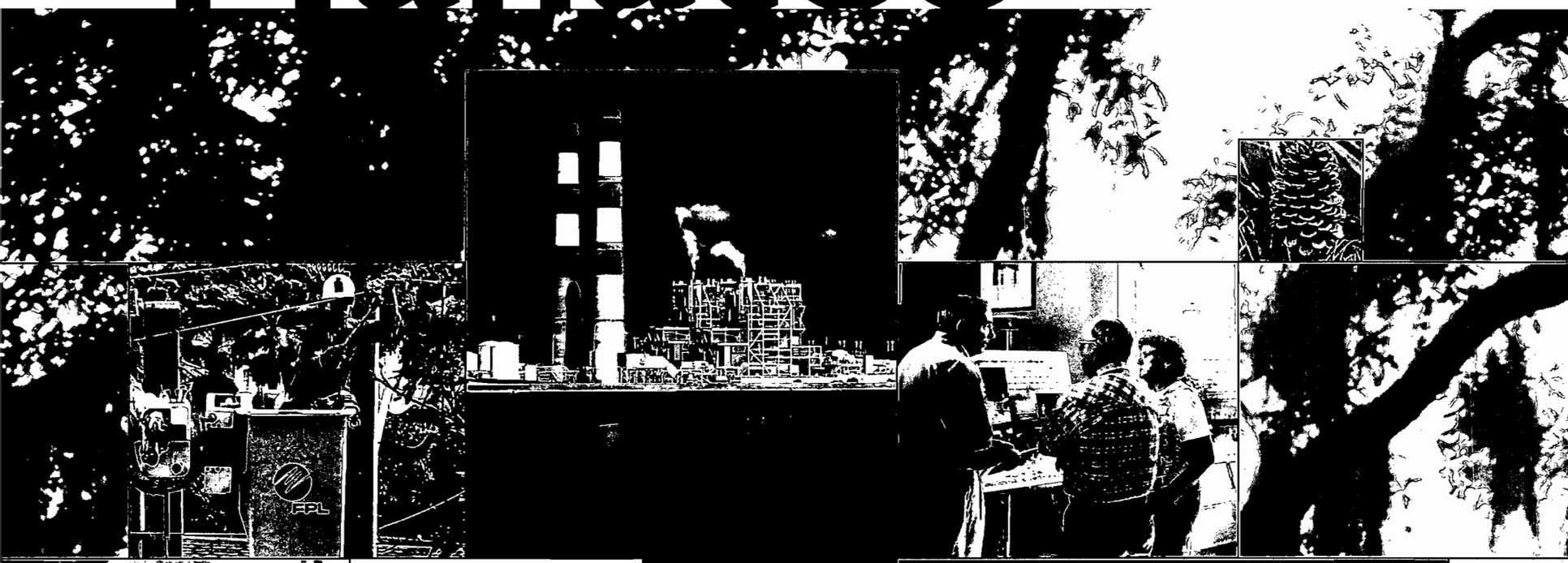
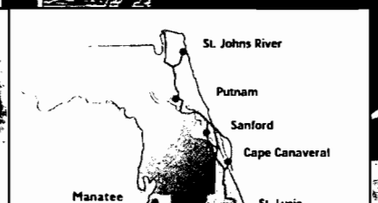
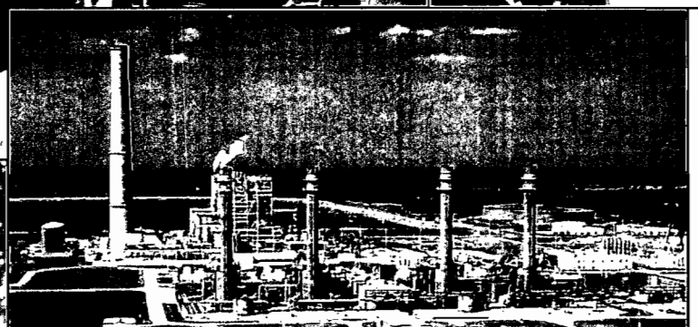
Manatee

expansion project







Volume III of III

FPL

SITE CERTIFICATION APPLICATION
MANATEE EXPANSION PROJECT

VOLUME III OF III

Submitted by:

Florida Power & Light Company
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Juno Beach, Florida 33408

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February 2002
0137609/GAS

FPL

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LIST OF ACRONYMS AND ABBREVIATIONS

AADT	Average Annual Daily Traffic
AAQS	Ambient Air Quality Standards
ANSI	American National Standard Institute
AR	argon
BACT	best available control technology
Btu/lb	British thermal units per pound
°C	degrees Celsius
CAA	Clean Air Act
CEM	continuous emission monitoring
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
C_2H_6	ethane
C_3H_8	propane
C_4H_{10}	butane
C_5H_{12}	pentane
C_6H_{14}	hexane
C_7H_{16}	heptane
C_8H_{18}	octane
Cl	chloride
cm	centimeter
CO	carbon monoxide
CO_2	carbon dioxide
CR	County Road
CT	combustion turbine
dB	decibel
dBA	A-weighted decibel
DEM	Digital Elevation Model
DLN	dry-low NO_x
DSM	demand side management
ELAPP	Environmental Lands Acquisition and Protection Program
EPA	U.S. Environmental Protection Agency

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LIST OF ACRONYMS AND ABBREVIATIONS - continued

ET	evapotranspiration
°F	degrees Fahrenheit
F.A.C.	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FFWCC	Florida Fish and Wildlife Conservation Commission
FGD	flue gas desulphurization
FLM	Federal Land Manager
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FNAI	Florida Natural Area Inventory
FPL	Florida Power & Light Company
FPSC	Florida Public Service Commission
F.S.	Florida Statutes
FSUTMS	Florida Standard Urban Transportation Modeling Structure
ft	foot
ft^2	square foot
ft^2/day	square feet per day
ft-bls	feet below land surface
ft/day	feet per day
ft/ft	feet per foot
ft/mile	feet per mile
ft-msl	feet above mean sea level
ft-NGVD	feet national geodetic vertical datum
gpd	gallons per day
gpm	gallons per minute
gr/100 scf	grains per 100 standard cubic feet
H_2O	water vapor
HCM	Highway Capacity Manual
H-D	Hester Dendy
He	Helium

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LIST OF ACRONYMS AND ABBREVIATIONS - continued

HHV	high heating value
HHW	higher high water
HLW	higher low water
HPM	higher power mode
HRSG	heat recovery steam generator
HSH	highest, second-highest
Hz	hertz
I	Interstate Highway
IRP	integrated resource planning
IWAQM	Interagency Workgroup on Air Quality Models
kg	kilogram
km	kilometer
kWh	kilowatt hour
lb/hr	pounds per hour
lb/yr	pounds per year
LHV	lower heating value
LHW	lower high water
LLW	lower low water
LOLP	loss-of-load probability
LOS	Level of Service
m	meter
Manatee Expansion Project	Manatee Unit 3 Combined Cycle Project or the Project
MB	mixed bed
mgd	million gallons per day
mg/L	milligrams per liter
mi^2	square mile
MM4	Mesoscale Model - Generation 4
MMBtu/hr	million British thermal units per hour
MMcf/hr	million cubic feet per hour
mph	miles per hour
MW	megawatt
N_2	nitrogen

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LIST OF ACRONYMS AND ABBREVIATIONS - continued

Na	sodium
NEPA	National Environmental Policy Act
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NOAA	National Oceanic and Atmospheric Administration
NSPS	New Source Performance Standards
NWS	National Weather Service
O_2	oxygen
O_3	ozone
OFW	Outstanding Florida Waters
‰	parts per thousand
Pb	lead
PDPI	Planned Development Public Interest
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
ppm	parts per million
ppmvd	parts per million-dry conditions
PPSA	Power Plant Siting Act
PSD	prevention of significant deterioration
QA/QC	quality assurance/quality control
RFP	Request for Proposal
RO	reverse osmosis
ROW	right-of-way
S	sulfur
SCA	Site Certification Application
SCR	selective catalytic reduction
SCRAM	Support Center for Regulatory Air Models
SHPO	State Historic Preservation Officer
SIP	site implementation plan
SO_2	sulfur dioxide
SOR	Save Our Rivers

