
- Catalyst replacement cost > US\$122,000, Ex Works
- Approximate dimensions of SCR system > 12.3' x 12.4'
- Utility Requirements (natural gas, urea, power) > temperature of gas to be at 525 degrees F (by others), 800 kW/hr (pumps & vaporizer), pressure drop of 2-3 in. w.c., dependant on final duct arrangement, 35 lbs/hr ammonia usage (25% aqueous)



- Lastly, the analysis requires that we estimate what the NOx permit limit should be for the fourth MWC with SCR control (currently 3 units installed, with a fourth to be added). The NOx permit limit is the outlet NOx concentration which can not be exceeded on a 12-month rolling average basis. We obviously can not require you to guarantee a long-term limit. However, as a surrogate, we are asking for guaranteed daily average NOx and NH3 limits which must be achieved for the duration of a two week continuous performance test > A NOx reduction of 90% @ ammonia slip of 15 ppmvdc could be reasonably expected, based on ammonia flow being correct, flue gas temperature being at or above 525 degrees F, gas and ammonia/ NOX distributions and gas composition and volume being consistently being met.
- As part of this submittal, you will find a separate file identifying ALSTOM's experience with SCR's at WTE facilities. You will note most are low dust installations in Europe, where this arrangement is more common than in North America, due to the cost of reheating the flue gas.
- Our Indicative estimate for the high dust SCR, including reactor, support steel, access, AIG, controls, and initial catalyst charge is \$2,250,000, plus cost of installation,

If you require further assistance, please do not hesitate to contact either Noel Kuck or myself. Thank you for your interest in ALSTOM's products and services.

Very truly yours,

John Holbrook

John Holbrook
Global Power Sales
(o) 410-781-0383
(c) 410-274-5799
(e) john.Holbrook@power.alstom.com

cc: Noel Kuck
Business Applications Manager
(o) 865-694-5368
(e) noel.c.kuck@power.alstom.com

Sapienza, Frank

From: Jansen, Peter [Peter_Jansen@fwc.com]
nt: Tuesday, February 15, 2005 3:23 PM
o: Sapienza, Frank
Cc: Parham, David; Wagner, Dave
Subject: SCR for Hillsborough County Florida

Mr. Sapienza,

We are currently in the process of reviewing your Selective Catalytic Reduction (SCR) information request for the Hillsborough County Florida municipal waste incinerator project. While Foster Wheeler (FW) does not have any direct experience with waste incinerator type SCR systems, we have designed, supplied and erected a multitude of other SCR systems for various fuels. With this type of application (waste incinerator), the focus is with selecting the proper catalyst to handle this type of fuel. The ammonia system, whether it is anhydrous, aqueous or urea based will be configured for your particular project.

With this in mind, we will require additional data to enable us to obtain the requested information from catalyst vendors. Please provide the following:

1. Fuel analysis.
2. Ash Analysis.
3. Trace Elements.
4. Required Outlet NOx.
4. Catalyst location: what equipment is located downstream of the SCR catalyst?
5. Temperature range: flue gas temperatures are a critical element in the selection of the catalyst, the information provided in your request suggests the temperature will range from 220 °F minimum to 270 °F. Is this the full range of temperatures the catalyst will be exposed to? Generally, a minimum flue gas temperature of 600°F is required for this type of sulfur bearing fuel.
6. Is there a SO2 oxidation requirement?

With the aforementioned information we can contact various catalyst suppliers and begin preliminary proposal development.

FW is willing to prepare an SCR system proposal for Hillsborough on a reimbursable basis with the agreement that FW would be awarded the work in the event the project moves ahead. Proposal costs would be deducted from the resulting contract price in the event of an award.

