3.0 THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

3.1 Background

PEF plans to add 180 MW of electrical generation resources to its system in order to continue to provide reliable, safe, and cost-effective service to its customers. The CR3 Uprate Project is an innovative application of technological advancements and efficiencies that will increase the power output of the plant approximately 180 MW, from 900 MW to 1,080 MW. The extra power output will result from improving the performance of the steam turbine and from using more highly enriched fuel which will result in increased thermal MWs produced in the reactor core. The additional heat will raise the temperature exchange between the primary and secondary systems, creating more steam for turning the turbines.

To safely proceed with the uprate, modifications to supporting equipment are necessary to accommodate the additional heat created from the more highly enriched fuel and to accommodate all designed conditions in the plant.

The uprate project will occur over two phases. The first phase (Phase I) will occur during a 2009 planned refueling outage and scheduled steam generator replacement. The improvement to the turbine line components will increase the efficiency of power production resulting in decreasing consumer costs. The existing steam turbine high-pressure rotor was designed in the 1960s and is a multi-piece assembly which causes more drag than current technology deems necessary. PEF will replace the outdated rotor with current rotor blade technology, a single piece model, which will effectively decrease the drag factor. Replacing the outdated turbine technology will enable the turbines to increase megawatt output by 40 MW with the same steam input.

Phase II will take place during the 2011 planned refueling outage. The second phase will result in an additional 140 MW of power and include alterations that will elevate temperatures within the reactor and the use of the enriched uranium fuel. In order to ensure that fusion reactions inside the core are maintained safely, cooling water flow rates will be increased and adjustments will be made to the safety systems. A larger pumping capacity than currently exists in the water flow system supplying the steam generators is required in order to elevate the flow rate. Therefore, modifications to or replacement of pumps and heat exchangers will occur. In order to determine appropriate replacement and modification needs, an engineering evaluation will be conducted to characterize the most cost effective upgrade necessary for each motor and pump to achieve the optimal flow rate.

3.1.1 Description of Other Onsite Projects

There are a number of projects which are currently being implemented at CR3 over the next several years. Several of the projects are ongoing and are described below as current and base-line conditions and may be referenced throughout the SCA. None of these projects are the subject of this SCA.

- Main step-up transformer replacement. The main step-up transformer will be replaced due to degradation which has led to recent on-line failures which adversely impact plant availability.

- Measurement Uncertainty Recapture. Since 2002, CR3 has been licensed to 2,568 MWt (megawatts thermal) based on maintaining a standard two percent measurement uncertainty margin to the requisite analyses and system evaluations performed at 2,619 MWt. Relatively recent guidance allows a reduction of this margin based on improved instrumentation so the plant can be licensed to operate at a slightly higher power level. The application for this increase was submitted to the NRC on April 25, 2007 to allow a restart from the 2007 outage at this slightly higher power level. This project can be implemented with existing permits and regulatory approvals.

- CR3 License Renewal. The license renewal is a comprehensive assessment of CR3 operations to demonstrate compliance with NRC regulatory requirements. The relicensing process will allow an additional 20 years of plant operation beyond the current CR3 licensed operating period of 40 years. It is anticipated that the License Renewal Application will be submitted to the NRC early in 2009.

- Steam Generator Replacement Project (SGRP). The once-through steam generators will be replaced in 2009 due to long-term degradation that will not support reliable operation to the end of plant life. The project will necessitate the utilization of a number of undisturbed areas for lay-down areas, transportation off-loading and equipment assembly areas. Many of these same areas will also be utilized to support the CR3 Uprate Project. The appropriate environmental permits to authorize the disturbance of these areas will be obtained separate from the site certification process.

3.1.2 Description of CR3 Uprate Project

The project that triggers the need for this application is power level upgrades scheduled for 2009 through 2011. The most substantial of the plant modifications will be installed during the refueling outages scheduled for 2009 and 2011. While not all the final engineering decisions have been made, the current plans include:

- In 2009, CR3 is planning to refurbish the low pressure turbines and electrical generator. Several main feed-water heat exchangers and main steam re-heaters will be modified or replaced. The net impact of these modifications is a substantially more efficient secondary plant. Thus, while the NRC licensed power level will remain constant; the electrical generation will be increased and the heat released to the environment will be lessened. The net generation increase from current levels is expected to be approximately 40 MW.

- Leading up to 2011, PEF will seek NRC license changes to allow operation of CR3 at the increased output. It will be necessary to make a large number of smaller, yet substantial, modifications to assure long term reliability of all plant systems at the conditions necessary to support this higher licensed power level. The most environmentally significant of these modifications is an increase in circulating water flow and an increase in discharge temperatures to the existing discharge canal. The higher, licensed power level is currently anticipated to result in a net electrical generation increase of 180 MW above current levels.

3.2 Site Layout

The CREC contains four coal-fired steam electric generating units - CR 1, 2, 4, and 5, and a single nuclear unit - CR3. The CREC is the largest power-producing complex in the state of Florida with a total generating capacity of 3,140 MW. Figure 3.2.1-1 provides the property boundary and Figure 3.2.1-2 provides the general layout of the various facilities within the CREC.

3.3 Fuel

The CR3 Uprate Project will not significantly alter fuel utilization as part of any of the above referenced projects. The primary fuel involved is the nuclear fuel used directly in power production. There will be no change in the nature of the fuel; no increase in maximum fuel enrichment and no substantial change in fuel assembly mechanical design will be required. There will be increases in the size of the refueling batch necessary to supply the necessary energy to support operation at the higher power levels.

Diesel fuel is used in a number of emergency generators. The main station emergency generators may be increased in capacity which will increase fuel use. However, these generators are for stand-by use only. Other than testing, these diesels, as well as a number of others, which power fire and emergency feedwater pumps, etc, are not routinely operated. Diesel fuel is delivered and unloaded as needed. The size of storage and refilling frequency is not expected to change significantly. There is no expected increase in use of other fuels.

3.4 Air Emissions and Controls

3.4.1 Air Emission Types and Sources

The entire CREC, including the nuclear unit's associated process equipment, is currently addressed under the site's Title V (TV) air operating permit. This permit (Final Permit No. 0170004-015-AV) is active until December 31, 2009, when renewal is required. The TV permit addresses four coal-fired fossil fuel steam generating units; two natural draft cooling towers; helper mechanical draft cooling towers; modular cooling towers; coal, fly ash and bottom ash handling facilities and relocatable diesel-fired generators. Although CR3 (the nuclear generating unit) is not considered an emission generating unit under the TV permit, certain emissions units associated with CR3 are appropriately considered.

The CREC is classified as an existing major facility. A "major facility" is defined as any 1 of 28 named source categories that have the potential to emit 100 tons per year (TPY) or more or any other stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under CAA. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment. A modification to an existing major facility that results in a significant net emissions increase equal to or exceeding the significant emissions rates (SER) listed in Section 62-212.400, Table 62-212.400-2, F.A.C., is classified as a major modification and will be subject to the PSD preconstruction permitting program for those pollutants that exceed the PSD SERs. The procedures for determining applicability of the Prevention of Significant Deterioration (PSD) permitting program to the project are specified in Rule 62-212.400(2), F.A.C. For each regulated pollutant, PSD is triggered as a result of a modification at an existing unit if the difference between the projected actual emissions and the baseline actual emissions equals or exceeds the SER for that pollutant, as defined at Rule 62-210.200(243), F.A.C.

