

Biological Assessment of

Town of Century WWTP

Escambia County

DEP Northwest District

NPDES #FL0032468

Sampled August 2001

July 2002

Biology Section

Bureau of Laboratories

Division of Resource Assessment and Management

Comprehensive Quality Assurance Plan No. 870346G

Florida Department of Environmental Protection

Fifth Year Inspection Summary

Discharger:	Town of Century WWTP
County:	Escambia
NPDES Number:	FL0032468
Permit Expiration:	3 October 2001

Toxics Sampling Inspection **(XSI)**

Date Sampled: 28 August 2001

Results: Aluminum (75 µg/L), copper (15.2 µg/L), iron (150 µg/L), nickel (3.9 µg/L), and zinc (32 µg/L) were detected in the effluent sample at levels that complied with Class III water quality standards. The organic compound di-n-octyl phthalate was detected in the effluent sample and the laboratory blank. The chemical is a leachate of plastic products and its presence in both the effluent sample and test blank indicate potential leaching from the sample containers.

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: 28 August 2001

Results: The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour acute bioassay.

Impact Bioassessment Inspection **(IBI)**

Date Sampled: 28 August 2001

Results: The Century WWTP discharge does not appear to be having a detrimental effect on the biological communities in the Escambia River. At the test site, taxa richness and diversity were at or slightly above the 95th percentile of other typical Florida streams. Further, the number of EPT taxa were the same between the control and test site samples and made up the dominant taxonomic groups at both sites.

Water Quality Inspection **(WQI)**

Date Sampled: 28 August 2001

Results: Most of the nutrient levels in the control and test sites were found to be very similar to each other and were both below the 50th percentile of other typical Florida waters. NO_2+NO_3 was slightly higher at the two sites with levels between the 60th and 70th percentile of other typical Florida waters. AGP was above the 'problem threshold' at the test site (8.66 mg dry wt/L) and below this level at the control site (1.36 mg dry wt/L). The effluent AGP was 219 mg dry wt/L suggesting that levels of nutrients and AGP may have been higher at the test site if it were located nearer the outfall, rather than 100 meters downstream in this very large system.

Biological assessments are prepared by FDEP staff to provide information for review of NPDES permit renewal applications. Biological assessments, in conjunction with other information concerning the subject facility and its receiving-water body, are used to determine appropriate permit conditions.

Introduction

The Town of Century Wastewater Treatment Facility is located in Escambia County, Florida. The treatment at this secondary domestic wastewater treatment plant includes flow equalization, influent screening, aeration, secondary clarification, chlorination, de-chlorination, and post-aeration (see Facility Summary in Appendix 1). The design flow of the wastewater system is 0.450 million gallons per day (MGD), the mean flow for the previous year was 0.321 MGD, and the actual flow during this survey was 0.334 MGD. The treated effluent is discharged into the Class III freshwaters of the Escambia River. Permit limits for the facility are listed in Table 1. Water Quality Limits follow Florida Administrative Code (FAC) 62-302. According to the facility's monthly operating reports, the plant has had two permit violations in the past year. The total residual chlorine concentration after disinfection exceeded permit limits from 4/01/2001 thru 4/31/2001, and the fecal coliform bacteria counts exceeded permit limits from 1/01/2001 through 1/31/2001 (Appendix 2).

Methods

The purpose of this investigation was to determine the discharger's effects on the quality of the receiving waters. Chemical and biological comparisons were made between an upstream control site (located in the Escambia River approximately 100 meters upstream of the discharge) and a downstream test site (located in the Escambia River approximately 100 meters downstream of the discharge). A habitat assessment was performed *in situ* to compare the upstream and downstream sites. Supplemental physical and chemical data were collected on the effluent and at both study sites. Data for this report were collected on August 28, 2001.

The effluent was analyzed for nutrients, metals and organic constituents (base, neutral, and acid extractables), and pesticide extractables. Levels of chemical constituents were compared with Water Quality Limits (FAC 62-302) and facility permit limits (Table 1, Appendix 2). Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee and may be viewed on the web at <www.dep.state.fl.us/labs/sops/index.htm>.

Acute screening toxicity bioassays were performed on the effluent sample using the invertebrate, *Ceriodaphnia dubia*, and the fish, *Cyprinella leedsi* (Weber 1993). The effluent and water from control and test sites were analyzed for total and fecal coliform bacteria (APHA 1992, methods 9222 B, 9222 D).

Chlorophyll *a* was determined from phytoplankton samples from both control and test sites using 1-liter grabs from 0.0-0.3 m depth (modified from APHA 1992, method 10200B.2).

Benthic macroinvertebrates were sampled via Hester-Dendy multiplate samplers incubated for 28 days (quantitative samples, method modified from APHA 1992, method 10500.5). Benthic macroinvertebrates were sorted and identified to the lowest practical taxonomic level, usually species.

All field and laboratory biological methods followed DEP Biology Section Standard Operating Procedures (SOP's) (see www.dep.state.fl.us/labs/sops/index.htm> for details) and met DEP quality assurance/quality control standards (see <www.dep.state.fl.us/labs/nelap/index.htm>).

Biological data were analyzed in several ways. Habitat assessment scores were calculated from *in situ* examination of the physical structure and extent of disturbance at study sites. An effluent sample and water samples from the control and test sites were inoculated with the unicellular green alga, *Selanastrum capricornutum*, and incubated for 14 days as a measure of algal growth potential (Miller *et al.* 1978). Seven measures were calculated from benthic macroinvertebrate data to determine the effects of the discharge on receiving water's benthic macroinvertebrate community. These measures included: (1) taxa richness, (2) community composition, (3) functional feeding groups, (4) percent dominant taxon, (5) Shannon-Weaver Diversity Index, (6) Florida Index, and (7) number of Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa. For a discussion of each biological measure, see Appendix 3.