Sincerely,

Pete Jansen

Sapienza, Frank

From: Reed Robert [Robert.Reed@argillon.com]
Date: Tuesday, February 08, 2005 3:04 PM
To: Sapienza, Frank
Subject: RE: SCR Sytem for Hillsborough County, FI

Frank,

I have attached a reference list of "Special Applications" for which we have supplied catalyst. It includes a number of waste incinerators. It does not have the level of detail that you are requesting, however it's what I can offer at this time. I have checked with our systems group regarding the budgetary quote for the system that you requested. They are not currently quoting systems for this application. If you find another company willing to quote the system, I would be happy to provide you with a budgetary quotation for the catalyst. If this is something you are interested in, I will need the following information:

- Gas temperature, composition, and flowrate after being reheated. The current temperature is far too low.
- Geometric constraints for catalyst bank
- Performance requirements (NOx reduction, allowable DP, allowable NH3 slip, SO2 conversion limits (if any), any others)
- Detailed gas analysis including any potential catalyst poisons

If you are interested in the catalyst quote, please get me the information above and I'll pull a design together.

Regards,
 Rob Reed

Robert R. Reed

Argillon LLC
 Tel: (341) 341-7521 (NEW)
 A: (341) 341-7509 (NEW)
 Email: robert.reed@argillon.com (NEW)

-----Original Message-----

From: Sapienza, Frank [mailto:SapienzaFC@cdm.com]
Sent: Tuesday, February 01, 2005 4:06 PM
To: Robert.Reed@argillon.com
Subject: SCR Sytem for Hillsborough County, FI

Dear Mr. Reed,

Good talking with you today. I remember meeting with Bob Johnson and hearing his presentation on Siemens/Argillon's SCR capabilities which I was very impressed with.

The attached request-for-proposal letter describes the Hillsborough County, Florida project and the information we are requesting. Do hope to hear from Argillon on this interesting project.

Yours truly,

Frank Sapienza
 Principal Engineer
 Camp Dresser & McKee Inc.
 10 Hampshire Street
 Cambridge, MA 02139
 Phone: 617-452-6239
 Fax: 617-452-8239

2/8/2005

Reference List - SINOx® Systems

Exhaust Gas Treatment Plants and Systems for Special Applications								
No.	Customer/Operator	Country	Field of Application	Fuel	Capacity in kW	Volume flow in Nm³/h	Extent of Delivery	Delivery Date
12	LAB/ Taejeon	F Korea	Waste Incineration	Municipal Waste	---	73,525	SINOx®	1997
13	LAB/ Tadaepo	F	Waste Incineration	Municipal Waste	---	57,619	SINOx®	1997
14	ENETEX Electro melting plant Kempten	D	Production process	tailgas	---	2,900	SINOx®	1997
15	MSE	USA	Ammunition Destruction	---	---	469	SINOx®	1998
16	TERAG Panofina	CH	Boiler	Gas	---	---	SINOx® and Oxi- Cat	1998
			Boiler	Gas	---	---	SINOx® and Oxi- Cat	1998
17	Siemens/ SBA Fürth	D	Waste Incineration	Gas	---	8,900	SINOx®	1998
			Waste Incineration	Gas	---	8,900	SINOx®	1998
18	ENETEX	D	Ammunition Destruction	---	---	---	SINOx®	2002
Total SCR Systems:		21						

Reference List - SINOx® Systems

Exhaust Gas Treatment Plants and Systems for Special Applications								
No.	Customer/Operator	Country	Field of Application	Fuel	Capacity in kW	Volume flow in Nm³/h	Extent of Delivery	Delivery Date
1	Sulzer Industries Du Pont de Nemours	F	Comustion of Production Residues	---	---	25,000	SINOx®	1992
2	Espindesa	E	Slag Decontamination	---	---	4,600	SINOx®	1994
3	Babcock BSH/ Leuna Werke	D	Chemical Process Exhaust	---	---	1,335	SINOx®	1994
4	Noell-KRC/ Wolff Walsrode	D	Cellulose Nitrifaction	---	---	6,170	SINOx®	1994
5	Faserwerk Kehlheim	D	Chemical Process Exhaust	---	---	4,400 4,400	SINOx® SINOx®	1994 1994
6	Forschungszentrum Karlsruhe	D	Waste Incineration	Waste	---	1,500	SINOx®	1994
7	Leybold Didactic	D	Distribution of Didactic Materials	---	---	---	SINOx®	1994 - 1995
8	Alsachimie (Rhône-Pulenc)	F	Combustion of Production Residues	Process Tail Gas/ HFO	---	112,000	SINOx®	1995
9	E.S.T.	D	Ammunition Destruction	---	---	---	SINOx®	1996