The scope of the proposed project includes an uprate of 40 MW associated with equipment modifications made during the 2009 refueling outage and 140 MW to be added after upgrades to the plant during the 2011 refueling outage. The uprate will increase the electrical output from CR3 and the associated circulating intake water flow rate. The air emission impacts associated with increased intake water flow (i.e., increased flow through additional new cooling towers) will trigger PSD for particulate matter (PM), but not for PM less than 10 microns (PM_{10}). Other regulated air emissions (e.g., NO_x and SO_2) will not be affected, as there will be no additional fuel combustion sources (e.g., additional diesel generator capacity) that may trigger PSD for these pollutants.

The project design is still evolving; however, as stated above, the engineering and design data currently indicate that the Project will be characterized as a major source subject to PSD. Therefore, this SCA addresses Best Available Control Technology (BACT) for PM emissions, which are the significant emission increase of concern. Federal PSD requirements are contained in 40 CFR 51.166, *Prevention of Significant Deterioration of Air Quality*. The state of Florida's PSD regulations are found in Rule 62-212.400, F.A.C.

The types and sources of air emissions associated with the CR3 Upgrade Project will consist of a potential new mechanical draft cooling tower to be designated the South Cooling Towers (SCT). PM and PM_{10} emissions will result from cooling tower operation in the form of drift. Drift is water aerosols emitted from the cooling tower containing dissolved minerals from the water circulating in the cooling tower. The dissolved minerals become PM, including PM_{10}, when the water in the drift is evaporated. Cooling tower drift will be controlled using mist eliminators that will be designed to limit drift to no more than 0.0005 percent of the circulating water rate of the cooling tower.

In addition to adding a cooling tower to remove the incremental heat required to be dissipated by the uprate project, PEF is considering replacement of the existing modular cooling towers with additional permanent cooling towers (the South Cooling Tower (SCT)). Based on the relative design heat dissipation rates, approximately 11 additional cells similar to the existing permanent helper cooling tower cells will be required to replace the modular cooling tower in full. Coupled with the six cells required to dissipate the incremental heat rejected due to the uprate project, a total of 17 cells would be required. The status of the existing modular cooling tower is unknown, therefore, in order to present a worst-case air quality assessment, it is assumed that the new SCT will include a safety factor (of at least one cell) and consist of 18 cells arranged in a 9 by 2 configuration. The estimated cooling water flow into the proposed 18 cell SCT is estimated at approximately 342,306 gpm. Again, this estimate assumes that the existing bank of modular towers would be replaced by the proposed SCT associated with this uprate project, which may not necessarily be the case.

Figure 3.4.1-1 presents the proposed location of the air emission sources. Estimated hourly emission rates, as a result of the proposed cooling tower addition are presented in Table 3.4.1-1, for both PM and PM_{10} emissions. In addition, the proposed cooling tower design parameters and annual PM/PM_{10} emissions estimates are provided in Table 3.4.1-2 for the maximum operating load. That is, the information presented is for the proposed cooling tower design that represents the worst-case emissions and flow characteristics. Appendix 10.1.5, the PSD Application, presents the basis for the emission rates and maximum annual emissions of regulated pollutants, as well as unit performance. As indicated, PSD review is triggered for PM (i.e., due to cooling tower impacts associated with the uprate).

3.4.2 Air Emission Controls

State-of-the-art air pollution control equipment will be installed on the project to minimize air emissions. The control techniques proposed for this project are based on an evaluation of economic, energy, and environmental impacts and have been determined to represent BACT on similar projects. The following subsection presents a summary of the Control Technology and the BACT analysis, which is presented in the PSD permit application in Appendix 10.1.5.

3.4.3 Control Technology Description/Best Available Control Technology

BACT review is required under FDEP rules and EPA regulations pertaining to PSD. Federal regulations are codified in 40 Code of Federal Regulations (CFR) Parts 51.166 and 52.21, and FDEP has adopted PSD rules in Rule 62-212.400, F.A.C. The BACT review is part of the evaluation of control technology under the Florida PSD rules. BACT is applicable to all pollutants for which PSD review is required and is pollutant-specific. It is an emission limitation that is based on the maximum degree of reduction for each regulated pollutant, which is determined to be appropriate after taking into account energy, environmental, economic impacts, and other costs. BACT cannot be any less stringent than the federal New Source Performance Standards (NSPS) applicable to the source under evaluation.

The FDEP and EPA have established a policy for BACT review in which the most stringent control alternatives are evaluated first. The alternatives are either rejected based on technological, environmental, energy or economic reasons or they are proposed as BACT. This procedure is referred to as the "top-down" approach. For the project, BACT is applicable for emissions of PM.

Appendix 10.1.5 of the SCA for the project contains a complete PSD Application. The PSD Application includes the BACT evaluation for the project and addresses those pollutants for which BACT is applicable. A discussion of the environmental, economic, and energy aspects of alternative control techniques and methods are included. The remainder of this section briefly describes those control technologies that are proposed for the CR3 Uprate Project.

PM emissions will be emitted from the cooling towers in the form of drift. Cooling tower drift will be controlled through the use of mist eliminators that will be designed to limit drift to no more than 0.0005 percent of the circulating water rate of the cooling tower. This level of control represents the best that is currently available. The total circulation water use will be limited to 1.8 E11 gallons per year, based on 8,760 hours per year at a maximum circulation rate of 342,306 gallons per minute (gpm).

3.4.4 Design Data for Control Equipment

Design information for the air pollution control equipment is presented in Section 5.0 of Appendix 10.1.5 (PSD Application).

3.4.5 Design Philosophy

The project minimizes air pollutant emissions by using efficient design and state-of-the-art air pollution control equipment that will meet a BACT emission rate. In addition, by maximizing the megawatt output per unit of cooling water consumed, the air pollutant emissions per megawatt output are minimized. Collectively, the design of the CR3 Uprate Project will incorporate features that will make it one of the most efficient and lowest emitting, with respect to the amount of air emissions emitted per MWs produced.

3.5 Plant Water Use

The primary water use for the CR3 Uprate Project will be an increase in cooling water flow through the CR3 condenser to cool the increased heat rejected by the CR3 condenser. The quantitative water use diagram for the existing CR 1, 2, and 3 is shown in Figure 2.3.4-4. This figure does not show the evaporative losses from the existing HCTs, however, that evaporation is estimated to range up to a maximum of only about 9,957 gpm. The only significant change in flow rates anticipated as a result of the CR3 Uprate Project is that of the potential increase of condenser cooling water flow for CR3 by approximately 150,000 gpm.