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LIST OF ACRONYMS AND ABBREVIATIONS - continued

SPCC	Spill Prevention Control and Countermeasure
SPL	sound pressure level
SR	State Road
SWFWMD	Southwest Florida Water Management District
TDS	Total dissolved solids
TPY	tons per year
TRB	Transportation Research Board
TTN	Technical Transfer Network
$\mu g/m^3$	micrograms per cubic meter
µm	micrometer
µS	microSiemens
USACE	U.S. Army Corps of Engineers
USF	University of South Florida
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
ft^3/year	cubic feet per year
ZOD	zone of discharge

APPENDIX 10.4

EXISTING STATE PERMITS

APPENDIX 10.4.1

TITLE V PERMIT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOTICE OF ADMINISTRATIVE PERMIT CORRECTION

In the Matter of an Application for Administrative Permit Correction

Mr. J. M. Parent
Plant General Manager
Florida Power & Light Company
PO Box 14000
Juno Beach, FL 33408-0420

FINAL Permit No.: 0810010-001-AV
Manatee Plant

The Department has determined that a minor correction to information contained in Final Permit Number 0810010-001-AV is required. This correction is related to a clarification of a permit condition. This correction is minor in nature and does not alter, modify or revise any permit requirement. This Administrative Permit Correction was processed as project number 0810010-004-AV, pursuant to Rule 62-210.360, F.A.C. The corrections are:

Specific condition A.35 shall read:

A.35. Fuel Analysis Report. The owner or operator shall, by the fifteenth day following each calendar month, submit to the Department's Southwest District, Air Section, a report of fuel analyses that are representative of each fuel received in the preceding month. The report shall document the heating value, density or specific gravity, and the percent sulfur content by weight of each fuel fired.
[Rule 62-4.070(3) and 62-213.440, F.A.C., AO 41-204804 Specific Condition 6, AO 41-219341 Specific Condition 6]

This permit correction corrects and is a part of Final Permit Number 0810010-001-AV. This permit correction is issued pursuant to Chapter 403, Florida Statutes.

Any party to this order has the right to seek judicial review of it under section 120.68 of the Florida Statutes, by filing a notice of appeal under rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department of Environmental Protection in the Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida, 32399-3000, 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 must be filed within thirty days after this order is filed with the clerk of the Department.

Executed in Tallahassee, Florida.

for C. H. Fancy, P.E., Chief
Bureau of Air Regulation

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT CORRECTION was sent by certified mail (*) and copies were mailed by U.S. Mail before the close of business on 09-14-98 to the person(s) listed:

Mr. J. M. Parent *
[redacted] William M. Reichel, FPL *
Hon. Joe McClash, Manatee County Board of County Commissioners *
Ms. Mary Archer, FPL
Mr. Bill Thomas, DEP SWD
Ms. Carla E. Pierce, USEPA, Region 4 (INTERNET E-mail Memorandum)
Ms. Yolanda Adams, USEPA, Region 4 (INTERNET E-mail Memorandum)

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Sandra G. Knight (Clerk) 09-14-98 (Date)

Rec 4-2-98

Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

NOTICE OF FINAL PERMIT

In the Matter of an
Application for Permit by:

Mr. J. M. Parent
Plant General Manager
Florida Power & Light Company
11770 U.S. Highway One
North Palm Beach, FL 33408

FINAL Permit No.: 0810010-001-AV
Manatee Plant

Enclosed is FINAL Permit Number 0810010-001-AV for the operation of the Manatee Plant located at 19050 State Road 62, Parrish, Manatee 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.

C. H. Fancy, P.E.
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 5/29/98 to the person(s) listed or as otherwise noted:

Mr. J. M. Parent *
Mr. William M. Reichel, FPL *
Hon. Joe McClash, Manatee County Board of County Commissioners *
Mr. Kennard F. Kosky, P.E., Golder Associates
Mr. Ronnie L. Adams, P.E., FPL
Mr. Richard G. Piper, FPL
Mr. Bill Thomas, P.E., DEP Southwest District, Air Section
Ms. Carla E. Pierce, USEPA, Region 4 (INTERNET E-mail Memorandum)
Ms. Yolanda Adams, 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. Boutwell 5/29/98
(Clerk) (Date)

FINAL PERMIT DETERMINATION

FINAL Permit No.: 0810010-001-AV

I. Comment(s).

Comments were received from USEPA, Region 4 and the PROPOSED Title V permit was changed. The comments were not considered significant enough to reissue a DRAFT Title V permit and require another public notice. The changes made are summarized below.

The Department has determined that the appropriate particulate testing frequency for the fossil fuel steam generators is annually whenever fuel oil is used for more than 400 hours in the preceding year. This frequency is justified by the low emission rate documented in previous emissions tests while firing fuel oil. These units are subject to a steady-state PM emission limit of 0.1 lb/mmBtu, and 0.3 lb/mmBtu for soot blowing. FPL has presented historical PM test results which show that the steady-state average results are less than half the applicable effective standard. The Department has determined that sources with steady-state emissions less than 0.075 lb/mmBtu shall test annually. A summary of results of particulate emission testing in lb/mmBtu for the units at Manatee are 0.066 (steady-state) and 0.081 (soot-blowing).

FPL may inject additives such as magnesium oxide, magnesium hydroxide and related compounds into each boiler for the purposes of reducing build-up of particulate matter on the interior boiler surfaces, to facilitate proper heat transfer and other boiler operation, and to reduce the particulate matter required to be removed from boiler surfaces during soot blowing and other boiler cleaning operations. The rate of additive injection is not large, generally on the order of 1 gallon of additive per approximately 2,500 (± 500) gallons of fuel oil (this is approximately 0.04% by volume). The permit requires that emission tests be conducted while injecting additives consistent with normal operating practices.

The heat input limitations have been placed in each permit to identify the capacity of each unit for the purposes of confirming that emissions testing is conducted within 90 to 100 percent of the unit's rated capacity (or to limit future operation to 110 percent of the test load), to establish appropriate emission limits and to aid in determining future rule applicability. A note below the permitted capacity condition clarifies this. Regular record keeping is not required for heat input. Instead the owner or operator is expected to determine heat input whenever emission testing is required, to demonstrate at what percentage of the rated capacity that the unit was tested. Rule 62-297.310(5),F.A.C., included in the permit, requires measurement of process variables for emission tests. Such heat input determination may be based on measurements of fuel consumption by various methods including but not limited to fuel flow metering or tank drop measurements, using the heat value of the fuel determined by the fuel vendor or the owner or operator, to calculate average hourly heat input during the test.

II. Conclusion.

The permitting authority hereby issues the FINAL Title V permit, with any changes noted above.

CHANGES TO TITLE V PERMITS ISSUED PRIOR TO 12/02/97

Title V permitting formats were updated due to recent rule changes and after considering comments received from the electric utilities. This permit reflects these changes. A brief summary of the changes is below.

1. Recent rule changes changed "exempt activities" to "insignificant activities." Rules 62-213.430(6), F.A.C. and 62-210, F.A.C., reflecting this change went into effect November 13, 1997.

a. The department inserted a condition in Appendix TV-1 clarifying that a Title V source can add an "insignificant activity" at its facility in accordance with the criteria under Rule 62-213.430(6), F.A.C., and include it in the Title V permit's list of "insignificant activities" at the next renewal, in accordance with Rule 62-213.430(6), F.A.C. See condition number 40.

b. Appendix E-1 has been changed to Appendix I-1, and the language of this appendix was revised to refer to insignificant emissions units where appropriate.

c. Appendix U-1 has been revised to refer to insignificant emissions units instead of exempt emissions units.