Sapienza, Frank

From: Pliska, Kevin [Kevin.Pliska@CovantaEnergy.com]
t: Wednesday, July 06, 2005 9:31 AM
To: Sapienza, Frank
Cc: Treshler, Joseph
Subject: RE: SNCR for Hillsborough

Frank,

The budget price we received from Fuel Tech in the fall of 2004 was \$1,021,600. We have applied CPI escalation to this budget price to bring the April '05 budget price in at \$1,044,684.

Please let me know if you need additional information.

Kevin

-----Original Message-----

From: Sapienza, Frank [mailto:SapienzaFC@cdm.com]
Sent: Tuesday, July 05, 2005 11:52 AM
To: Pliska, Kevin
Subject: SNCR for Hillsborough

Kevin,

I am working on the Hillsborough County proposed Waste to Energy Facility, specifically I am preparing the Best Available Control Technology (BACT) evaluation. I am confirming some of our cost estimates at this point. Could you please supply us with the cost of the SNCR system proposed for Hillsborough's fourth combustion unit. We do not need the installed cost just the cost for the supply of the SNCR equipment. I was involved with the Hillsborough spec reviews which CDM performed so I am familiar with the system.

The cost we are requesting is basically the scope of supply which Fuel Tech is providing for their NOxOUT Process. Specifically, Fuel Tech's scope includes:

- One 15,000 gallon NOxOUT Reagent Storage Tank
- One Circulation Module
- One Redundant Metering Module
- 3 Distribution Modules
- 21 Wall Injector Assemblies
- One Furnace Temperature Monitor
- One Control Room Interface (PC-PLC based control system)
- Engineering, Drawings, O&M Manuals by Fuel Tech

I could use this cost information as soon as possible, within a day or two.

Thank you,

Frank Sapienza
 CDM
 Cambridge, MA
 tel: 617-452-6239
 e-mail: sapienzaafc@cdm.com

Sapienza, Frank

From: Gorrie, Jason
t: Thursday, February 10, 2005 3:00 PM
To: Sapienza, Frank; Hibbard, Cynthia; Wallace, Marc
Subject: FW: FGR \$

From: Pliska, Kevin [mailto:Kevin.Pliska@CovantaEnergy.com]
Sent: Thursday, February 10, 2005 2:34 PM
To: Gorrie, Jason
Cc: Treshler, Joseph; Crellin, William; Strobridge, Daniel; Schneider, James
Subject: RE: FGR \$

Jason,

Our boiler vendor has identified the approximate value of the proposed installed FGR system at \$250,000.00. The split is approximately \$200K material and \$50K labor. Additionally, the APC vendor has estimated the installed component of the FGR duct in their scope at \$27,700.

Please let me know if you require additional information in support of the permit application.

-----Original Message-----

From: Pliska, Kevin
Sent: Wednesday, February 09, 2005 11:21 AM
To: 'Gorrie, Jason'
Subject: FGR \$

I have asked the vendors to breakout the equipment and labor costs.

2/11/2005



Department of Environmental Protection

Division of Air Resource Management

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit for a proposed project:

- subject to prevention of significant deterioration (PSD) review, nonattainment area (NAA) new source review, or maximum achievable control technology (MACT) review; or
- where the applicant proposes to assume a restriction on the potential emissions of one or more pollutants to escape a federal program requirement such as PSD review, NAA new source review, Title V, or MACT; or
- at an existing federally enforceable state air operation permit (FESOP) or Title V permitted facility.

Air Operation Permit – Use this form to apply for:

- an initial federally enforceable state air operation permit (FESOP); or
- an initial/revised/renewal Title V air operation permit.