A new SCT has been proposed both to offset the increased circulating water rejected heat and to replace the existing modular HCT. A small portion of the increased flow associated with the uprate project (up to about 1,288 gpm) will be evaporated in the recirculating portion of the new SCT, which will be used to dissipate the increase in rejected heat. The new SCT has also been designed to avoid any increase in flow into the intake canal from Crystal Bay/Gulf of Mexico, and to avoid any increase in heat load or temperature rise leaving the discharge canal to Crystal Bay/Gulf of Mexico. For the purpose of this SCA, a conservative and conceptual design plan for the South Cooling Tower has been proposed. Detailed design will be addressed as part of the NPDES renewal process in 2009.

3.5.1 Heat Dissipation System

In Section 2.3.4, the design value of the existing heat rejection rate via the condenser cooling water for CR3 was quantified as 5.88 Billion Btu per hour. CR3 currently produces approximately 900 MWe (megawatts electrical) and 2,609 MWt (megawatts thermal). The net result of the uprate project will be to increase CR3's output to approximately 1,080 MWe and 3,014 MWt. These quantities can all be converted to Btu per hour by the formula 1 watt = 3.412141 Btu/hour. The result is shown in the table below, Heat Dissipation System Comparison. The difference between MWt and MWe is the amount of heat produced by the unit that is not converted to electricity and which is therefore rejected via the condenser cooling water system. The net increase in heat rejection is 225 MWt, which is equivalent to 0.768 Billion Btu per hour, and represents an increase of about 13.2 percent relative to the current baseline heat rejection rate of 5.88 Billion Btu per hour for CR3, and about seven percent for the design three-unit heat rejection rate of 10.91 Billion Btu per hour currently leaving the discharge canal.

The size and shape of the discharge thermal plume varies with plant and meteorological conditions. The thermal plume is generally proportional to the amount of heat rejected, which is a function of the product of the flow rate and the temperature rise. PEF is proposing additional recirculating cooling towers to remove the increased rejected heat anticipated by the uprate project (0.768 Billion Btu/hour), therefore, the size of the thermal plume will not increase beyond existing conditions.

As described in Section 2.3.4, CR 1, 2 and 3 currently operate both permanent and modular HCTs. The permanent HCT consists of four separate tower structures, each containing nine cells.

Heat Dissipation System Comparison		
	Pre-Existing (Baseline) Unit 3	Post-Uprate Unit 3
MWe	900	1,080
MWt	2,609	3,014
Billion Btu per hour (electrical)	3.070	3.685
Billion Btu per hour (thermal)	5.831	6.599
Increase in Billion Btu per hour (electrical)	Base	0.615
Increase in Billion Btu per hour (thermal)	Base	0.768

Each cell has a water flow rate of 19,017 gpm, and a heat dissipation rate of 0.127 Billion Btu per hour. To achieve the dissipation of the increase of 0.768 Billion Btu per hour, a preliminary estimate indicates that a new cooling tower consisting of six cells, similar to the permanent HCT cells, would be required. A six-cell cooling tower would be approximately 50 ft wide by 300 ft long by 55 ft tall, or roughly 2/3 the size of one of the existing permanent HCT.

PEF has the option during the uprate of increasing either the CR3 condenser cooling water flow rate, or temperature rise, or both. The amount of heat that the new cooling towers must dissipate is independent of the specific choice of flow rate and temperature rise. If the CR3 flow rate is held constant at the existing 680,000 gpm, the temperature rise is expected to increase from 17.5 °F to 19.8 °F for CR3, and the overall temperature rise for the 3-unit flow rate of 1,318,000 gpm *prior to the use of HCT* is expected to increase from 16.7 to 17.9 °F. The use of the existing HCT and the new SCT in the helper mode would then reduce the combined discharge temperature rise down to 7.7 °F, assuming the full use of all HCT and ignoring the HCT evaporation. This is the same temperature rise that would be expected under the same conditions with the existing plant configuration.

Similarly, if the condenser cooling water flow rate for CR3 is increased to 830,000 gpm, and to 1,468,000 gpm for all three units, the delta T for CR3 will be reduced to approximately 14.3 °F, whereas the combined three-unit temperature rise will decrease from 16.74 °F to 15.03 °F prior to the use of HCT. The use of the existing HCT and the new six-cell cooling tower in the helper mode would then reduce the combined discharge temperature rise down to 6.46 °F. This is a temperature 1.24 °F less than would be expected under the same conditions with the existing plant configuration, and is less because the three-unit flow rate has been increased by 150,000 gpm, which is about

11.4 percent of the present three-unit flow rate. Although the flow rate has been increased, the rate of heat rejection remains at the existing level, as evidenced by the reduction in temperature rise.

However, in order to avoid incremental intake entrainment impacts due to the uprate, PEF proposes to increase the size of the new SCT and to run a portion of the facility in the recirculating mode (i.e., with the cold water return routed back to the intake canal rather than to the discharge canal). At the maximum expected condenser cooling water flow rate increase of 150,000 gpm, the size of the recirculating portion of the SCT thus needs to be eight cells (flow rate of 152,136 gpm).

In addition to adding the new cooling tower to remove the incremental heat required to be dissipated by the uprate project, PEF could potentially replace the existing modular cooling towers with an additional permanent HCT. Based on the relative design heat dissipation rates, approximately 11 additional cells equivalent to the existing permanent HCT cells would be required. Coupled with the six cells required to dissipate the incremental heat rejected due to the uprate project, this means a total of 17 cells would be required, assuming additional cells were not required for intake canal flow reduction. The break point for this is the six-cell flow rate of 114,102 gpm; at a condenser cooling water flow rate increase less than 114,102 gpm no additional recirculation for intake flow reduction is needed. If the condenser cooling water flow rate increase exceeds 114,102 gpm additional recirculating cells are required for intake flow reduction. In the worst case, at the maximum increase of 150,000 gpm, this would entail two additional recirculating cells. However, the other result of increasing the flow rate is that the discharge temperature is reduced. Because the HCT are designed solely to reduce the discharge temperature to not exceed a value of 96.5 °F on a rolling three-hour average, the reduced temperature rise results in the fact that less cooling is needed from the HCT. The resultant amount of reduction in HCT heat transfer is about 0.5 Billion Btu per hour, which is equivalent to about four cooling tower cells. Thus, while this case requires two extra cells for intake flow reduction, it decreases the number of helper cells required by four. In summary, the two cases are described in the following table:

Case	Minimum condenser cooling water flow increase (0 gpm)	Maximum condenser cooling water increase (150,000 gpm)
Required number of cells in recirculating mode	6	8
Required number of cells in helper mode	11	7
Total number of required cells	17	15

PEF may propose to install the new permanent SCT, between the intake and the discharge canal as shown in Figure 3.5.1-1, which will include a safety factor (of at least one cell) and consist of 18 cells arranged in a 9 by 2 configuration. Depending on the final amount of the increase in condenser cooling water, between six and eight cells will be operated full time in the recirculating mode, and from 12 to 10 respectively would be operated in the helper mode as required. Figure 3.5.1-1 provides a simplified water use diagram showing the expected division of flow for the latter case. The flow from eight cells is estimated to be 152,136 gpm, which is more than the potential maximum CR3 condenser cooling water flow rate increase of 150,000 gpm. Therefore, the CR3 Uprate Project should actually cause some slight reduction in entrainment relative to the existing conditions.