The following personnel were involved in this investigation: Glenn Butts and Laurence Donelan of the DEP Northwest District planned and collected samples for the study; staff from the DEP Bureau of Laboratories and the Northwest District analyzed samples and Frank Butera, Joy Jackson, David Whiting, and Steve Wolfe of the DEP Bureau of Laboratories interpreted the data, wrote, and edited the report which was reviewed by Wayne Magley, Chuck Ziegmont and Michael Tanski (Point Source Review Committee), along with Northwest District representatives.

Results and Discussion

Chemical results are reported in Table 1. Aluminum, copper, iron, nickel and zinc were detected at concentrations compliant with Class III water quality standards (FAC 62-302). The organic compound di-n-octyl phthalate was detected in the effluent sample and test blank. The chemical is a leachate of plastic products, and its presence in both the effluent (7.1 mg/L) and test blank (9.0 mg/L) samples indicates potential leaching from the sample containers and not from the wastewater facilities effluent discharge (L.T. Lin, DEP Chemistry Section, personal communication).

Table 1. Effluent limits and summary of chemistry data.

Century WWTP	Effluent Limits	Effluent Samples	Control Site	Test Site
Organic Constituents (µg/L)				
Di-n-octyl phthalate	-	7.1	-	-
Metals (µg/L)				
Aluminum	≤ 1500 **	75 I	-	-
Arsenic	≤ 50 **	3.0 U	-	-
Cadmium	≤ 2.33 *b	0.066 U	-	-
Chromium	≤ 438.68 *b	0.70 U	-	-
Copper	≤ 25.89 *b	15.2	-	-
Iron	≤ 1000 **	150	-	-
Lead	≤ 10.23 *b	0.7 U	-	-
Nickel	≤ 230.55 *b	3.9 I	-	-
Selenium	≤ 5.0 **	0.5 U	-	-
Silver	≤ 0.07 **	0.025 U	-	-
Zinc	≤ 342.54 **b	32	-	-
Nutrients (mg/L)				
Ortho-phosphate	-	1.6	0.022	0.026
Total phosphorus	≤ 2.5 *	1.7 I	0.034 I	0.032 I
Ammonia	≤ 6.0 * d	0.053	0.054	0.041 A
Un-ionized Ammonia	≤ 0.02	0.0002	0.0003	0.0002
Nitrate+Nitrite	-	3.9 J	0.15 J	0.19 J
TKN (mg/L)	-	0.92	0.34	0.28
Organic Nitrogen	-	0.87	0.29	0.24
Total Nitrogen	-	4.82	0.49	0.47
General Phys-Chem Parameters				
Habitat Assessment	-	-	129	141
DO (mg/L)	≥ 6.0 *	7.4	6.8	7.2
pH (SU)	6.0 - 8.5 *	6.6	6.8	7.1
Color (PTU)	-	20	80	60
Conductivity (µmhos/cm)	≤ 1275 **	309	126	91
Temperature (°C)	-	28.9	28.0	27.4
CBOD, 5 day (mg/L)	≤ 60	2.3 JQ	1.0 JQ	0.8 JQA
Flow (MGD)	0.450 * c	0.334	-	-
Turbidity (NTU)	≤ 31 *	2.0	10.0	7.0
Hardness (mg $CaCO_3$)	-	50.0	43.0	29 A
AGP (mg dry wt/L)	-	219 J	1.36 J	8.66 J
Chlorophyll *a* (µg/L)	-	-	3.0	2.6
Toxicity (48-hour static, screening bioassay)				
Bioassay - Fish	NOEC	100 L	-	-
Bioassay - Invertebrate	NOEC	100 L	-	-
Microbiology (# counts/100ml)				
Fecal Coliforms	800 d	10 BQ	10 UQ	10 BQ
Total Coliforms	2,400 **	360 Q	310 Q	260 Q

A - Value is the mean of two or more determinations
B - Based on colony counts outside the acceptable range
I - Value reported is < the PQL, and > the MDL
J - Estimated value
L - Value is known to be > value given
Q - Sample held beyond normal holding time
U - Not detected; value is the MDL
NOEC - A No Observed Effect Concentration < 100% effluent will constitute a violation

* Permit limit
** Class III water quality standard
a - Annual average
b - Value is based on hardness
c - Monthly average
d - Single sample

Dissolved oxygen, water temperature and pH at test and control sites were within normal ranges and complied with Class III water standards (Table 1, FAC 62-302).

The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour acute screening bioassays (Table 1, see Appendix 5 for details). Fecal and total coliform samples were analyzed beyond normal holding times and therefore cannot be used to determine compliance, but the low counts suggest samples processed within holding time would have complied with Class III water quality standards and permit limits.

Most of the nutrient levels in the control and test site samples were found to be very similar to each other and were both below the 50th percentile of other typical Florida waters (Table 1, Appendix 4). NO_2+NO_3 was slightly higher at the two sites with levels between the 60th and 70th percentile of other typical Florida waters. There were slightly higher levels of orthophosphate and NO_2+NO_3 in the test site samples compared to control site samples and may explain the elevated AGP in the test site sample.

Algal growth potential (AGP) is a measure of nutrients available for algal growth (Miller *et al.* 1978). Raschke and Shultz (1987) found that AGP values above 5.00 mg dry wt/L exceed a "problem threshold" for fresh receiving waters, implying excessive nutrient enrichment. The AGP value at the upstream control site was 1.36 mg dry wt/L, while the test site AGP value was 8.66 mg dry wt/L (Table 2), indicating potential nutrient enrichment from the effluent. The effluent AGP value was 219 mg dry wt/L.