2. Several changes were made to Appendix TV-1 to reflect the rule changes discussed above, and to properly identify conditions that are not federally enforceable.

a. The following additional rules have been marked as "not federally enforceable":

62-4.030, F.A.C., General Prohibition, (see condition number 1.)
62-4.220, F.A.C., Operation Permit for New Sources, (see condition number 14.)
62-210.300(5), F.A.C., Notification of Startup, (see condition number 19.)

b. Appendix TV-1, now carries a version date of "**12/02/97**".

In conclusion, the changes that have been made are insignificant in nature and do not impose additional noticing requirements.

[v:\formats\ xxxxxxx.c2] 12/02/97

REVISED STATEMENT OF BASIS

Title V FINAL Permit No.: 0810010-001-AV
Florida Power and Light Company
Manatee Plant
Manatee County

This Title V air operation permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210, 62-213, and 62-214. 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.

This facility consists of two fossil fuel steam generators, Unit 1 and Unit 2, each rated at 800 megawatts (MW) (900 MW gross capacity) output. The steam generators each burn a variable combination of No. 6 fuel oil, No. 2 fuel oil, propane, and used oil from FPL operations, discharging pollutants through a stack 499 feet above ground level. Propane is utilized primarily for ignition of the main fuel. When firing fuel oil, the maximum heat input for each boiler is 8650 mmBtu per hour. Each unit is a Foster-Wheeler oil fired steam generator, equipped with multiple cyclones with fly ash reinjection, a flue gas recirculation system and staged combustion. Each operates a Westinghouse tandem compound, reheat-type extraction turbine.

These emissions units are regulated under Acid Rain, Phase II; and Rule 62-296.405, F.A.C., Fossil Fuel Steam Generators with More than 250 million Btu per Hour Heat Input. Fossil fuel fired steam generator Unit 1 began commercial operation in 1976 and fossil fuel fired steam generator Unit 2 began commercial operation in 1977. These emissions units may inject additives such as magnesium oxide, magnesium hydroxide and related compounds into each boiler.

Also included in this permit are miscellaneous unregulated/insignificant emissions units and/or activities.

Based on the initial Title V permit application received June 12, 1996, this facility is a major source of hazardous air pollutants (HAPs).

Additional Items to Resolve EPA Objections

The Department has determined that the appropriate particulate testing frequency for the fossil fuel steam generators is annually whenever fuel oil is used for more than 400 hours in the preceding year. This frequency is justified by the low emission rate documented in previous emissions tests while firing fuel oil. These units are subject to a steady-state PM emission limit of 0.1 lb/mmBtu, and 0.3 lb/mmBtu for soot blowing. FPL has presented historical PM test results which show that the steady-state average results are less than 0.075 lb/mmBtu. The Department has determined that sources with steady-state emissions less than 0.075 lb/mmBtu shall test annually. A summary of results of particulate emission testing in lb/mmBtu for the units at Manatee are 0.066 (steady-state) and 0.081 (soot-blowing).

FPL may inject additives such as magnesium oxide, magnesium hydroxide and related compounds into each boiler for the purposes of reducing build-up of particulate matter on the interior boiler surfaces, to facilitate proper heat transfer and other boiler operation, and to reduce the particulate matter required to be removed from boiler surfaces during soot blowing and other boiler cleaning operations. The rate of

additive injection is not large, generally on the order of 1 gallon of additive per approximately 2,500 (± 500) gallons of fuel oil (this is approximately 0.04% by volume). The permit requires that emission tests be conducted while injecting additives consistent with normal operating practices.

The heat input limitations have been placed in each permit to identify the capacity of each unit for the purposes of confirming that emissions testing is conducted within 90 to 100 percent of the unit's rated capacity (or to limit future operation to 110 percent of the test load), to establish appropriate emission limits and to aid in determining future rule applicability. A note below the permitted capacity condition clarifies this. Regular record keeping is not required for heat input. Instead the owner or operator is expected to determine heat input whenever emission testing is required, to demonstrate at what percentage of the rated capacity that the unit was tested. Rule 62-297.310(5),F.A.C., included in the permit, requires measurement of process variables for emission tests. Such heat input determination may be based on measurements of fuel consumption by various methods including but not limited to fuel flow metering or tank drop measurements, using the heat value of the fuel determined by the fuel vendor or the owner or operator, to calculate average hourly heat input during the test.

Florida Power & Light Company
Manatee Plant
Facility ID No.: 0810010
Manatee County

Initial Title V Air Operation Permit
FINAL Permit No.: 0810010-001-AV

Permitting Authority:
State of Florida
Department of Environmental Protection
Division of Air Resources 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

Initial Title V Air Operation Permit
FINAL Permit No.: 0810010-001-AV

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Department of Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Lawton Chiles
Governor

Virginia B. Wetherell
Secretary

Permittee:
Florida Power & Light Company

FINAL Permit No.: 0810010-001-AV
Facility ID No.: 0810010
SIC Nos.: 49, 4911
Project: Initial Title V Air Operation Permit

This permit is for the operation of the Manatee Plant. This facility is located at 19050 State Road 62, Parrish, Manatee County; UTM Coordinates: Zone 17, 367.250 km East and 3054.150 km North; Latitude: 27° 36' 21" North and Longitude: 82° 20' 44" West.

STATEMENT OF BASIS: This Title V air operation permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210, 62-213, and 62-214. 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-1, Title V Conditions (version dated 12/02/97)
Appendix SS-1, Stack Sampling Facilities (version dated 10/07/96)
Table 297.310-1, Calibration Schedule (version dated 10/07/96)
Phase II Acid Rain Application/Compliance Plan received 12/6/95
Alternate Sampling Procedure: ASP Number 97-B-01
Order Granting Reduced Sampling Frequency, OGC Case Nos. 83-0580 and 83-0581, Order dated April 24, 1984
Order Extending Permit Expiration Date

Effective Date: January 1, 1999
Renewal Application Due Date: July 5, 2003
Expiration Date: December 31, 2003

Howard L. Rhodes, Director
Division of Air Resources Management

HLR/sms/sd

Section I. Facility Information.

Subsection A. Facility Description.

This facility consists of two fossil fuel steam generators, Unit 1 and Unit 2, each rated at 800 megawatts (MW) (900 MW gross capacity) output. The steam generators each burn a variable combination of No. 6 fuel oil, No. 2 fuel oil, propane, and used oil from FPL operations, discharging pollutants through a stack 499 feet above ground level. Each unit is a Foster-Wheeler oil fired steam generator, equipped with multiple cyclones, a flue gas recirculation system and staged combustion. Each operates a Westinghouse tandem compound, reheat-type extraction turbine.

Also included in this permit are miscellaneous unregulated/insignificant emissions units and/or activities.

Based on the initial Title V permit application received June 12, 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).

E.U. ID No.	Brief Description
001	Fossil Fuel Steam Generator, Unit 1
002	Fossil Fuel Steam Generator, Unit 2
Unregulated Emissions Units and/or Activities	
003	Emergency Diesel Generator, Miscellaneous Mobile Equipment and Internal Combustion Engines
004	Painting of Plant Equipment and Non-halogenated Solvent Cleaning Operations

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.

<u>These documents are provided to the permittee for information purposes only:</u>
Appendix A-1, Abbreviations, Acronyms, Citations, and Identification Numbers
Appendix H-1, Permit History/ID Number Changes
Table 1-1, Summary of Air Pollutant Standards and Terms
Table 2-1, Summary of Compliance Requirements

<u>These documents are on file with the permitting authority:</u>
Initial Title V Permit Application received June 12, 1996
Additional Information Request dated May 13, 1997
Additional Information Response received August 15, 1997
DEP Letter to US EPA Region 4 dated March 10, 1998
US EPA Region 4 letter to DEP received March 25, 1998

Section II. Facility-wide Conditions.