Through-screen velocity is anticipated to increase from 1.45 fps (max at MLW) to as much as 2.02 fps (max at MLW) with the CR3 Uprate Project. This is because the four existing cooling water pumps will be modified to deliver as much as 207,778 gpm each. This increased velocity could result in an increase in impingement mortality. The installation and operation of the proposed recirculating six to eight cells of the SCT will slightly reduce entrainment impacts due to the slightly reduced overall intake flow from Crystal Bay, and may also reduce impingement mortality by reducing the number of organisms available to be impinged.

As necessary PEF intends to request modification of the NPDES permit to authorize the operation of the new SCT and an increase in circulating water flow at CR3 from 680,000 gpm/923 MGD to as much as 830,000 gpm/1,195 MGD. Overall, the proposed CR3 Uprate Project will not increase flow to the intake canal from Crystal Bay and there will be no net increase in the thermal discharge at the NPDES POD. The CR3 Uprate Project will not have a negative impact to fisheries or the aquatic environment.

3.5.2 Domestic/Sanitary Wastewater

The CR3 Uprate Project will not require any increase in permanent staff; therefore, no changes will be made to the existing and permitted Domestic/Sanitary Wastewater system, which is described in Section 2.3.4.

3.5.3 Potable Water Systems

The CR3 Uprate Project will not require any increase in permanent staff; therefore, no changes will be made to the existing and permitted Potable Water system, which is described in Section 2.3.4.

3.5.4 Process Wastewater Systems

The process wastewaters are described in Section 2.3.4. They are not anticipated to change with the CR3 Uprate Project.

3.6 Chemical and Biocide Waste

The CR 1, 2, and 3 NPDES permit currently authorizes the use of Spectrus CT1300 to control biofouling for the CR3 service water system, which is presently completed subject to the timing and concentration limits specified in the NPDES permit (Appendix 10.4). The CR3 Uprate Project will cause no change in the use of Spectrus CT1300.

These processes will not change as a result of the CR3 Uprate Project.

3.7 Solid and Hazardous Waste

The CR3 Uprate Project is not expected to significantly increase solid and hazardous waste on site. During construction, solid and hazardous wastes are anticipated to increase and will be temporarily stored and prepared for offsite disposal in accordance with state, federal and NRC regulations. The CR3 Uprate Project will result in a small increase in the spent fuel discharge rate. These fuel assemblies will continue to be stored in the onsite NRC approved spent fuel storage facilities.

CREC generates wastes categorized as regulated waste, universal waste, hazardous waste, mixed waste, and radioactive waste. Whenever possible, wastes are recycled or minimized by chemical control management. All vendors used for handling, recycling, or disposal of wastes are approved vendors by PEF. Quantities of wastes differ due to outage requirements and types/quantities of waste generally remain the same unless new processes are added or different maintenance tasks are required. PEF, the CR3 Hazardous Waste Coordinator and the CR3 Environmental Specialist determine the appropriate waste characterization, waste profiles, and waste disposal methods including land disposal or incineration while complying with state, federal and NRC regulations. Minimal quantities of wastes are stored on site in a segregated area, inventoried weekly, and managed by the Hazardous Waste Coordinator.

Very little opportunity exists for spills to pervious surfaces. However, a spill of this type would be managed in accordance with state and federal regulations. The CR3 site has a percolation pond system and approved groundwater monitoring plan with ground water monitoring wells located at various locations on site. The facility Spill Prevention and Countermeasure (SPCC) Plan and Best Management Practices (BMP) Plan help ensure pollution prevention at the CR3.

3.8 On-Site Drainage System

The current onsite drainage system at CREC meets all applicable local, regional, state and federal requirements including those outlined by the National Pollution Discharge Eliminations System (NPDES) and 40 CFR 112. As detailed in the CR3 SPCC Plan, runoff controls, and contamination prevention for stormwater drains by fuel oil, lubricating oil, and mineral oil associated with machinery, transformers and scheduled shutdowns of the CR3, are in place (Progress Energy 2006). A diversionary structure provides drainage protection for all in-service step up transformers. In the occurrence of a large leak, oil will flow down though a rock-filled trench into a retention basin. Secondary containment is provided for all above ground storage tanks, and any rainwater which collects in secondary containments is procedurally monitored and evaluated for oily sheens prior to drainage. The storm drains located onsite are additionally safeguarded from contamination during oil unloading operations by personnel trained in proper operating procedures and the use of storm drain covers.

3.9 Materials Handling

3.9.1 Construction Materials and Equipment

Construction material and equipment will be delivered to the CR3 site by the existing roadway, U.S. Highway 19. Equipment and component parts will be unloaded to various laydown and assembly areas and moved around the site using portable cranes and trucks. Pollution control measures will be in place for the laydown areas and roads as necessary to control dust and runoff.

3.9.2 Roads

During normal plan operations, CREC averages approximately 1400 employees and 125 daily truck trips. During the uprate project, employee and construction traffic will vary between 2009 and 2012 and use U.S. Highway 19 to access the CR3 site.

3.10 References

Florida Department of Environmental Protection. 2004. Crystal River NPDES Permit FL0000159.

Golder Associates Inc. 2006. Crystal River Energy Complex Proposal for Information Collection NPDES Permit No. FL000159.

Progress Energy, 2006. Spill Prevention and Countermeasure Plan.

SWEC (Stone & Webster Engineering Corporation), 1985. Crystal River Units 1, 2 and 3. 316 Studies – Final Report.

U. S. Nuclear Regulatory Commission, 2002. "NRC Approves Power Uprate for Crystal River 3." News release, Dated December 6. [Online] Available: http://www.nrc.gov/reading-rm/do-collection/news/2002/02-140.html.

TABLES

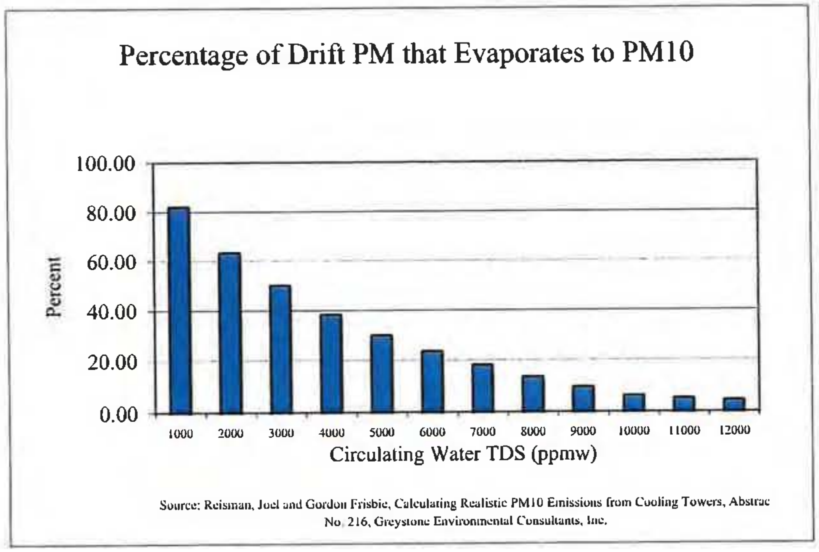
TABLE 3.4.1-1
Potential PM and PM_{10} Emissions