Periphyton samplers were not deployed due to sampling conditions at the time, which included heavy boat traffic and recreational fishing (G. Butts, DEP Northwest District, personal communication).

Habitat assessment scores were in the optimal category for both the control (129 points) and test sites (141 points). Difference in scores between the test and control site is due to an increase in habitat smothering at the control site, and bank channelization from a gravel mine (see Appendix 6). Only two of the Hester-Dendys were recovered from the test site. The benthic macroinvertebrate assemblages from the Hester-Dendy samplers were different between the study sites however these differences did not appear to be a result of the Century WWTP effluent (Table 3, Appendix 7). The number of individuals was substantially different between the samples (822 at the test site vs. 3,659 at the control site), which helps to explain several of the macroinvertebrate community measures. For example, taxa richness (32 test, 40 control), Florida Index (25 points test, 31 points control), and the Trichoptera percentage (17.4% test, 67.5% control) were greater in the control site samples. This is not surprising given the four-fold difference in the number of individuals. There is an inverse relationship between the Shannon-Weaver Diversity Index and the number of individuals; as the number of individuals continues to increase, diversity begins to decline. This explains the lower diversity score at the control site compared to the site (2.68 control and 3.93 test). The trichopteran, *Hydropsyche* sp. was the dominant taxon at the control site with 57.4% contribution while the ephemeropteran, *Caenis* sp. dominated the test site community with 24.2% contribution.

Table 2. Macroinvertebrate community structure of control and test sites.

Century WWTP	Control Site	Test Site
Macroinvertebrate Hester-Dendy		
Number of Taxa	40	32
Florida Index	31	25
Shannon-Weaver Diversity	2.68	3.93
EPT Taxa	13	13
Percent Dominant Taxon	57.4	24.2
Number of Individuals	3,659	822
Community Composition		
% Coleoptera	0.8	1.5
% Diptera	17.2	25.6
% Ephemeroptera	13.5	53.1
% Trichoptera	67.5	17.4
% Plecoptera	0.1	0.5
% Other	0.9	1.9
Functional Feeding Groups		
% Predators	4.9	13.8
% Surface Deposit Feeders	11.5	48.8
% Suspension Feeders	77.8	15.7
% Scrapers	4.2	18.8
% Shredders	1.4	2.9

The qualitative benthic macroinvertebrate samples were not properly preserved and therefore were not analyzed. As a result, SCI scores were not calculated for the control or test sites.

Most of the nutrients, physical/chemical parameters, toxicity, and microbiology were similar between the test and control sites. There appears to have been sufficient dilution at the test site to ameliorate the effects of the elevated nutrients on the test site AGP sample. Although it was above the 5 mg dry wt/L "problem threshold" (8.66 mg dry wt/L) it would likely have been higher if the test site were closer to the actual discharge. Even at this distance, there were slightly higher levels of ortho-phosphate and NO_2+NO_3 and suggests a

trend toward nutrient enrichment but not to the point of causing obvious eutrophication. The effluent AGP was extremely elevated (219 mg dry wt/L). The macroinvertebrate community measures do not indicate a trend toward degradation at the test site in response to the effluent.

Literature Cited

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Appendices

Appendix 1. Map of facility

Appendix 2. Facility summary

Appendix 3. Explanation of biological measurements

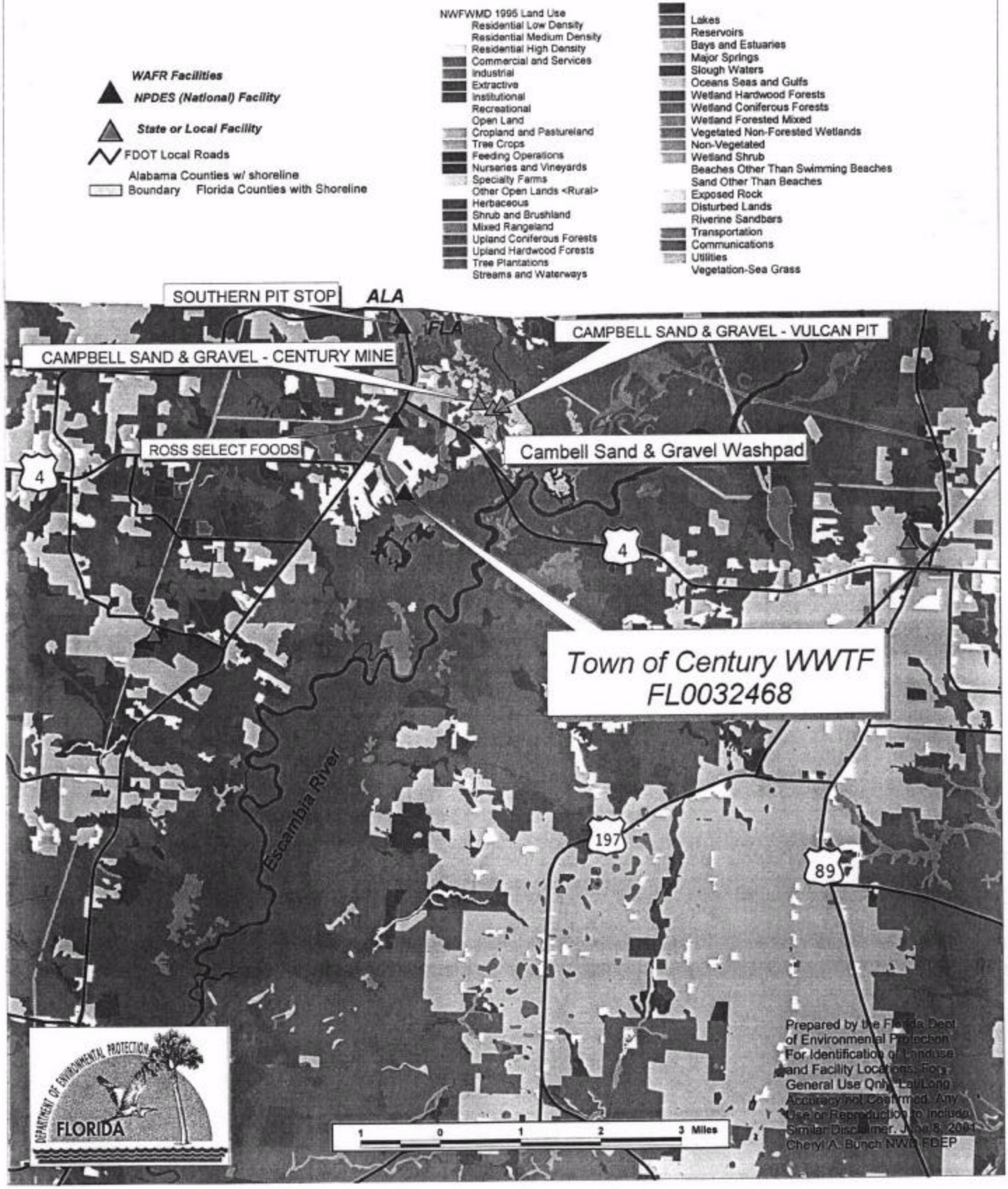
Appendix 4. Typical values for selected parameters in Florida waters