Air Construction Permit & Revised/Renewal Title V Air Operation Permit (Concurrent Processing Option)

– Use this form to apply for both an air construction permit and a revised or renewal Title V air operation permit incorporating the proposed project.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: Hillsborough County, Florida	
2. Site Name: Hillsborough County Resource Recovery Facility	
3. Facility Identification Number: 0570261	
4. Facility Location Street Address or Other Locator: 350 N. Falkenburg Road City: Tampa County: Hillsborough Zip Code: 33619	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: Jason Gorrie, P.E.	
2. Application Contact Mailing Address... Organization/Firm: CDM Street Address: 1715 N. Westshore Blvd., Suite 875 City: Tampa State: FL Zip Code: 33607	
3. Application Contact Telephone Numbers... Telephone: (813) 281-2900 ext. Fax: (813) 288-8787	
4. Application Contact Email Address: gorriejm@cdm.com	

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	
2. Project Number(s):	
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

APPLICATION INFORMATION

Purpose of Application

This application for air permit is submitted to obtain: (Check one)

Air Construction Permit

☐ Air construction permit.

Air Operation Permit

☐ Initial Title V air operation permit.

☐ Title V air operation permit revision.

☐ Title V air operation permit renewal.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

☒ Air construction permit and Title V permit revision, incorporating the proposed project.

☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

☒ I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

This application is being made under the provisions of the Florida Electrical Power Plant Siting Act

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee
	Municipal Waste Combustor – Unit 4	AC1A	

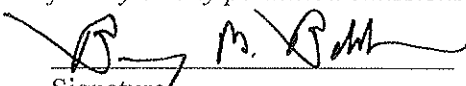
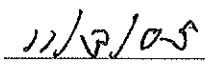
Application Processing Fee

Check one: ☒ Attached - Amount: \$ 125,000 (Power Plant Siting Act ☐ Not Applicable

APPLICATION INFORMATION

Owner/Authorized Representative Statement

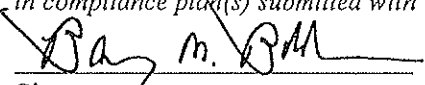
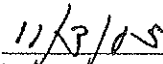
Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name : Barry M. Boldissar
2. Owner/Authorized Representative Mailing Address... Organization/Firm: Hillsborough County Solid Waste Street Address: 601 E. Kennedy Blvd. City: Tampa State: FL Zip Code: 33602
3. Owner/Authorized Representative Telephone Numbers... Telephone: (813) 272 - 5680 ext. Fax: () -
4. Owner/Authorized Representative Email Address:
5. Owner/Authorized Representative Statement: <i>I, the undersigned, am the owner or authorized representative of the facility addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other requirements identified in this application to which the facility is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit.</i>  Signature  Date

APPLICATION INFORMATION

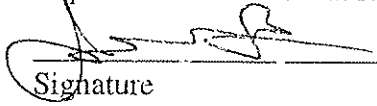
Application Responsible Official Certification

Complete if applying for an initial/revised/renewal Title V permit or concurrent processing of an air construction permit and a revised/renewal Title V permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name: Barry M. Boldissar
2. Application Responsible Official Qualification (Check one or more of the following options, as applicable): ☐ For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C. ☐ For a partnership or sole proprietorship, a general partner or the proprietor, respectively. ☒ For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official. (delegated) ☐ The designated representative at an Acid Rain source.
3. Application Responsible Official Mailing Address... Organization/Firm: Hillsborough County Solid Waste Street Address: 601 E. Kennedy Blvd. City: Tampa State: FL Zip Code: 33602
4. Application Responsible Official Telephone Numbers... Telephone: (813) 272 - 5680 ext. Fax: () -
5. Application Responsible Official Email Address:
6. Application Responsible Official Certification: <i>I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.</i>  Signature  Date