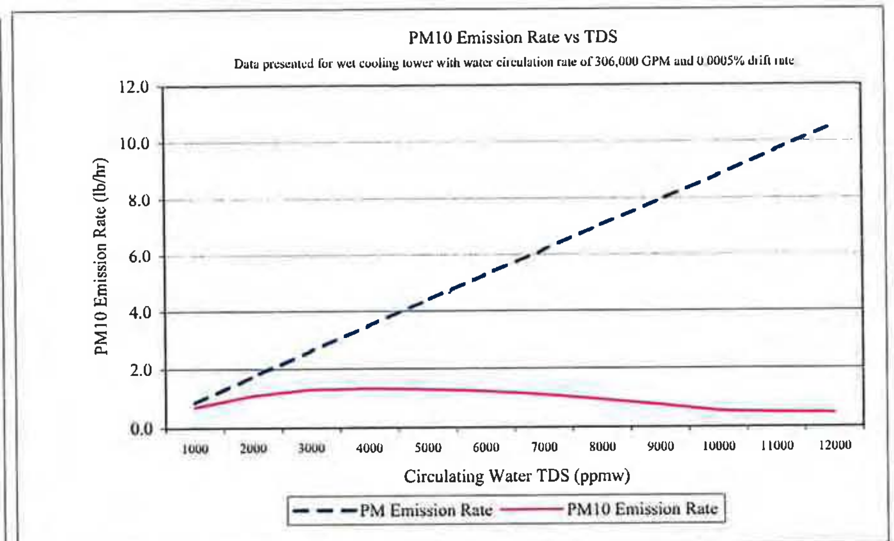
TDS (ppmw)	PM Emission Rate (lb/hr)	Percent of Emissions < or = PM10 %	PM10 Emissions (lb/hr)	
1000	0.88	82.04	0.722	
2000	1.76	63.50	1.118	
3000	2.64	50.00	1.320	
4000	3.52	38.33	1.349	max
5000	4.40	29.97	1.319	
6000	5.28	23.59	1.246	
7000	6.16	18.20	1.121	
8000	7.04	13.57	0.955	
9000	7.92	9.65	0.764	
10000	8.80	6.28	0.553	
11000	9.68	5.11	0.495	
12000	10.56	4.46	0.471	
25307	22.27	1.07	0.238	
29000	25.52	0.82	0.209	
89600	78.85	0.22	0.173	

Tower Circulation Rate (GPM)	Drift Rate %
342,306	0.0005

	Salt water density (lb/gal)
swd	8.57
	64.2 lb per cu ft

Calculated PM10 % < or = PM10 %
82.04
63.50
50.00
38.33
29.97
23.59
18.20
13.57
9.65
6.28
5.11
4.46
1.07
0.82
0.22





Reisman, Joel and Gordon Frisbie, *Calculating Realistic PM10 Emissions from Cooling Towers*, Abstract No. 216, Greystone Environmental Consultants, Inc.

TABLE 3.4.1-2.
Physical, Performance, and Annual Emissions Data for the HCT

Parameter	Vendor (TBD)
<u>**Physical Data**</u>	
Number of Cells	18
Deck Dimensions, ft	
Length	50
Width	50
Height(Tower Height)	55
Stack Dimensions	
Height, ft	TBD
Stack Top Effective Inner Diameter, per cell, ft	TBD
Effective Diameter, all cells, ft	TBD
<u>**Performance Data (per cell)**</u>	
Discharge Velocity, ft/min	TBD
Circulating Water Flow Rate (CWFR), gal/min	342,306
Design hot water temperature, °F	103
Design Air Flow Rate per cell, acfm, (estimated)	TBD
Hours of operation	8,760
<u>**Emission Data**</u>	
Drift Rate [a] (DR), percent	0.0005
Total Dissolved Solids (TDS) Concentration [b], average ppm	25,307
Solution Drift [c] (SD), lb/hr	880.1
PM Drift [d], lb/hr	22.3
tons/year	97.6
PM_{10} Drift [e]	
PM_{10} Emissions, lb/hr	1.35
tons/year	5.9

[a] Drift rate is the percent of circulating water.

[b] A TDS of 25,307 Average Value from Historical Data (Ron Johnson email 12/13/05)

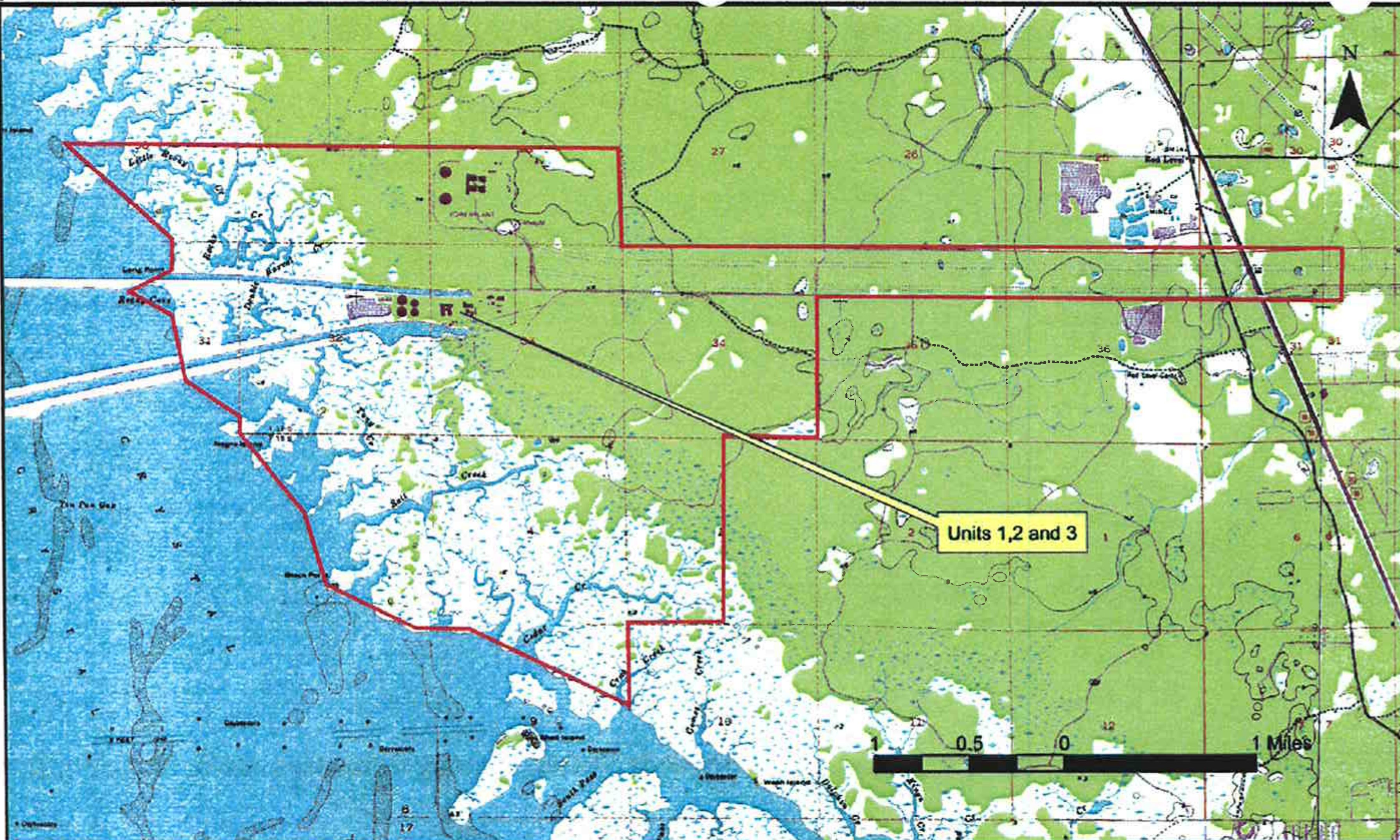
[c] Includes water and based on circulating water flow rate and drift rate (CWFR x DR x 8.57 lb/gal x 60 min/hr).