Appendix 5. Bioassay bench sheets for acute toxicity screening

Appendix 6. Habitat assessment field sheets

Appendix 7. Hester-Dendy multiplate samplers: macroinvertebrate density and taxa lists

Upper Escambia River Landuse & Facilitiy Delineation



State of Florida
Department of Environmental Protection
Facility Summary

Facility Name: Town of Century WWTF		**Prepared By: Angela Schrift**
Location: Jefferson Street Century, FL	**County: Escambia**	**District: NWD**
Federal Permit No.: FL0032468-01 **Expiration Date: August 31, 2001**	**State Permit No.:** **Expiration Date:**	**Facility Type: Domestic Wastewater Treatment Facility**
Function of Facility: A .450 mgd monthly average daily flow wastewater treatment facility.		
Description of treatment process: A secondary domestic wastewater treatment plant treats .450 mgd monthly average daily flow with flow equalization, influent screening, aeration, secondary clarification, chlorination, dechlorination, and postaeration.		
Receiving Waters: Escambia River		**Classification: Class III Waterbody, Outstanding Florida Waterbody**
Design Flow:.450 mgd	**Mean Flow: .321 mgd**	**Flow During Survey: .334 mgd**
Discharge is: (4)Continuous Intermittent Seasonal Rainfall Dependent Other		
Facility Mixing Zone Details: no mixing zone		

List Effluent Limits:

Parameter and Units	Limit	Describe special permit conditions and permit modifications:
Flow mgd	.450 monthly	
BOD mg/l	20.0 ann. Av. 30.0 monthly avg. 45.0 weekly avg. 60.0 single sample	
Total Suspended Soilds mg/l	20.0 ann. Avg. 30.0 monthly avg. 45.0 weekly avg. 60.0 single sample	
Total Ammonia as N mg/l	2.0 ann. Avg. 2.5 monthly avg. 3.0 weekly avg. 6.0 single sample	
Dissolved Oxygen as O_2 mg/l	6.0 single sample	
Fecal Coliform Bacteria #/100ml	200 annual 800 single sample	

PH units	**6.0-8.5**	
Total Residual Chlorine (After Disinfection) mg/l	**.5 single sample**	
Total Residual Chlorine (After Dechlorination) mg/l	**.01 single sample**	
BOD (Influent) mg/l	**report annual avg.** **report weekly avg.** **report monthly avg.** **report single sample**	
Total Suspended Soilds (Influent) mg/l	**report annual avg.** **report weekly avg.** **report monthly avg.** **report single sample**	

Description of permitted outfall: A .450 mgd monthly average daily flow is permitted to discharge into the Escambia River. The point of discharge is located at latitude 30° 57' 58" N, longitude 87° 14' 50" W.

List permit violations (DMR data) and plant upsets that occurred at the plant within the last year:
04/1/01 thru 04/30/01 Permit Effluent Violation – Total Residual Chlorine (After Disinfection)
01/01/01 thru 01/31/01 Permit Effluent Violation – Fecal Coliform Bacteria

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:

In 1995, a WQBEL was completed and Richard Wieckowicz concluded that the WWTF had no measurable effects on any river parameters.

Discuss MOR trends to prior data; is trend improving or declining:
Additional Information:

Appendix 3

Explanation of Biological Measures

(1) Habitat Assessment:

Eight aspects of the physical structure and extent of disturbance were ranked, with 20 possible points for each factor (SOP #IZ-21, based on Plafkin *et al.*, 1989 and Barbour and Stribling, 1994). The Habitat Assessment score includes types and amounts of benthic substrates, water velocity, amount of sand or silt accumulation, extent of artificial channelization, bank stability, and riparian zone width and vegetation type. Based on the sum of the scores for each factor, Habitat Assessment score ranges from 11-160 and overall habitat quality is assigned to one of four categories: Optimal (105-160 points), Suboptimal (102-123 points), Marginal (54-80 points), and Poor (11-33 points).