APPLICATION INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: Jason M. Gorrie, P.E. Registration Number: 55341
2. Professional Engineer Mailing Address... Organization/Firm: CDM Street Address: 1715 N. Westshore, Suite 875 City: Tampa State: FL Zip Code: 33607
3. Professional Engineer Telephone Numbers... Telephone: (813) 281 - 2900 ext. Fax: (813) 288 - 8787
4. Professional Engineer Email Address: gorriejm@cdm.com
5. Professional Engineer Statement: <i>I, the undersigned, hereby certify, except as particularly noted herein*, that:</i> <i>(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and</i> <i>(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.</i> <i>(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☒, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.</i> <i>(4) If the purpose of this application is to obtain an air construction permit (check here ☐, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☒, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.</i> <i>(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.</i> Signature  Date <u>11/16/05</u> (seal)

* Attach any exception to certification statement.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone 17 East (km) 368.2 North (km) 3092.7		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) 27/57/14 Longitude (DD/MM/SS) 82/40/22	
3. Governmental Facility Code:3	4. Facility Status Code:A	5. Facility Major Group SIC Code: 49	6. Facility SIC(s): 4953
7. Facility Comment :			

Facility Contact

1. Facility Contact Name:Glenn Hoag
2. Facility Contact Mailing Address... Organization/Firm: Covanta Hillsborough, Inc. Street Address: 350 Falkenburg Rd. City: Tampa State: FL Zip Code: 33619
3. Facility Contact Telephone Numbers: Telephone: (813) 684 - 5688 ext. Fax: () -
4. Facility Contact Email Address:

Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I. that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name: Glenn Hoag
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Covanta Hillsborough, Inc. Street Address: 350 Falkenburg Rd City: Tampa State: FL Zip Code: 33619
3. Facility Primary Responsible Official Telephone Numbers... Telephone: () - ext. Fax: () -
4. Facility Primary Responsible Official Email Address:

FACILITY INFORMATION

Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a “major source” and a “synthetic minor source.”

1. ☐ Small Business Stationary Source	☐ Unknown
2. ☐ Synthetic Non-Title V Source	
3. ☒ Title V Source	
4. ☒ Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. ☐ Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. ☒ Major Source of Hazardous Air Pollutants (HAPs)	
7. ☐ Synthetic Minor Source of HAPs	
8. ☒ One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. ☒ One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. ☐ One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. ☐ Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	
12. Facility Regulatory Classifications Comment:	

FACILITY INFORMATION

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
SO ₂	A	N
NO _x	A	N
CO	A	N
PM	A	N
PCDD/PCDF	A	N
Hg	A	N
Cd	A	N
Pb	A	N
HCl	A	N
HF	A	N
Ozone (as VOC)	A	N
SAM	A	N

FACILITY INFORMATION

B. EMISSIONS CAPS

Facility-Wide or Multi-Unit Emissions Caps

[illegible]

FACILITY INFORMATION

C. FACILITY ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: <u>Vol. I</u> ☐ Previously Submitted, Date: _____
2. Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: <u>Vol. I</u> ☐ Previously Submitted, Date: _____
3. Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____

Additional Requirements for Air Construction Permit Applications

1. Area Map Showing Facility Location: ☒ Attached, Document ID: <u>Vol. I</u> ☐ Not Applicable (existing permitted facility)
2. Description of Proposed Construction or Modification: ☒ Attached, Document ID: <u>Vol. III, Section 3</u>
3. Rule Applicability Analysis: ☒ Attached, Document ID: <u>Vol. III, Section 2</u>
4. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.): ☒ Attached, Document ID: <u>Vol. III, Section 4</u> ☐ Not Applicable (no exempt units at facility)
5. Fugitive Emissions Identification (Rule 62-212.400(2), F.A.C.): ☒ Attached, Document ID: <u>Vol. III, Section 4</u> ☐ Not Applicable
6. Preconstruction Air Quality Monitoring and Analysis (Rule 62-212.400(5)(f), F.A.C.): ☒ Attached, Document ID: <u>Vol. III, Section 5</u> ☐ Not Applicable
7. Ambient Impact Analysis (Rule 62-212.400(5)(d), F.A.C.): ☒ Attached, Document ID: <u>Vol. III, Section 5</u> ☐ Not Applicable
8. Air Quality Impact since 1977 (Rule 62-212.400(5)(h)5., F.A.C.): ☒ Attached, Document ID: <u>Vol. III, Section 5</u> ☐ Not Applicable
9. Additional Impact Analyses (Rules 62-212.400(5)(e)1. and 62-212.500(4)(e), F.A.C.): ☒ Attached, Document ID: <u>Vol. III, Section 5</u> ☐ Not Applicable
10. Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☒ Attached, Document ID: <u>Volume III, Section 3</u> ☐ Not Applicable