[d] PM calculated based on total dissolved solids and solution drift (TDS x SD).

[e] PM_{10} based on Cooling Tower PM_{10} emissions study see Attachment A.

Source: Progress Energy, 2007; Golder, 2007.

FIGURES



REFERENCES

1.) USGS 7.5 MINUTE QUADRANGLE RED LEVEL, FLORIDA

PROJECT

PROGRESS ENERGY-FLORIDA
CRYSTAL RIVER UNIT 3
POWER UPRATE PROJECT
CITRUS COUNTY, FLORIDA

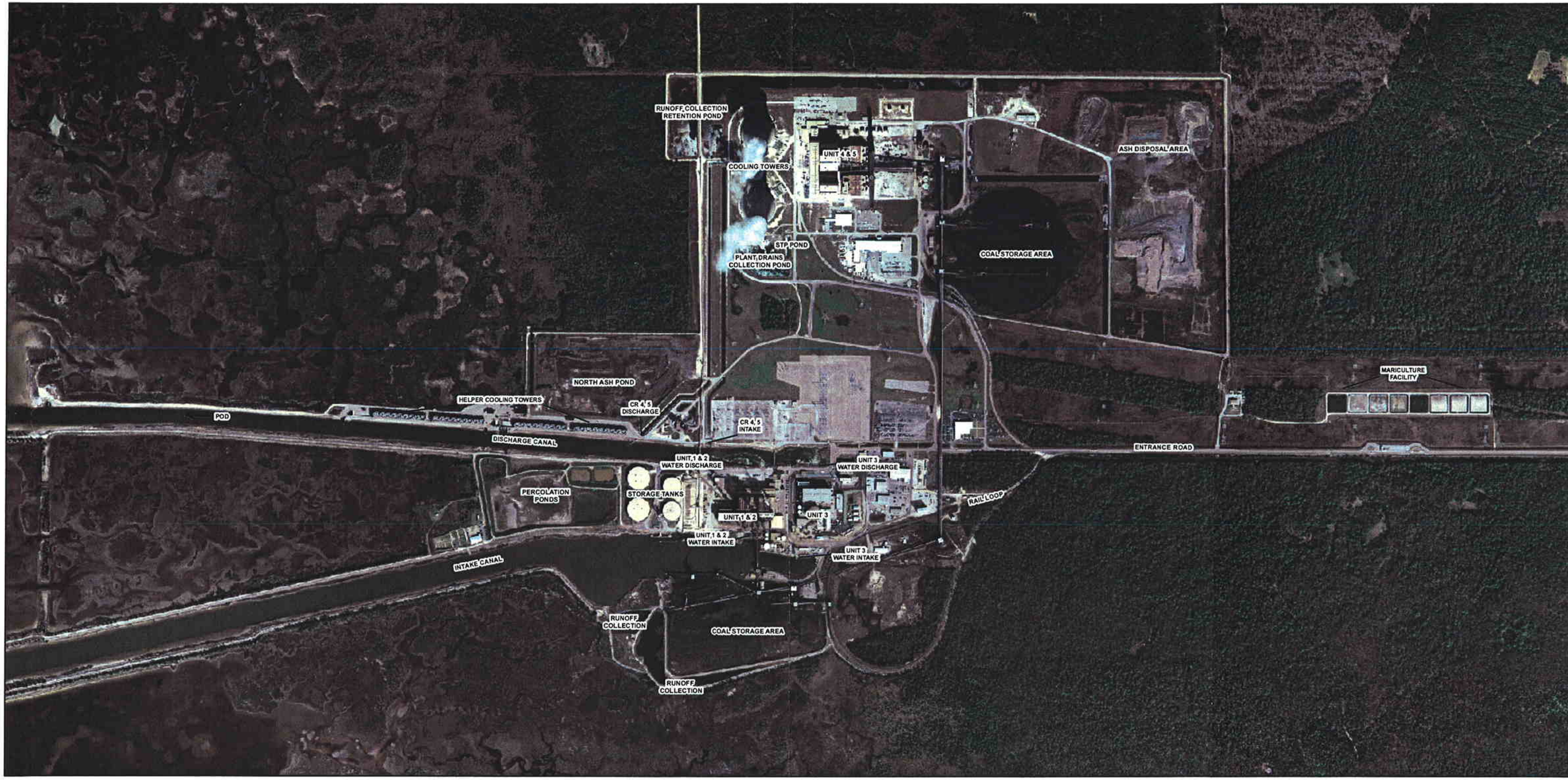
TITLE

CREC PROPERTY BOUNDARY

Golder Associates
Tampa, Florida

PROJECT No.		073-89531	FILE No.	07389531B023
DESIGN	MM	04/30/07	SCALE AS SHOWN	REV. 0
CADD	MEF	04/30/07	FIGURE 3.2.1-1	
CHECK	MM	04/30/07		
REVIEW	MM	04/30/07		

F:\PROJECTS\2007 PROJ\073-89531 CR 3 Nuclear Uprate (SCA)\A-PG Crystal River Nuclear Site Upgrade\GIS\MXD\073-89531A030 CREC SITE LAYOUT FIG 3_2_1-2.mxd



0 1,000 2,000 Feet

N

LEGEND

REFERENCE

1. 2006 Southwest Florida Water Management District Aerials.