(2) Effluent and Water Samples from Control and Test Sites

Algal Growth Potential (AGP): The effluent and water from control and test sites were incubated with the diatom, *Selenastrum capricornutum,* as a measure of algal growth potential (AGP, Miller *et al.* 1978). Raschke and Shultz (1987) found that AGP above 5 mg dry weight/L creates a "problem" threshold for fresh receiving waters, implying nutrient enrichment.

(3) Algal Phytoplankton and Periphyton Assemblages

Chlorophyll *a* Content: Chlorophyll *a* content was measured in both phytoplankton and periphyton samples to estimate algal biomass (Modified from *Standard Methods* 10200H). High algal biomass implies nutrient stress.

Cell Density: Cell density was estimated as number/ml for phytoplankton samples and number/cm^2 for periphyton samples (Modified from *Standard Methods* 10200F and 10900G).

Taxa richness: Taxa richness is the number of distinct algal taxa present in a sample. Stress tends to reduce the number of different types of algae present in a sample, but moderate nutrient enrichment of nutrient poor waters may sometimes be correlated with increased algal taxa richness.

Community Composition: Shifts in relative proportions of major groups of algae downstream of a point source, compared to upstream, control conditions, may indicate negative effects of a discharge.

Diatom to Blue-Green Algae Ratio: A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta plus Cyanophyta) is often indicative of nutrient enriched conditions in flowing streams.

Shannon-Weaver Diversity Index: This index is specified in the Florida Administrative Code 62-302 as a measure of biological integrity. Low diversity scores are undesirable. Where diversity is low, only a few taxa are abundant as compared to an area where many taxa are present with more equitable abundance among taxa.

(4) Benthic Macroinvertebrate Assemblages

Taxa richness: Taxa richness is the number of distinct macroinvertebrate taxa present in a sample. Stress, habitat destruction and pollution tend to reduce the number of different types of organisms present.

Percent Contribution of Dominant Taxon: Percent contribution of the dominant taxon is calculated by dividing the number of individuals in the most abundant taxa by the total number of individuals counted. Percent contribution of the dominant taxon tends to increase with increasing perturbation (Plafkin *et al.*, 1989).

Shannon-Weaver Diversity Index: This index is specified in the Florida Administrative Code 62-302 as a measure of biological integrity. Low diversity scores are undesirable. Where diversity is low, only a few taxa are abundant as compared to an area where many taxa are present in equitable abundance among taxa.

The Florida Index: Some organisms become rare or absent as the intensity or duration of disturbance increases. The Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (Beck 1954). A site with a high Florida Index score is considered healthy (Ross 1990).

Ephemeroptera/Plecoptera/Trichoptera (EPT) Taxa: This value is the number of EPT taxa present. More EPT taxa are usually present in unpolluted waters (Plafkin *et al.*, 1989, Wallace *et al.*, 1996).

Community Composition: Shifts in proportions of major groups of organisms downstream of a point source, compared to upstream, control conditions, may indicate negative effects of a discharge.

Functional Feeding Groups: Environmental degradation may differentially affect groups of invertebrates based on how the group feeds (e.g. predators, deposit feeders, etc.). In Florida, pollution may be responsible for reducing the numbers of filter feeders (FDEP 1994) and shredders (EA Engineering 1994).

The Stream Condition Index (SCI): The SCI is a composite macroinvertebrate metric (Barbour *et al.* 1996a, b) developed for Florida. Using data from qualitative dipnet samples, the SCI assigns points to seven parameters, depending on how closely each parameter approaches an expected reference condition (see Table 4, Barbour *et al.* 1996a, b). Points are summed to yield a final SCI score (range 7-33, depending on region and index period). Included in the calculation of SCI are taxa richness, number of EPT taxa, number of Chironomid taxa, percent contribution of the dominant taxon, the Florida Index, percent contribution of Diptera, and the percent contribution of suspension and filter feeders.

Appendix 4

Typical Values for Selected Parameters in Florida Waters

Percentile Distribution (1617 stations)

Century WWTP – Control Site

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Biological Parameters												
Phytoplankton Chlorophyll *a* (ug/L),	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70	3.0
Periphyton Chlorophyll *a* (mg/m^2),	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85	Not measured
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90	2.68
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00	Not measured
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00	40
Chemical Parameters (												
TKN (mg/L)	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80	0.95
Ammonia (NH_3) (mg/L)	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	0.054
NO_2+NO_3 (mg/L)	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05	0.15
Total Phosphorus (mg/L)	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51	0.034
Ortho Phosphate (mg/L)	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37	0.022
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	10.0

Century WWTP – Test Site

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Biological Parameters												
Phytoplankton Chlorophyll *a* (ug/L),	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70	2.6
Periphyton Chlorophyll *a* (mg/m^2),	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85	Not measured
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90	3.93
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00	Not measured
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00	32
Chemical Parameters												
TKN (mg/L)	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80	0.78
Ammonia (NH_3) (mg/L)	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	0.041
NO_2+NO_3 (mg/L)	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05	0.19
Total Phosphorus (mg/L)	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51	0.032
Ortho Phosphate (mg/L)	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37	0.026
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	7.0

Taxa richness and diversity values are for benthic macroinvertebrates. H-D = Hester-Dendy sample. Qualitative taxa richness = number of taxa collected in standardized dipnet samples. Diversity = Shannon-Weaver H'. TKN = Total kjedahl nitrogen. NO_2-NO_3 = Nitrate + nitrite. NTU = Nephelometric turbidity units. Adapted from Joe Hand, FDER, personal communication, 1991 (data collected 1980-1989).