Additional Requirements for FESOP Applications

- ## Additional Requirements for Title V Air Operation Permit Applications

- ### Additional Requirements Comment

[illegible]

EMISSIONS UNIT INFORMATION

Section [1] of [1]

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application for air permit. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application - Where this application is used to apply for both an air construction permit and a revised/renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. **The air construction permitting classification must be used to complete the Emissions Unit Information Section of this application for air permit.** A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air construction permitting and insignificant emissions units are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

EMISSIONS UNIT INFORMATION

Section [1] of [1]

A. GENERAL EMISSIONS UNIT INFORMATION**Title V Air Operation Permit Emissions Unit Classification**

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

☒ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section: Municipal Waste Combustor, Unit 4

3. Emissions Unit Identification Number:

4. Emissions Unit Status Code: C	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code: 49	8. Acid Rain Unit? ☐ Yes ☒ No
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9. Package Unit:

Manufacturer:

Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment:

EMISSIONS UNIT INFORMATION

Section [1] of [1]

Emissions Unit Control Equipment

1. Control Equipment/Method(s) Description:

APC for the fourth unit will consist of a spray dryer absorber, fabric filter baghouse, activated carbon injection system, selective non-catalytic reduction system, and flue gas recirculation.

2. Control Device or Method Code(s): 016, 025, 048, 067, 107

EMISSIONS UNIT INFORMATION

Section [1] of [1]

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate: 600 tpd of waste when HHV = 5000 Btu/lb
2. Maximum Production Rate:
3. Maximum Heat Input Rate: 288 million Btu/hr
4. Maximum Incineration Rate: 50,000 pounds/hr 600 tons/day
5. Requested Maximum Operating Schedule: 24 hours/day 52 weeks/year 7 days/week 8760 hours/year
6. Operating Capacity/Schedule Comment: MWC Unit No. 4 is rated at 600 tons per day of MSW with a reference higher heating value of 5,000 Btu/lb of waste on an annual basis.

EMISSIONS UNIT INFORMATION

Section [1] of [1]

C. EMISSION POINT (STACK/VENT) INFORMATION

(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: existing stack		2. Emission Point Type Code: 1	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:			
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:			
5. Discharge Type Code: V	6. Stack Height: 220 feet	7. Exit Diameter: 5.5 feet	
8. Exit Temperature: 270 °F	9. Actual Volumetric Flow Rate: varies	10. Water Vapor: Varies	
11. Maximum Dry Standard Flow Rate: Varies (see Vol. III, Section 6)		12. Nonstack Emission Point Height: feet	
13. Emission Point UTM Coordinates... Zone: 17 East (km): 368.2 North (km): 3092.7		14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) 27/57/16 Longitude (DD/MM/SS) 82/21/12	
15. Emission Point Comment: Existing flue for unit no. 4 is enclosed in a common annulus			

EMISSIONS UNIT INFORMATION

Section [1] of [1]

D. SEGMENT (PROCESS/FUEL) INFORMATION**Segment Description and Rate:** Segment 1 of 1

1. Segment Description (Process/Fuel Type): Municipal Solid Waste		
2. Source Classification Code (SCC): 50100105		3. SCC Units: Tons burned
4. Maximum Hourly Rate: 25 tons/hr	5. Maximum Annual Rate: 219,000 tons/yr	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit: 10
10. Segment Comment:		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):		3. SCC Units:
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

EMISSIONS UNIT INFORMATION

Section [] of []

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)**Segment Description and Rate:** Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):		3. SCC Units:
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):		3. SCC Units:
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