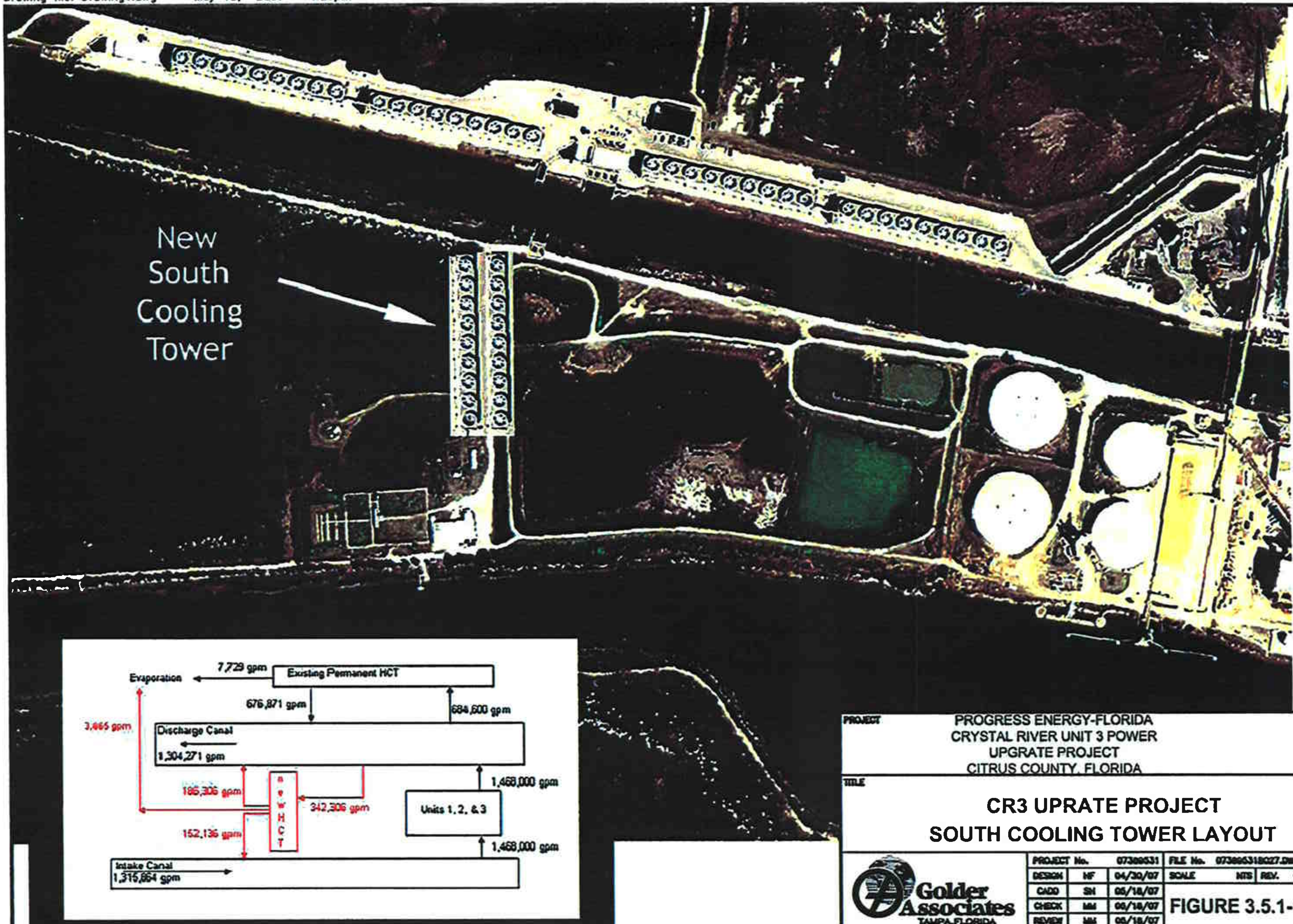
PROJECT
PROGRESS ENERGY FLORIDA, CRYSTAL RIVER NUCLEAR UNIT 3 UPRATE PROJECT

TITLE
CRYSTAL RIVER NUCLEAR UNIT 3 UPRATE PROJECT

Golder Associates
Tampa, Florida

PROJECT No. 073-89531			SCALE AS SHOWN	REV. 0
DESIGN	JG	Mar. 15, 2007	**FIGURE**	
GIS	JG	April 30, 2007		
CHECK	KG	April 30, 2007	**3.2.1-2**	
REVIEW	MM	April 30, 2007		

Drawing file: Drawing1.dwg May 18, 2007 - 4:23pm



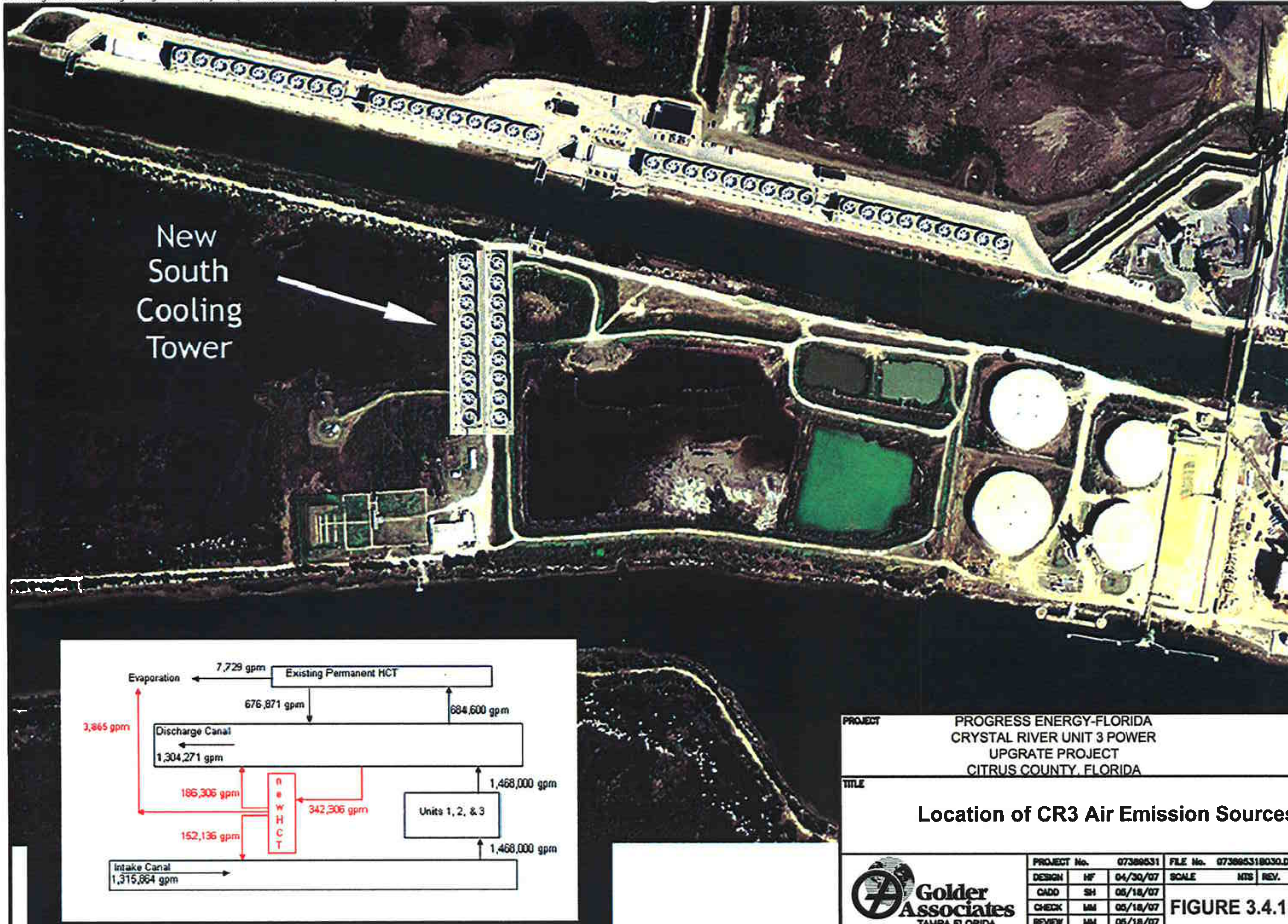
PROJECT
PROGRESS ENERGY-FLORIDA
CRYSTAL RIVER UNIT 3 POWER
UPGRATE PROJECT
CITRUS COUNTY, FLORIDA