Appendix 5

Bioassay bench sheets for acute toxicity screening.

FDEP Biology Section — Acute Bioassay Bench Sheet

ample Source: Town of Century WWTP
County: Escambia
ntact / District: Glenn Butts / Northwest
DES Permit #: FL0032468
IMS Sample #: 544035 LIMS Job #: ZLH-2001-08-28-34
sample log 8/31/01
st Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
st Number: 1 of 2

Remarks:

Sample Collection: Date 8/27/01 Time 0905
Test Beginning: Date 8/28/01 Time 1350
Test Ending: Date 9/3/01 Time 1330
Organism Batch #: 38 Diluent Batch #: 23
Organism Age: <24hrs. SRT toxicant batch #: NA
Test organism: Ceriodaphnia dubia

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm)) 0 hr	UNCORRECTED Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (µmhos/cm) 48 h
Control A	A	5	5	5	8.3	—	8.3	25.2	—	24.7	8.1	—	7.9	175	—	205
Control B	B	5	5	5	—	—	8.3	—	—	24.3	—	—	7.9	—	—	215
Control C	C	5	5	5	—	—	8.4	—	—	24.3	—	—	7.6	—	—	210
Control D	D	5	5	5	—	—	8.4	—	—	24.2	—	—	8.1	—	—	210
100% A	A	5	5	5	7.3	—	8.4	24.8	—	24.2	7.5	—	8.4	330	—	410
100% B	B	5	5	5	—	—	8.4	—	—	24.2	—	—	8.4	—	—	415
100% C	C	5	5	5	—	—	8.4	—	—	24.1	—	—	8.10	—	—	400
100% D	D	5	5	5	—	—	8.3	—	—	23.9	—	—	8.6	—	—	410
measured by:		DAH	JA	DAH	DAH	—	JA	DAH	—	JA	DAH	—	JA	DAH	—	JA
recorded by:		JA	JA	DAH	JA	—	DAH	JA	—	DAH	JA	—	DAH	JA	—	DAH

Investigators' Signatures
L. Marshall Faircloth
Willie Parker Henson
Julia Ayers

Temperature Range °C
Incubator # (2) 25.5 - 26.5 (C)
Room 24.0 - 26.0 (C)

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			—	—	—	—
Lab Total Residual Cl2 (mg/L):		<0.05	<0.03	Hach	DAH/JA	JA
Alkalinity (mg/L as $CaCO_3$):		73	41	Hach	DAH/JA	JA
Hardness (mg/L as $CaCO_3$):		83	52	Hach	DAH/JA	JA
Total ammonia (mg/L as N):		<0.017	<0.017	Denver	DAH/JA	JA
Salinity:		<1	<1	YSI	JA	JA

reviewer form updated 3/3/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Town of Century WWTP
County: Escambia
Contact / District: Glenn Butts / NorthWest
NPDES Permit #: FL00 32468
LIMS Sample #: 544035 **LIMS Job #:** TLH-2001-08-28-34
sample log 8/31/01
Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Test Number: 2 of 2

Sample Collection: Date 8/29/01 Time 0905
Test Beginning: Date 8/29/01 Time 1405
Test Ending: Date 9/2/01 Time 1330
Organism Batch #: 8 **Diluent Batch #:** well H2O
Organism Age: Young SRT toxicant batch #: NA
Test organism: Cyprinella leedsi Hydrolab batch CL273

Remarks:
(A) wrong data, wrong place (SA) 8/28/01

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	Cond. 24 h	Cond. 48 h
Control A	F17	5	5	5	8.0	8.4	8.5	25.1	24.4	24.6	7.6	7.5	7.8	255	275	275
Control B	F18	5	5	5	8.0	8.4	8.5	25.0	24.2	24.5	7.6	7.3	7.8	260	270	270
Control C	F19	5	5	5	8.0	8.4	8.5	25.0	24.2	24.5	7.6	7.7	7.7	260	270	275
Control D	F20	5	5	5	8.0	8.5	8.5	25.0	24.2	24.2	7.6	7.5	7.7	260	290	310
100% A	F21	5	5	5	7.1	7.7	7.8	25.1	24.2	24.1	7.5	7.7	7.7	335	360	390
100% B	F22	5	5	5	7.1	7.7	7.8	25.0	24.3	24.4	7.4	7.5	7.8	335	360	370
100% C	F23	5	5	5	7.1	7.7	7.8	25.0	24.2	24.5	7.4	7.5	7.5	335	355	370
100% D	F24	5	5	5	7.1	7.7	7.8	25.0	~~24.8~~	24.7	7.4	7.6	7.5	335	360	370
measured by:		MT	SA	SA	DEH	DPH	SA	DEH	DPH	SA	DEH	DPH	SA	DPH	DPH	SA
recorded by:		SA	SA	DPH	SA	SA	DPH	SA	SA	DPH	SA	SA	DPH	SA	SA	DPH

(A) SA 24.6

Investigators' Signatures

Temperature Range °C
Incubator # 3 25.0-25.5 (C)
Room 24.0-26.0 (C)

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			—	—	—	
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03 (A)	<0.03	Hach	DPH/SA	SA
Alkalinity (mg/L as $CaCO_3$):	126	73	41	Hach	DPH/SA	SA
Hardness (mg/L as $CaCO_3$):	124	83	52	Hach	DPH/SA	SA
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	Denver	DPH/SA	SA
Salinity:	<1	<1	<1	YSI	SA	SA

reviewer form updated 3/3/99

Appendix 6

Habitat Assessment Field Sheets.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: FDEP NWD	STORET STATION NUMBER: 33.02.0023	DATE (M/D/Y): ~~08-13-01~~ 08-28-01	TIME: 1000	RECEIVING BODY OF WATER: ESCAMBIA RIVER