EMISSIONS UNIT INFORMATION

Section [1] of [1]

E. EMISSIONS UNIT POLLUTANTS**List of Pollutants Emitted by Emissions Unit**

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
PM	016		EL
SO2	067		EL
NOx	107	026	EL
Pb	016		EL
HF	067		EL
Hg	207		EL
Cd	016		EL
HCl	067		EL
PCDD/PCDF	016		EL
CO	025		EL
VOC	067		EL
SAM	067		EL

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: PM		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 5.7 lb/hour 25.1 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 20.6 mg/dscm @ 7% O2	4. Equivalent Allowable Emissions: 5.7 lb/hour 25.1 tons/year
5. Method of Compliance: USEPA Method 5	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ___ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ___ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: SO2		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 19.2 lb/hour 84.3 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 2

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 26 ppmv @ 7% O2	4. Equivalent Allowable Emissions: 19.2 lb/hour 84.3 tons/year
5. Method of Compliance: CEMS	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions 2 of 2

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 80% reduction	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: CEMS	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: NOx		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 58.5 lb/hour 256.1 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 110 ppmv @ 7% O ₂	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: Pb	2. Total Percent Efficiency of Control:
3. Potential Emissions: 5.5 x 10 ⁻² lb/hour 0.243 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: N/A Reference:	7. Emissions Method Code: 0
8. Calculation of Emissions: See Volume III, Section 4	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 0.2 mg/dscm @ 7% O ₂	4. Equivalent Allowable Emissions: 5.5 x 10 ⁻² lb/hour 0.243 tons/year
5. Method of Compliance: USEAP Method 29	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: HF		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 0.80 lb/hour 3.5 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 3.5 ppmv @ 7% O2	4. Equivalent Allowable Emissions: 0.80 lb/hour 3.5 tons/year
5. Method of Compliance: USEPA Method 13 A or 13B	
6. Allowable Emissions Comment (Description of Operating Method): Proposed as initial stack test only	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: Hg		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 0.037 lb/hour 0.163 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 2

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 0.028 mg/dscm @ 7% O ₂	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: USEPA Method 29	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions 2 of 2

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 85% reduction	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: USEPA Method 29	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: Cd		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 4.56 x 10 ⁻³ lb/hour 0.02 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code:	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 0.02 mg/dscm @ 7% O2	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: USEPA Method 29	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: HCl		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 25.36 lb/hour 111.1 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 2

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 25 ppm _{dv} @ 7% O ₂	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: USEPA Method 26 or 26A	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions 2 of 2

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 95% reduction	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: USEPA Method 26 or 26A	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: PCDD/PCDF		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 3.61 x 10 ⁻⁶ lb/hour 1.58 x 10 ⁻⁵ tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 13 ng/dscm @ 7% O2	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: USEPA Method 23	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: CO		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 25.89 lb/hour 113.4 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 80 ppmdv @ 7% O2	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: CEMS	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour / tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: ozone (as VOC)		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 2.74 lb/hour 12 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 0.1 lb/ton	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: USEPA Method 18 or 25A, initial stack test only	
6. Allowable Emissions Comment (Description of Operating Method): Based on Harrisonburg, VA RRF emission limit	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: SAM		2. Total Percent Efficiency of Control:	
3. Potential Emissions: 16.99 lb/hour 74.4 tons/year		4. Synthetically Limited? ☐ Yes ☒ No	
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year			
6. Emission Factor: N/A Reference:		7. Emissions Method Code: 0	
8. Calculation of Emissions: See Volume III, Section 4			
9. Pollutant Potential/Estimated Fugitive Emissions Comment:			

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 15 ppm _{dv} @ 7% O ₂	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance: USEPA Method 8, initial stack test only	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions of

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

EMISSIONS UNIT INFORMATION

Section [1] of [1]

G. VISIBLE EMISSIONS INFORMATION

Complete if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: VE10	2. Basis for Allowable Opacity: ☒ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: 10 % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: 6 min/hour	
4. Method of Compliance: COMS	
5. Visible Emissions Comment:	