The following conditions apply facility-wide:

1. APPENDIX TV-1, TITLE V CONDITIONS, is a part of this permit.
{Permitting note: APPENDIX TV-1, 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. **Not Federally Enforceable.** General Pollutant Emission Limiting Standards. Objectionable Odor Prohibited. The permittee shall not cause, suffer, allow, or permit the discharge of air pollutants which cause or contribute to an objectionable odor.
[Rule 62-296.320(2), F.A.C.]

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.
[Rule 62-296.320(4)(b)1. & 4, F.A.C.]

4. Prevention of Accidental Releases (Section 112(r) of CAA). If required by 40 CFR 68, the permittee shall submit to the implementing agency:
   a. a risk management plan (RMP) when, and if, such requirement becomes applicable; and
   b. certification forms and/or RMPs according to the promulgated rule schedule.
[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. **Not Federally Enforceable.** General Pollutant Emission Limiting Standards. Volatile Organic Compounds (VOC) Emissions or Organic Solvents (OS) Emissions. The permittee shall allow no person to store, pump, handle, process, load, unload or use in any process or installation, volatile organic compounds (VOC) or organic solvents (OS) without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department. The owner or operator shall:
   a. Tightly cover or close all VOC or OS containers when they are not in use.
   b. Tightly cover all open tanks which contain VOC or OS when they are not in use.
   c. Maintain all pipes, valves, fittings, etc., which handle VOC or OS in good operating condition.
   d. Immediately confine and clean up VOC or OS spills and make sure wastes are placed in closed containers for reuse, recycling or proper disposal.
[Rule 62-296.320(1)(a), F.A.C.]

8. Not Federally Enforceable. No person shall cause, let, permit, suffer or allow the emissions of unconfined particulate matter from any activity without taking reasonable precautions to prevent such emissions. Reasonable precautions to prevent emissions of unconfined particulate matter at this facility include:

a. The facility shall construct temporary sandblasting enclosures when necessary, in order to perform sandblasting on fixed plant equipment.
b. Maintenance of paved areas as needed.
c. Regular mowing of grass and care of vegetation.
d. Limiting access to plant property by unnecessary vehicles.
e. Bagged chemical products are stored in concrete block buildings until they are used.
f. Spills of powdered chemical products are cleaned up as soon as practicable.

[Rule 62-296.320(4)(c)2., F.A.C., proposed by the applicant in the initial Title V permit application received June 12, 1996]

9. When appropriate, any recording, monitoring or reporting requirements that are time-specific shall be in accordance with the effective date of this 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), F.A.C., shall be submitted within 60 (sixty) days after the end of the calendar year.
{See condition No. 51., Appendix TV-1, Title V Conditions}
[Rule 62-214.420(11), F.A.C.]

11. Submittals. All reports, tests, notifications or other submittals required by this permit shall be submitted to the Department's Southwest District, Air Section:

Department of Environmental Protection
Southwest District Office
3804 Coconut Palm Drive
Tampa, FL 33619-8218
Telephone: 813/744-6100
Fax: 813/744-6458

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
Operating Permits Section
61 Forsyth Street
Atlanta, GA 30303
Phone: 404/562-9099
Fax: 404/562-9095

FINAL Permit No.: 0810010-001-AV

Section III. Emissions Unit(s) and Conditions.

Subsection A. This section addresses the following emissions unit(s).

E.U. ID No.	Brief Description
001	Fossil Fuel Steam Generator, Unit 1
002	Fossil Fuel Steam Generator, Unit 2

Fossil fuel fired steam generators Unit 1 and Unit 2 are each nominal 800 megawatt (900 MW gross capacity) (electric) steam generators designated as Manatee Plant Unit 1 and Unit 2. The emissions units are fired on a variable combination of No. 6 fuel oil, No. 2 fuel oil, propane, and used oil from FPL operations. Propane is utilized primarily for ignition of the main fuel. When firing fuel oil, the maximum heat input for each boiler is 8650 mmBtu per hour.

Each emissions unit consists of a boiler which drives a turbine generator. Emissions are controlled with multiple cyclones , a flue gas recirculation system and staged combustion. Each unit is equipped with a 499 foot stack.

{Permitting note(s): These emissions units are regulated under Acid Rain, Phase II; and Rule 62-296.405, F.A.C., Fossil Fuel Steam Generators with More than 250 million Btu per Hour Heat Input. Fossil fuel fired steam generator Unit 1 began commercial operation in 1976 and fossil fuel fired steam generator Unit 2 began commercial operation in 1977. These emissions units may inject additives such as magnesium oxide, magnesium hydroxide and related compounds into each boiler.}

The following specific conditions apply to the emissions units listed above:

Essential Potential to Emit (PTE) Parameters

A.1. Permitted Capacity. The maximum operation heat input rates are as follows:

Unit No.	mmBtu/hr Heat Input	Fuel Type
1	8650	No. 2 or 6 Fuel Oil
2	8650	No. 2 or 6 Fuel Oil

[Rules 62-4.160(2), 62-210.200(PTE) and 62-296.405, F.A.C.]

{Permitting note: The heat input limitations have been placed in each permit to identify the capacity of each unit for the purposes of confirming that emissions testing is conducted within 90 to 100 percent of the unit's rated capacity (or to limit future operation to 110 percent of the test load), to establish other appropriate emission limits and to aid in determining future rule applicability.} Regular record keeping is not req'd for heat input.

A.2. Emissions Unit Operating Rate Limitation After Testing. See specific condition **A.26** and **A.27** of this permit.
[Rule 62-297.310(2), F.A.C.]

A.3. Methods of Operation. Fuels.

a. Startup: The only fuels allowed to be burned are any combination of No. 6 fuel oil, No. 2 fuel oil and propane.

b. Normal: The only fuels allowed to be burned are any combination of No. 6 fuel oil, No. 2 fuel oil, propane and on-specification used oil from FPL operations.

[Rule 62-213.410, F.A.C.]

A.4. Hours of Operation. The emissions units may operate continuously, i.e., 8,760 hours/year.
[Rule 62-210.200(PTE), F.A.C.]

Emission Limitations and Standards

{Permitting Note: The attached 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.}

A.5. Visible Emissions. Visible emissions shall not exceed 40 percent opacity. Emissions units governed by this visible emissions standard shall compliance test for particulate matter emissions annually.
[Rule 62-296.405(1)(a), F.A.C.; and OGC Case Nos. 83-0580 & 83-0581, Order dated April 24, 1984.]

A.6. Visible Emissions - Soot Blowing and Load Change. Visible emissions shall not exceed 60 percent opacity during the 3-hours in any 24 hour period of excess emissions allowed for boiler cleaning (soot blowing) and load change.

A load change occurs when the operational capacity of a unit is in the 10 percent to 100 percent capacity range, other than startup or shutdown, which exceeds 10 percent of the unit's rated capacity and which occurs at a rate of 0.5 percent per minute or more.

Visible emissions above 60 percent opacity shall be allowed for not more than 4, six (6)-minute periods, during the 3-hour period of excess emissions allowed by this condition.
[Rule 62-210.700(3), F.A.C., Note: these units have operational continuous opacity monitors.]

A.7. Particulate Matter. Particulate matter emissions shall not exceed 0.1 pound per million Btu heat input, as measured by applicable compliance methods.
[Rule 62-296.405(1)(b), F.A.C.]

A.8. Particulate Matter - Soot Blowing and Load Change. Particulate matter emissions shall not exceed an average of 0.3 pound per million Btu heat input during the 3-hours in any 24-hour period of excess emissions allowed for boiler cleaning (soot blowing) and load change.
[Rule 62-210.700(3), F.A.C.]