TITLE
CR3 UPRATE PROJECT
SOUTH COOLING TOWER LAYOUT

Golder Associates
TAMPA, FLORIDA

PROJECT No.		07389531	FILE No.	07389531B027.DWG
DESIGN	NF	04/30/07	SCALE NTS	REV. 0
CADD	SH	05/18/07		
CHECK	MM	05/18/07	FIGURE 3.5.1-1	
REVIEW	MM	05/18/07		

Drawing file: Drawing1.dwg May 18, 2007 - 4:23pm



PROJECT

PROGRESS ENERGY-FLORIDA
CRYSTAL RIVER UNIT 3 POWER
UPGRATE PROJECT
CITRUS COUNTY, FLORIDA

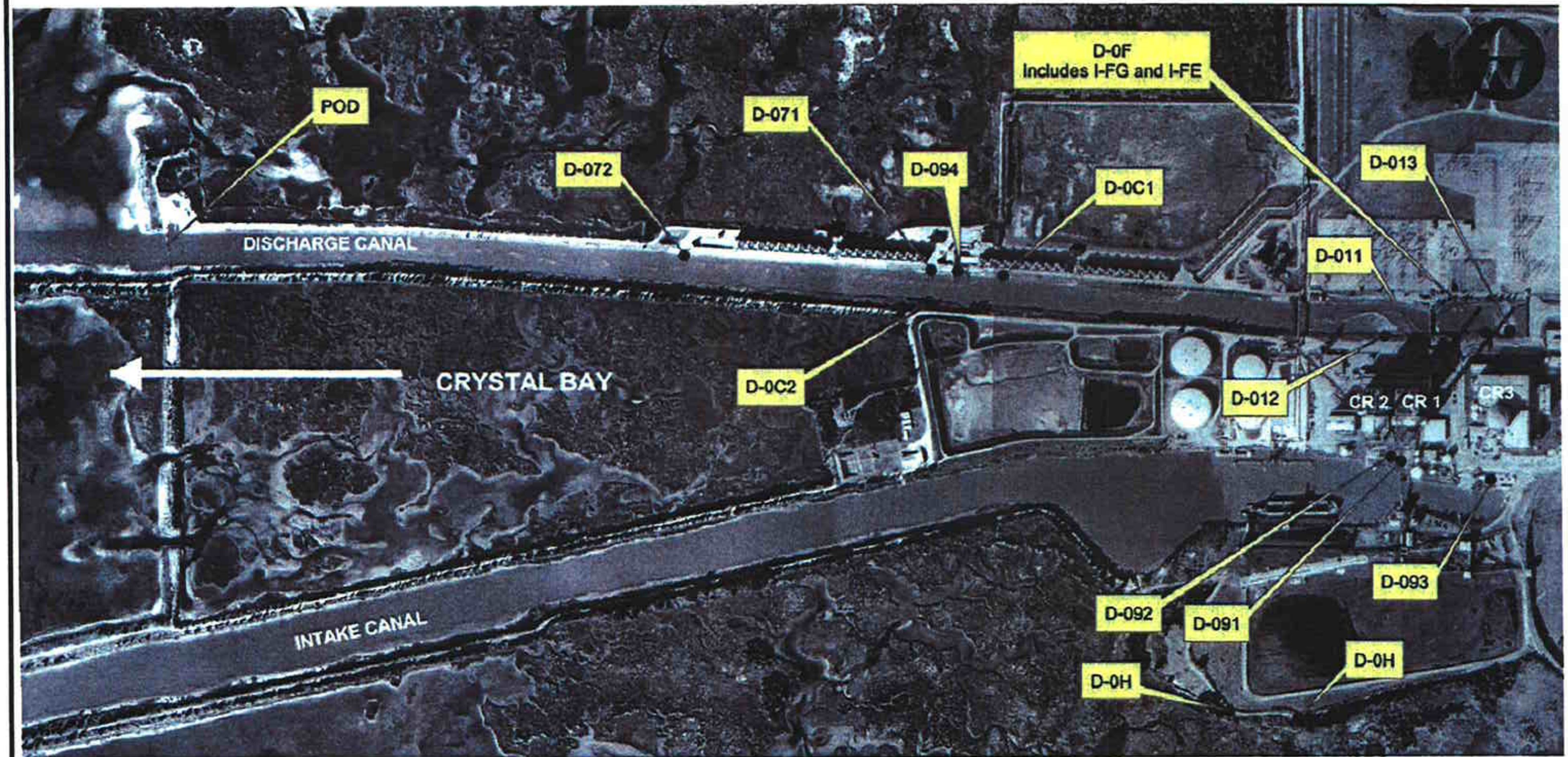
TITLE

Location of CR3 Air Emission Sources

Golder Associates
TAMPA, FLORIDA

PROJECT No.		07389531	FILE No.	07389531B030.DWG
DESIGN	HF	04/30/07	SCALE	NTS REV. 0
CADD	SH	05/18/07		
CHECK	MM	05/18/07	FIGURE 3.4.1-1	
REVIEW	MM	05/18/07		

Drawing file: 07389531B024.dwg Apr 30, 2007 - 3:50pm



REFERENCES

1.) NPDES DISCHARGE POINTS #FL0000159

PROJECT	PROGRESS ENERGY-FLORIDA CRYSTAL RIVER UNIT 3 POWER UPRATE PROJECT CITRUS COUNTY, FLORIDA				
TITLE	CR 1,2,3 NPDES DISCHARGE POINTS				
Golder Associates Tampa, Florida	PROJECT No.		073-89531	FILE No.	07389531B024
	DESIGN	MM	04/30/07	SCALE AS SHOWN	REV. 0
	CADD	MEF	04/30/07	FIGURE 3.5.4-1	
	CHECK	MM	04/30/07		
	REVIEW	MM	04/30/07		