Visible Emissions Limitation: Visible Emissions Limitation ____ of ____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

EMISSIONS UNIT INFORMATION

Section [1] of [1]

H. CONTINUOUS MONITOR INFORMATION**Complete if this emissions unit is or would be subject to continuous monitoring.****Continuous Monitoring System:** Continuous Monitor 1 of 4

1. Parameter Code: O2	2. Pollutant(s):
3. CMS Requirement:	☒ Rule ☐ Other
4. Monitor Information... to be determined Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment: 40 CFR 60.58b(b)	

Continuous Monitoring System: Continuous Monitor 2 of 4

1. Parameter Code: EM	2. Pollutant(s): CO
3. CMS Requirement:	☒ Rule ☐ Other
4. Monitor Information... to be determined Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment: 40 CFR 60.58b(i)	

EMISSIONS UNIT INFORMATION

Section [1] of [1]

H. CONTINUOUS MONITOR INFORMATION (CONTINUED)

Complete if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor 3 of 4

1. Parameter Code: EM	2. Pollutant(s): SO ₂
3. CMS Requirement: ☒ Rule ☐ Other	
4. Monitor Information... to be determined Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment: 40 CFR 60.58b(e)	

Continuous Monitoring System: Continuous Monitor 4 of 4

1. Parameter Code: EM	2. Pollutant(s): NO _x
3. CMS Requirement: ☒ Rule ☐ Other	
4. Monitor Information... to be determined Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment: 40 CFR 60.58b(h)	

EMISSIONS UNIT INFORMATION

Section [1] of [1]

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: <u>see comment</u> ☐ Previously Submitted, Date ____
2. Fuel Analysis or Specification (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: <u>see comment</u> ☐ Previously Submitted, Date ____
3. Detailed Description of Control Equipment (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: <u>see comment</u> ☐ Previously Submitted, Date ____
4. Procedures for Startup and Shutdown (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____ ☒ Not Applicable (construction application)
5. Operation and Maintenance Plan (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: <u>see comment</u> ☐ Previously Submitted, Date ____ ☐ Not Applicable

6. Compliance Demonstration Reports/Records

☐ Attached, Document ID: _____

Test Date(s)/Pollutant(s) Tested: _____

☐ Previously Submitted, Date: _____

Test Date(s)/Pollutant(s) Tested: _____

☐ To be Submitted, Date (if known): _____

Test Date(s)/Pollutant(s) Tested: _____

☒ Not Applicable

Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute

☒ Attached, Document ID: see comment__

☐ Not Applicable

EMISSIONS UNIT INFORMATION

Section [1] of [1]

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(6) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)) ☒ Attached, Document ID: <u>see comment</u> ☐ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rule 62-212.400(5)(h)6., F.A.C., and Rule 62-212.500(4)(f), F.A.C.) ☒ Attached, Document ID: <u>see comment</u> ☐ Not Applicable
3. Description of Stack Sampling Facilities (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: <u>see comment</u> ☐ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements ☒ Attached, Document ID: <u>see comment</u>
2. Compliance Assurance Monitoring ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Alternative Methods of Operation ☐ Attached, Document ID: _____ ☒ Not Applicable
4. Alternative Modes of Operation (Emissions Trading) ☐ Attached, Document ID: _____ ☒ Not Applicable
5. Acid Rain Part Application ☐ Certificate of Representation (EPA Form No. 7610-1) ☐ Copy Attached, Document ID: _____ ☐ Acid Rain Part (Form No. 62-210.900(1)(a)) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Repowering Extension Plan (Form No. 62-210.900(1)(a)1.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ New Unit Exemption (Form No. 62-210.900(1)(a)2.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Retired Unit Exemption (Form No. 62-210.900(1)(a)3.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Phase II NO _x Compliance Plan (Form No. 62-210.900(1)(a)4.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Phase II NO _x Averaging Plan (Form No. 62-210.900(1)(a)5.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☒ Not Applicable

Additional Requirements Comment

Supporting information is located through Volume III of the Application for Power Plant Site Certification