A.9. Sulfur Dioxide. The sulfur content of fuel oils burned shall not exceed 1.0 percent by weight, as received at the plant. See specific conditions **A.9, A.15, A.23 and A.24** of this permit.
[Rules 62-213.440 and 62-296.405(1)(c)1.g., F.A.C., and applicant agreement with EPA on March 3, 1998]

A.10. Nitrogen Oxides. Nitrogen oxides emissions shall not exceed 0.30 pounds per million Btu heat input. Compliance shall be demonstrated based on a 30-day rolling average as measured by

a continuous emission monitoring system (CEMS). The CEMS must meet the performance specifications contained in 40 CFR 75.
[Rules 62-296.405(1)(d)2. and (1)(d)4., F.A.C., AO 41-204804 and AO 41-219341, Issued August 30, 1993]

Excess Emissions

A.11. 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 two hours in any 24 hour period unless specifically authorized by the Department for longer duration.
[Rule 62-210.700(1), F.A.C.]

A.12. Excess emissions resulting from startup or shutdown shall be permitted provided that best operational practices to minimize emissions are adhered to and the duration of excess emissions shall be minimized.
[Rule 62-210.700(2), F.A.C.]

A.13. 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.]

Monitoring of Operations

A.14. Annual Tests Required. Except as provided in specific conditions **A.17** through **A.19** of this permit, emission testing for particulate emissions and visible emissions shall be performed annually, each federal fiscal year, except for units that are not operating because of scheduled maintenance outages and emergency repairs, which will be tested within thirty days of returning to service.
[Rules 62-4.070(3) and 62-213.440, F.A.C.]

A.15. Sulfur Dioxide. **The permittee elected to demonstrate compliance using fuel sampling and analysis.** This protocol is allowed because the emissions unit does not have an operating flue gas desulfurization device. See specific conditions **A.9, A.23 and A.24** of this permit.
[Rule 62-296.405(1)(f)1.b., F.A.C.]

A.16. 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.]

A.17. 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.

2. For excess emission limitations for particulate matter specified in Rule 62-210.700, F.A.C., a compliance test shall be conducted annually while the emissions unit is operating under soot blowing conditions in each federal fiscal year during which soot blowing is part of normal emissions unit operation, except that such test shall not be required in any federal fiscal year in which a fossil fuel steam generator does not burn liquid fuel for more than 400 hours other than during startup.

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 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: 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 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., SIP approved]

A.18. When VE Tests Not Required. By this permit, annual emissions compliance testing for visible emissions is not required for these emissions units while burning:

a. only gaseous fuel(s); or

b. gaseous fuel(s) in combination with any amount of liquid fuel(s) for less than 400 hours per year; or

c. only liquid fuel(s) for less than 400 hours per year.

[Rule 62-297.310(7)(a)4., F.A.C.]

A.19. When PM Tests Not Required. Annual and permit renewal compliance testing for particulate matter emissions is not required for these emissions units while burning:

a. only gaseous fuel(s); or

b. gaseous fuel(s) in combination with any amount of liquid fuel(s) for less than 400 hours per year; or

c. only liquid fuel(s) for less than 400 hours per year.

[Rules 62-297.310(7)(a)3. & 5., F.A.C.; and, ASP Number 97-B-01.]

Test Methods and Procedures

{Permitting Note: The attached 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.}

A.20. Visible emissions. The test method for visible emissions shall be DEP Method 9, incorporated in Chapter 62-297, F.A.C. A transmissometer may be used and calibrated according to Rule 62-297.520, F.A.C. See specific condition **A.21** of this permit. VE testing shall be conducted in accordance with the requirements of specific condition **A.27** of this permit.
[Rule 62-296.405(1)(e)1., F.A.C.]

A.21. DEP Method 9. The provisions of EPA Method 9 (40 CFR 60, Appendix A) are adopted by reference with the following exceptions:

1. EPA Method 9, Section 2.4, Recording Observations. Opacity observations shall be made and recorded by a certified observer at sequential fifteen second intervals during the required period of observation.

2. EPA Method 9, Section 2.5, Data Reduction. For a set of observations to be acceptable, the observer shall have made and recorded, or verified the recording of, at least 90 percent of the possible individual observations during the required observation period. For single-valued opacity standards (e.g., 20 percent opacity), the test result shall be the highest valid six-minute average for the set of observations taken. For multiple-valued opacity standards (e.g., 20 percent opacity, except that an opacity of 40 percent is permissible for not more than two minutes per hour) opacity shall be computed as follows:

   a. For the basic part of the standard (i.e., 20 percent opacity) the opacity shall be determined as specified above for a single-valued opacity standard.

b. For the short-term average part of the standard, opacity shall be the highest valid short-term average (i.e., two-minute, three-minute average) for the set of observations taken.

In order to be valid, any required average (i.e., a six-minute or two-minute average) shall be based on all of the valid observations in the sequential subset of observations selected, and the selected subset shall contain at least 90 percent of the observations possible for the required averaging time. Each required average shall be calculated by summing the opacity value of each of the valid observations in the appropriate subset, dividing this sum by the number of valid observations in the subset, and rounding the result to the nearest whole number. The number of missing observations in the subset shall be indicated in parenthesis after the subset average value.
[Rule 62-297.401, F.A.C.]

A.22. Particulate Matter. The test methods for particulate emissions shall be EPA Methods 17, 5, 5B, or 5F, incorporated by reference in Chapter 62-297, F.A.C. The minimum sample volume shall be 30 dry standard cubic feet. EPA Method 5 may be used with filter temperature no more than 320 degrees Fahrenheit. For EPA Method 17, stack temperature shall be less than 375 degrees Fahrenheit. The owner or operator may use EPA Method 5 to demonstrate compliance. EPA Method 3 or 3A with Orsat analysis shall be used when the oxygen based F-factor, computed according to EPA Method 19, is used in lieu of heat input. Acetone wash shall be used with EPA Method 5 or 17. Particulate testing shall be conducted in accordance with the requirements of specific conditions **A.26** and **A.27** of this permit.
[Rules 62-213.440, 62-296.405(1)(e)2., and 62-297.401, F.A.C.]

A.23. Sulfur Dioxide. The test methods for sulfur dioxide emissions shall be EPA Methods 6, 6A, 6B, or 6C, incorporated by reference in Chapter 62-297, F.A.C. Fuel sampling and analysis may be used as an alternate sampling procedure if such a procedure is incorporated into the operation permit for the emissions unit. If the emissions unit obtains an alternate procedure under the provisions of Rule 62-297.620, F.A.C., the procedure shall become a condition of the emissions unit's permit. The Department will retain the authority to require EPA Method 6 or 6C if it has reason to believe that exceedences of the sulfur dioxide emissions limiting standard are occurring. Results of an approved fuel sampling and analysis program shall have the same effect as EPA Method 6 test results for purposes of demonstrating compliance or noncompliance with sulfur dioxide standards. **The permittee may use the EPA test methods, referenced above, to demonstrate compliance; however, as an alternate sampling procedure authorized by permit, the permittee elected to demonstrate compliance using fuel sampling and analysis.** See specific conditions **A.9 and A.24** of this permit.
[Rules 62-213.440, 62-296.405(1)(e)3. and 62-297.401, F.A.C.]

A.24. The following fuel sampling and analysis protocol shall be used as an alternate sampling procedure authorized by permit to demonstrate compliance with the sulfur dioxide standard:

Compliance with the liquid fuel sulfur limit shall be verified by a fuel analysis provided by the vendor or performed by FPL upon each fuel delivery at the Port Manatee Fuel Oil Terminal with the following exception: in cases where No. 6 fuel oil is received with a sulfur content exceeding 1.0 percent by weight, and blending at the terminal is required to obtain a fuel mix equal to the applicable percent sulfur limit, an analysis of a fuel sample representative of fuel from the fuel storage tanks shall be performed by FPL prior to transferring oil to the Manatee plant. Reports of percent sulfur content of these analyses shall be maintained at the power plant facility.