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
HD's OUT	ESCAMBIA	100 M ABOVE SR 4, ABOVE CENTURY WWTP	# 3

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category): Gravel mining

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
35	30	20		5	10		

Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☒ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☒

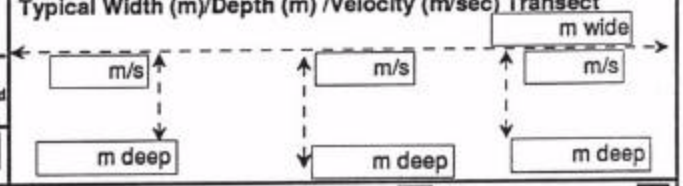
Width of riparian vegetation (m) on least buffered side: ***List & map dominant vegetation on back***

Artificially Channelized ☒ no ☐ ☐ ☐ (recent, severe / some recovery / mostly recovered, more sinuous)

Artificially Impounded ☐ yes

High Water Mark: ____ (m above present water level) + ____ (present depth in m) = ____ (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☒ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☒ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☐ Sand smothering: none / slight / moderate / severe Silt smothering: none / slight / moderate / severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				***Draw aerial view sketch of habitats found in 100 m section***			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.5	27.95	6.75	6.82	126			0.8
Mid-depth	↓	↓	↓	↓	↓			
Bottom	↓	↓	↓	↓	No Change			

System Type : Stream: ☒ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐

Water Odors (check box): Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils (check box): None: ☒ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☒ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☒ Green (algae): ☐ Clear: ☐ Other: ☐

Weather Conditions/Notes:
08-27-01
3 HD's RECOVERED

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☒	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes	☐	☒	☐	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
BUTTS / DONELAN	Glenn Butts	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (5-27-98)

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: FDEP NWD	STORET STATION NUMBER: 33.02.0023	DATE (M/D/Y): ~~06-12-01~~ 08-27-01	RECEIVING BODY OF WATER: ESCAMBIA RIVER

REMARKS:	COUNTY: ESCAMBIA	LOCATION: ABOVE CENTURY WWTP 100 M ABOVE SR 4	FIELD ID/NAME: # 3

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** [16]	Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock). 20 19 18 17 (16)	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability [17]	Greater than 30% productive habitat present at site. 20 19 18 (17) 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15 % productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity [17]	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 18 (17) 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Habitat Smothering [13]	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation Gravel mine 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Primary Score [63]				
Secondary Habitat Components **Artificial Channelization** [15]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern Gravel Mine (15) 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank [8] Left Bank [7]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank [10] Left Bank [8]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank [9] Left Bank [9]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1
Secondary Score [66]				

[129] TOTAL SCORE

ANALYSIS DATE: 06-12-01	ANALYST: G. BUTTS	SIGNATURE: Glenn Butts

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: FDEP NWD	STORET STATION NUMBER: 33.02.0001	DATE (M/D/Y): 08-27-01	TIME 1035	RECEIVING BODY OF WATER: ESCAMBIA RIVER

REMARKS:	COUNTY: ESCAMBIA	LOCATION: BELOW HWY 4, BELOW CENTURY WWTP	FIELD ID/NAME: # 2

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
40	30	20	5		5		

Local Watershed Erosion (check box): None ☐ Slight ☒ Moderate ☐ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☒ Moderate potential ☐ Obvious sources ☐

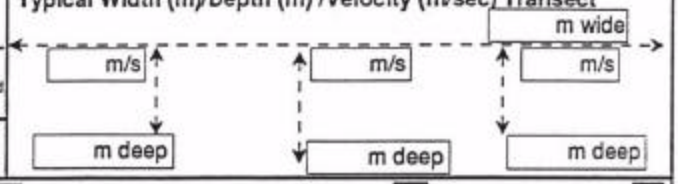
Width of riparian vegetation (m) on least buffered side: 20 — *List & map dominant vegetation on back*

Artificially Channelized ☒ no ☐ ☐ ☐ ☐ (recent, severe / some recovery / mostly recovered / more sinuous)

Artificially Impounded ☐ yes

High Water Mark: ____ (m above present water level) + ____ (present depth in m) = ____ (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☒ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐ ____

Sediment Oils: Absent: ☐ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☐ Sand smothering: none / slight / moderate / severe Silt smothering: none / slight / moderate / severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.5	27.4	7.05	7.2	91			0.85
Mid-depth		↓	↓	↓	↓			
Bottom	3.2	↓	↓	↓	↓ SAME			

System Type : Stream: ☒ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐ ____

Water Odors (check box): Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐ ____

Water Surface Oils (check box): None: ☒ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☒ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☒ Green (algae): ☐ Clear: ☐ Other: ☐ ____

Weather Conditions/Notes:
2 HDS RECOVERED

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☒	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes	☐	☒	☐	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

SAMPLING TEAM: BUTTS / DONELAN	SIGNATURE: Glenn Butts	DATE:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (5-27-98)

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: FDEP NWD	STORET STATION NUMBER: 33.02.0001	DATE (M/D/Y): 08-22-01	RECEIVING BODY OF WATER: ESCAMBIA RIVER