The owner or operator shall maintain records of the as-fired fuel oil heating value, density or specific gravity, and the percent sulfur content. Fuel sulfur content, percent by weight, for liquid fuels shall be determined by either ASTM D2622-94, ASTM D4294-90 (95), ASTM D1552-95, ASTM D1266-91, or both ASTM D4057-88 and ASTM D129-95 (or latest editions) to analyze a representative sample of the fuel oil.
[Rules 62-213.440, 62-296.405(1)(e)3., 62-296.405(1)(f)1.b. and 62-297.440, F.A.C., and applicant agreement with EPA on March 3, 1998]

A.25. 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.]

A.26. Operating Rate During Testing. Testing of emissions shall be conducted with each 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.]

A.27. Operating Conditions During Testing - PM and VE. When required, testing for particulate matter and visible emissions shall be conducted while firing No. 6 fuel oil at the maximum allowable rate of 8650 million Btu per hour, except as provided below. Particulate and visible emissions shall be conducted under both sootblowing and non-sootblowing conditions, and shall be conducted while injecting the maximum quantity of additives approved by the Department.

Testing may be conducted while firing No. 6 fuel oil at less than 90 percent of the maximum allowable rate; however, subsequent emissions unit operation is limited as described in specific condition **A.26** of this permit.
[Rules 62-4.070(3) and 62-213.440 F.A.C., AO 41-204804 Specific Condition 5, AO 41-219341 Specific Condition 5]

A.28. 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 separate test runs unless otherwise specified in a particular test method or applicable rule.
[Rule 62-297.310(3), F.A.C.]

A.29. 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:
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 to 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.]

A.30. 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.]

A.31. Testing While Injecting Additives. The owner or operator shall conduct emission tests while injecting additives consistent with normal operating practices.
[Rule 62-213.440, F.A.C., applicant agreement with EPA on March 3, 1998]

Record Keeping and Reporting Requirements

A.32. Excess Emissions - Malfunctions. In the case of excess emissions resulting from malfunctions, each owner or operator shall notify the Department's Southwest District, Air Section, 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's Southwest District, Air Section.
[Rule 62-210.700(6), F.A.C.]

A.33. Excess Emissions - Reports. Submit to the Department's Southwest District, Air Section, a written report of emissions in excess of emission limiting standards for opacity and sulfur dioxide as set forth in Rule 62-296.405(1), F.A.C., 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.
[Rules 62-213.440 and 62-296.405(1)(g), F.A.C.]

A.34. 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's Southwest District, Air Section, on the results of each such test.
(b) The required test report shall be filed with the Department's Southwest District, Air Section, 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's Southwest District, Air Section, 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.]

A.35. Sulfur Dioxide Emission Report. The owner or operator shall, by the thirtieth day following each calendar quarter, submit to the Department's Southwest District, Air Section, a summary report of the daily averages of sulfur dioxide emissions in pounds per hour (or tons per hour) and pounds per million Btu, for each month of the preceding calendar quarter. The report shall include the quantities of each fuel fired and document the heating value, density or specific gravity, and the percent sulfur content of the fuel fired.
[Rule 62-4.070(3) and 62-213.440, F.A.C., AO 41-204804 Specific Condition 6, AO 41-219341 Specific Condition 6]

A.36. COMS for Periodic Monitoring. The owner or operator is required to install continuous opacity monitoring systems (COMS) pursuant to 40 CFR Part 75. The owner or operator shall maintain and operate COMS and shall make and maintain records of opacity measured by the COMS, for purposes of periodic monitoring.
[Rule 62-213.440, F.A.C., and applicant agreement with EPA on March 3, 1998]

Miscellaneous Conditions

A.37. Used Oil. Burning of on-specification used oil is allowed at this facility in accordance with all other conditions of this permit and the following additional conditions:

a. On-specification Used Oil Allowed as Fuel: This permit allows the burning of used oil fuel meeting EPA "on-specification" used oil specifications, with a PCB concentration of less than 50 ppm, originating from FPL operations. Used oil that does not meet the specifications for on-specification used oil shall not be burned at this facility.

   On-specification used oil shall meet the following specifications: [40 CFR 279, Subpart B.]

   Arsenic shall not exceed 5.0 ppm;
   Cadmium shall not exceed 2.0 ppm;
   Chromium shall not exceed 10.0 ppm;
   Lead shall not exceed 100.0 ppm;
   Total halogens shall not exceed 1000 ppm;
   Flash point shall not be less than 100 degrees F.

b. Quantity Limited: The maximum total quantity of used oil that may be burned in both emissions units is 40,000 gallons in any consecutive 12-month period.

c. Used Oil Containing PCBs Not Allowed: Used oil containing a PCB concentration of 50 or more ppm shall not be burned at this facility. Used oil shall not be blended to meet this requirement.

d. PCB Concentration of 2 to less than 50 ppm: On-specification used oil with a PCB concentration of 2 to less than 50 ppm shall be burned only at normal source operating temperatures. On-specification used oil with a PCB concentration of 2 to less than 50 ppm shall not be burned during periods of startup or shutdown.

e. Testing Required: The owner or operator shall sample and analyze each batch of used oil to be burned for the following parameters:

Arsenic, cadmium, chromium, lead, total halogens, flash point, PCBs.

Testing (sampling, extraction and analysis) shall be performed using approved methods specified in EPA Publication SW-846 (Test Methods for Evaluating Solid Waste, Physical/Chemical Methods), latest edition.

Split samples of the used oil shall be retained for three months after analysis for further testing if necessary.
[AO 41-204804 Specific Condition 9, and AO 41-219341 Specific Condition 9]

f. Record Keeping Required: The owner or operator shall obtain, make, and keep the following records related to the use of used oil in a form suitable for inspection at the facility by the Department: [40 CFR 279.61 and 761.20(e)]

(1) The gallons of on-specification used oil received and burned each month. (This record shall be completed no later than the fifteenth day of the succeeding month.)
(2) The total gallons of on-specification used oil burned in the preceding consecutive 12-month period. (This record shall be completed no later than the fifteenth day of the succeeding month.)
(3) Results of the analyses required above.

g. Reporting Required: The owner or operator shall submit to the Department's Southwest District, Air Section, within thirty days of the end of each calendar month in which used oil is burned, the analytical results and the total amount of on-specification used oil burned during the previous calendar month

The owner or operator shall submit, with the Annual Operation Report form, the analytical results and the total amount of on-specification used oil burned during the previous calendar year.

[Rules 62-4.070(3) and 62-213.440, F.A.C., 40 CFR 279 and 40 CFR 761, unless otherwise noted]

Section IV. This section is the Acid Rain Part.

Operated by: Florida Power and Light Company
ORIS code: 6042

Subsection A. This subsection addresses Acid Rain, Phase II.

The emissions unit(s) listed below are regulated under Acid Rain, Phase II.

E.U. ID No.	Brief Description
001	Fossil Fuel Steam Generator, Unit 1
002	Fossil Fuel Steam Generator, Unit 2

A.1. The Phase II permit application(s) submitted for this facility, as approved by the Department, is a part of this permit. The owners and operators of these Phase II acid rain unit(s) must comply with the standard requirements and special provisions set forth in the application(s) listed below:
a. DEP Form No. 62-210.900(1)(a), dated July 1, 1995.
[Chapter 62-213, F.A.C. and Rule 62-214.320, F.A.C.]

A.2. Sulfur dioxide (SO_2) allowance allocations for each Acid Rain unit are as follows:

E.U. ID No.	EPA ID	Year	2000	2001	2002	2003
001	ID No. 01 PMT1	SO2 allowances, under Table 2 or 3 of 40 CFR Part 73	13654*	13654*	13654*	13654*
002	ID No. 02 PMT2	SO2 allowances, under Table 2 or 3 of 40 CFR Part 73	12581*	12581*	12581*	12581*

* The number of allowances held by an Acid Rain source in a unit account may differ from the number allocated by the USEPA under Table 2 or 3 of 40 CFR 73.

A.3. Emission Allowances. Emissions from sources subject to the Federal Acid Rain Program (Title IV) shall not exceed any allowances that the source lawfully holds under the Federal Acid Rain Program. Allowances shall not be used to demonstrate compliance with a non-Title IV applicable requirement of the Act.

1. No permit revision shall be required for increase in emissions that are authorized by allowances acquired pursuant to the Federal Acid Rain Program, provided that such increases do not require a permit revision pursuant to Rule 62-213.400(3), F.A.C.
2. No limit shall be placed on the number of allowances held by the source under the Federal Acid Rain Program.
3. Allowances shall be accounted for under the Federal Acid Rain Program.

[Rule 62-213.440(1)(c), F.A.C.]

A.4. Fast-Track Revisions of Acid Rain Parts. Those Acid Rain sources making a change described at Rule 62- 214.370(4), F.A.C., may request such change as provided in Rule 62-213.413, Fast-Track Revisions of Acid Rain Parts.
[Rule 62-213.413, F.A.C.]

A.5. Comments, notes, and justifications: None.

Appendix U-1, List of Unregulated Emissions Units and/or Activities

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'.

E.U. ID No.	Brief Description of Emissions Units and/or Activity
003	Emergency Diesel Generator, Miscellaneous Mobile Equipment and Internal Combustion Engines
004	Painting of Plant Equipment and Non-halogenated Solvent Cleaning Operations

Appendix I-1, List of Insignificant Emissions Units and/or Activities

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. Spent boiler chemical cleaning liquid evaporation.
2. Propane relief valves
3. Hydrazine mixing tank an relief valves.
4. Fuel oil storage tanks and related equipment.
5. Lube oil tank vents and extraction vents
6. Oil/water separators and related equipment
7. Miscellaneous mobile vehicle operation (cars, light trucks, heavy-duty trucks, backhoes, tractors, forklifts, cranes, etc.)

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Appendix S
Permit Summary Tables

Table 1-1, Summary of Air Pollutant Emission Standards

This table summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.

Emissions Unit	Brief Description
001	Fossil Fuel Steam Generator, Unit 1, heat input of 8650 mmBtu/hr on fuel oil
002	Fossil Fuel Steam Generator, Unit 2, heat input of 8650 mmBtu/hr on fuel oil

			Allowable Emissions			Equivalent Emissions*			
Pollutant	Fuel(s)	Hours per Year	Standard(s)	lb/hour	TPY	lb/hour	TPY	Regulatory Citations	See Permit Condition(s)
VE Steady State	Oil, Propane	8760	40% opacity					Rule 62-296.405(1)(a), F.A.C.	A.5
VE Soot Blowing or Load Change	Oil, Propane	8760	60 % opacity (>60% opacity for not more than 4, six-minute periods					Rule 62-210.700(3), F.A.C.	A.6
PM Steady State	Oil, Propane	8760	0.1 lb/mmBtu			865 865	3,789 43*	Rule 62-296.405(1)(b), F.A.C.	A.7
PM Soot Blowing or Load Change	Oil, Propane	8760	0.3 lb/mmBtu			2,595 2,595	1,421 130*	Rule 62-210.700(3), F.A.C.	A.8

* The equivalent annual emissions for propane are based on the expected annual usage of propane reported by the applicant primarily as a startup fuel. Propane usage is not limited by this permit.

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Appendix S
Permit Summary Tables

Table 1-1, Summary of Air Pollutant Emission Standards, Continued

Emissions Unit	Brief Description
001	Fossil Fuel Steam Generator, Unit 1, heat input of 8650 mmBtu/hr on fuel oil
002	Fossil Fuel Steam Generator, Unit 2, heat input of 8650 mmBtu/hr on fuel oil

Remove

			Allowable Emissions			Equivalent Emissions[1]			
Pollutant	Fuel(s)	Hours per Year	Standard(s)	lb/hour	TPY	lb/hour	TPY	Regulatory Citations	See Permit Condition(s)
SO_2	Oil, Propane	8760	1.1 lb/mmBtu			9515 (oil)	41676 (oil)	Rules 62-213.440 & 62-296.405(1)(c)1.g., F.A.C.	**A.9**
NO_x	Oil, Propane	8760	0.30 lb/mmBtu			2595 2712	11366 11879	Rules 62-296.405(1)(d)2., F.A.C.	**A.10**

Notes:

[1] The "Equivalent Emissions" listed are for informational purposes only. Equivalent emissions are for each emissions unit.

Appendix S
Permit Summary Tables

Table 2-1, Summary of Compliance Requirements

This table summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.

Emissions Unit	Brief Description
001	Fossil Fuel Steam Generator, Unit 1
002	Fossil Fuel Steam Generator, Unit 2

Pollutant or Parameter	Fuel(s)	Compliance Method	Testing Frequency	Frequency Base Date[1]	Minimum Compliance Test Duration	CMS[2]	See Permit Condition(s)
SO_2	Oil	Fuel sampling & analysis	As fired As Received			~~Yes~~	**A.9, A.15, A.23 & A.24**
NO_x	Oil, Propane	Continuous Emissions Monitor	Continuous			Yes	**A.10**
PM	Oil, Propane	Rule 62-296.405(1)(e)2	Annual	July	3 hours		**A.22, A.26 & A.27**
VE	Oil, Propane	DEP Method 9	Annual	July	1 hour	Yes	**A.20, A.21 & A.27**
On-spec. Used Oil		Record Keeping and Analysis	As fired				**A.37**

Notes:

[1] Frequency base date established for planning purposes only; see Rule 62-297.310, F.A.C.
[2] CMS = continuous monitoring system

Appendix A-1, Abbreviations, Acronyms, Citations, and Identification Numbers (continued)

Identification Numbers:

Facility Identification (ID) Number:

Example: Facility ID No.: 1050221

Where:

105 = 3-digit number code identifying the facility is located in Polk County
0221 = 4-digit number assigned by state database.

Permit Numbers:

Example: 1050221-002-AV, or
1050221-001-AC

Where:
AC = Air Construction Permit
AV = Air Operation Permit (Title V Source)
105 = 3-digit number code identifying the facility is located in Polk County
0221 = 4-digit number assigned by permit tracking database
001 or 002 = 3-digit sequential project number assigned by permit tracking database

Example: PSD-FL-185
PA95-01
AC53-208321

Where:
PSD= Prevention of Significant Deterioration Permit
PA = Power Plant Siting Act Permit
AC = old Air Construction Permit numbering

Appendix H-1, Permit History/ID Number Changes

Permit History (for tracking purposes):

E.U. ID No.	Description	Permit No.	Issue Date	Expiration Date	Extended Date[1, 2]	Revised Date(s)
001	Fossil Fuel Steam Generator, Unit 1	AO41-204804*	08/30/93	01/14/97		05/27/97
002	Fossil Fuel Steam Generator, Unit 2	AO41-219341*	08/30/93	01/14/97		05/27/97

* These permits were partially revised by Operation Permit Amendments, 0810010-002-AO.

ID Number Changes (for tracking purposes):

From: **Facility ID No.:** 40MAN410010

To: **Facility ID No.:** 0810010

Notes:
1 - AO permit(s) automatic extension(s) in Rule 62-210.300(2)(a)3.a., F.A.C., effective 03/21/96.
2 - AC permit(s) automatic extension(s) in Rule 62-213.420(1)(a)4., F.A.C., effective 03/20/96.
{Rule 62-213.420(1)(b)2., F.A.C., effective 03/20/96, allows Title V Sources to operate under existing valid permits}

Appendix A-1, Abbreviations, Acronyms, Citations, and Identification Numbers
(version dated 02/05/97)

Abbreviations and Acronyms:

°F: Degrees Fahrenheit
BACT: Best Available Control Technology
CFR: Code of Federal Regulations
DEP: State of Florida, Department of Environmental Protection
DARM: Division of Air Resource Management
EPA: United States Environmental Protection Agency
F.A.C.: Florida Administrative Code
F.S.: Florida Statute
ISO: International Standards Organization
LAT: Latitude
LONG: Longitude
MMBtu: million British thermal units
MW: Megawatt
ORIS: Office of Regulatory Information Systems
SOA: Specific Operating Agreement
UTM: Universal Transverse Mercator

Citations:

The following examples illustrate the methods used in this permit to abbreviate and cite the references of rules, regulations, guidance memorandums, permit numbers, and ID numbers.