REMARKS:	COUNTY: ESCAMBIA	LOCATION: BELOW HWY 4, BELOW CENTURY WWTP	FIELD ID/NAME: # 2

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** [18]	Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock). 20 19 (18) 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability [18]	Greater than 30% productive habitat present at site. 20 19 (18) 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15 % productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity [17]	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 1 8 (17) 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Habitat Smothering [16]	Less than 20% of habitats affected by sand or silt accumulation 20 19 1 8 17 (16)	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Primary Score [69]				
Secondary Habitat Components **Artificial Channelization** [18]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 (18) 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank [8] Left Bank [8]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. (8) 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank [10] Left Bank [10]	Width of native vegetation (least buffered side) greater than 18 m (10) 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank [9] Left Bank [9]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 (9)	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1
Secondary Score [72]				

141 TOTAL SCORE

ANALYSIS DATE: 06-12-01	ANALYST: G. BUTTS	SIGNATURE: Glenn Butts

Appendix 7

Benthic macroinvertebrate taxa list for Town of Century WWTP, collected via Hester-Dendy artificial substrates in Escambia River, on 27 August, 2001. Densities, in number/m^2, represent the mean of three replicates for the control site and two for the test site.

	Control Site	Test Site
Coleoptera		
Ancyronyx variegatus	3	4
Dubiraphia vittata	3	-
Macronychus glabratus	3	4
Stenelmis sp.	21	4
Diptera		
Ablabesmyia rhamphe grp.	3	24
Ceratopogonidae	-	4
Chironomidae	34	8
Corynoneura sp.	-	4
Cryptochironomus sp.	-	32
Empididae	5	4
Hemerodromia sp.	69	8
Nilotanypus fimbriatus	19	-
Nilothauma sp.	13	-
Orthocladiinae	3	-
Pentaneura inconspicua	5	-
Polypedilum flavum grp.	58	4
Polypedilum illinoense grp.	-	8
Polypedilum scalaenum grp.	5	4
Rheocricotopus robacki	11	-
Rheotanytarsus pellicida grp.	26	4
Rheotanytarsus exiguus grp.	230	-
Rheotanytarsus sp.	21	-
Simulium sp.	32	-
Stelechomyia perpulchra	19	-
Tanytarsus sp.	3	8
Tanytarsus sp. D Epler	21	-
Tanytarsus sp. S Epler	-	4
Thienemanniella sp.	3	4
Thienemanniella sp. A Epler	3	4
Thienemanniella sp. B Epler	3	-

Benthic macroinvertebrate taxa list for Town of Century WWTP, collected via Hester-Dendy artificial substrates in Escambia River, on 27 August 2001. Densities, in number/m^2, represent the mean of three replicates for the control site and two for the test site. Continued.

Diptera, continued	**Control Site**	**Test Site**
Thienemanniella similis	8	-
Thienemannimyia grp.	29	20
Tribelos fuscicornis	-	67
Tvetenia sp.	8	-
Ephemeroptera		
Baetidae	5	-
Caenis sp.	3	198
Callibaetis floridanus	11	-
Heptageniidae	71	-
Isonychia sp.	90	8
Procloeon sp.	-	4
Stenonema exiguum	130	24
Stenonema smithae	-	32
Stenonema sp.	66	40
Tricorythodes albilineatus	106	131
Undetermined Ephemeroptera	11	-
Gastropoda		
Ancylidae	3	-
Megaloptera		
Corydalidae	5	-
Corydalus cornutus	11	4
Unknown Megaloptera	3	-
Odonata		
Argia moesta	-	4
Coenagrionidae	-	4
Neurocordulia molesta	14	-
Undetermined Odonata	-	4
Plecoptera		
Acroneuria sp.	3	4
Trichoptera		
Chimarra sp.	175	40
Cheumatopsyche sp.	135	20

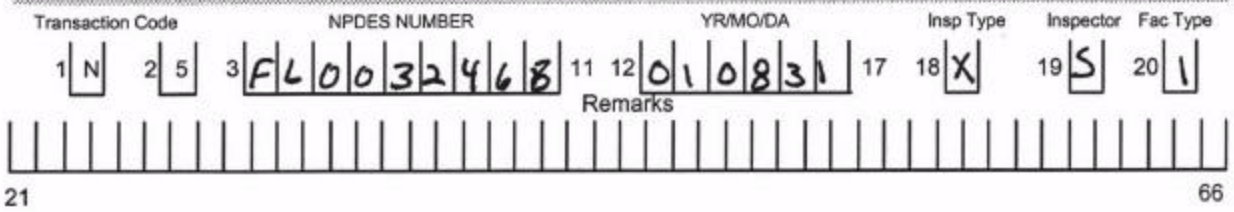
Benthic macroinvertebrate taxa list for Town of Century WWTP, collected via Hester-Dendy artificial substrates in Escambia River, on 27 August 2001. Densities, in number/m^2, represent the mean of three replicates for the control site and two for the test site. Continued.

Trichoptera, continued	**Control Site**	**Test Site**
Cyrnellus fraternus	-	16
Hydropsyche sp.	1796	28
Hydropsychidae	317	-
Hydroptila sp.	8	-
Leptoceridae	3	4
Macrostemum carolina	-	8
Oecetis georgia	5	4
Oecetis morsei or *sphyra*	3	-
Oecetis persimilis	13	-
Oecetis sp.	5	24
Undetermined Trichoptera	8	-
Turbellaria		
Planariidae	3	-

Benthic macroinvertebrate taxa list for Town of Century WWTP, collected via Hester-Dendy artificial substrates in Escambia River, on 27 August 2001. Densities, in number/m^2, represent the mean of three replicates for the control site and two for the test site. ~~Continued.~~

Trichoptera, continued	**Control Site**	**Test Site**
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Oecetis persimilis	13	-
Oecetis sp.	5	24
Undetermined Trichoptera	8	-
Turbellaria		
Planariidae	3	-

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)



Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)