Code of Federal Regulations:

Example: **[40 CFR 60.334]**

Where:	40	reference to	Title 40
	CFR	reference to	Code of Federal Regulations
	60	reference to	Part 60
	60.334	reference to	Regulation 60.334

Florida Administrative Code (F.A.C.) Rules:

Example: **[Rule 62-213, F.A.C.]**

Where:	62	reference to	Title 62
	62-213	reference to	Chapter 62-213
	62-213.205	reference to	Rule 62-213.205, F.A.C.

ISO: International Standards Organization refers to those conditions at 288 degrees K, 60 percent relative humidity, and 101.3 kilopascals pressure.

00093

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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of:	
Petition for Reduction in Quarterly Particulate Emissions Compliance Testing; FLORIDA POWER AND LIGHT COMPANY, Petitioner.	OGC Case Nos.: 83-0576, 83-0577, 83-0578, 83-0585, 83-0586, 83-0587, 83-0588, 83-0589, 83-0590

ORDER GRANTING PETITION FOR REDUCED FREQUENCY OF PARTICULATE TESTING

On September 16, 1983, the Petitioner, FLORIDA POWER AND LIGHT COMPANY, filed a Petition for Reduction in Quarterly Particulate Emissions Compliance Testing pursuant to Florida Administrative Code Rule 17-2.600(5)(b)1 for the following fossil fuel steam generating units:

Port Everglades Plant Unit No. 2
Port Everglades Plant Unit No. 3
Port Everglades Plant Unit No. 4
Turkey Point Plant Unit No. 1
Turkey Point Plant Unit No. 2
Riveria Plant Unit No. 3
Riveria Plant Unit No. 4
Manatee Plant Unit No. 1
Manatee Plant Unit No. 2

Each of the units has a heat input exceeding 250 million Btu per hour.

The petition and supporting documentation submitted by the Petitioner indicate that between August 1979 and July 21, 1983, these units were afforded relief from the particulate standard contained in Florida Administrative Code Rule 17-2.600(5)(b)2 under the terms of a Department-issued variance. During the same period of time the Company elected to test quarterly as permitted under Rule 17-2.600(5)(b)1. Despite the existence of the variance, the tests results submitted during the last two years reveal that each of the above-listed units met the particulate emissions limitations contained in Rule 17-2.600(5)(b)2 of 0.1 pounds per million Btu heat input.

Florida Administrative Code Rule 17-2.600(5)(b)1 specifically provides that I may reduce the frequency of particulate testing

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To Scott Sheplak | From RICH PIPER
Co. | Co.
Dept. | Phone #
Fax # | Fax #

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upon a demonstration that the particulate standard has been regularly met. The particulate standard referred to is the general standard found in the rule--0.1 parts per million Btu heat input--not a relaxed emission limit established by a variance.

The intent of Rule 17-2.600(5)(b)1 is to ensure that before the frequency of particulate testing is reduced, the source has established a record of complying with the requirements of Florida Administrative Code Chapter 17-2 relating to particulate matter emissions. Petitioner has documented that each of these units has a history of regulary complying with the particulate matter standard applicable to them.

IT IS ORDERED that the present petition is GRANTED. Under the terms of Rule 17-2.600(5)(b)1, Petitioner may reduce the frequency of particulate testing to an annual basis for each of the units named in this Order. If, however, any of the units fails to comply with the applicable particulate or visible emission standard, this Order will terminate upon written notice by the Department.

The Petitioner may request a hearing in accordance with Section 120.57, Florida Statutes, and Florida Administrative Code Chapters 17-1 and 28-5. The request for hearing must be filed (received) in the Office of General Counsel of the Department, 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32301, within (14) days of receipt of this Order. Failure to file a request for hearing within this time shall constitute a waiver of Petitioner's right to request a hearing under Section 120.57, Florida Statutes.

DONE and ORDERED this 24 day of April, 1994.

FILING AND ACKNOWLEDGEMENT

FILED, on this date, pursuant to §120.52 (9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk

Date

VICTORIA J. TSCHINKEL
Secretary

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION
2600 Blair Stone Road
Tallahassee, Florida 32301
(904)488-4805

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing Order Denying Petition for Reduced Frequency of Particulate Testing and the Order Granting Petition for Reduced Frequency of Particulate Testing have been furnished by U.S. Mail to Peter C. Cunningham, Esquire, Hopping Boyd Green and Sams, Post Office Box 6526, Tallahassee, Florida 32314 this 25th day of April, 1984.

Nancy E. Wright

NANCY E. WRIGHT
Assistant General Counsel

State of Florida Department
of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301
904/488-9730

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Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

July 9, 1997

Certified Mail - Return Receipt Requested

Mr. Rich Piper, Chair
Florida Power Coordinating Group, Inc.
405, Reo Street, Suite 100
Tampa, Florida 33609-1004

Dear Mr. Piper:

Enclosed is a copy of a Scrivener's Order correcting an error in the Order concerning particulate matter testing of natural gas fired boilers.

If you have any questions concerning the above, please call Yogesh Manocha at 904/488-6140, or write to me.

Sincerely,

M. D. Harley, P.E., DEE
P.E. Administrator
Emissions Monitoring Section
Bureau of Air Monitoring and
Mobile Sources

MDH:ym

cc: Dotty Diltz, FDEP
Pat Comer, FDEP

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

In the matter of:	)	
	)	
Florida Electric Power Coordinating Group, Inc.,	)	ASP No. 97-B-01
	)	
Petitioner.	)	

ORDER CORRECTING SCRIVENER'S ERROR

The Order which authorizes owners of natural gas fired fossil fuel steam generators to forgo particulate matter compliance testing on an annual basis and prior to renewal of an operation permit entered on the 17th day of March, 1997, is hereby corrected on page 4, paragraph number 4, by deleting the words "pursuant to Rule 62-210.300(2)(a)3.b., c., or d., F.A.C.":

4. 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 particulate matter emission compliance test results for any fossil fuel steam generator emissions unit that burned liquid and/or solid fuel for a total of no more than 400 hours during the year prior to renewal.

DONE AND ORDERED this 2 day of July, 1997 in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

HOWARD L. RHODES, Director
Division of Air Resources Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400
(904) 488-0114

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that a copy of the foregoing was mailed to Rich Piper, Chair, Florida Power Coordinating Group, Inc., 405 Reo Street, Suite 100, Tampa, Florida 33609-1004, on this 10th day of July 1997.

Clerk Stamp

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to §120.52(7), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Martha Durell Wise 7/10/97
Clerk Date

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

In the matter of:	)	
	)	
Florida Electric Power Coordinating Group, Inc.,	)	ASP No. 97-B-01
	)	
Petitioner.	)	

ORDER ON REQUEST
FOR
ALTERNATE PROCEDURES AND REQUIREMENTS

Pursuant to Rule 62-297.620, Florida Administrative Code (F.A.C.), the Florida Electric Coordinating Group, Incorporated, (FCG) petitioned for approval to: (1) Exempt fossil fuel steam generators which burn liquid and/or solid fuel for less than 400 hours during the federal fiscal year from the requirement to conduct an annual particulate matter compliance test; and, (2) Exempt fossil fuel steam generators which burn liquid and/or solid fuel for less than 400 hours during the federal fiscal year from the requirement to conduct an annual particulate matter compliance test during the year prior to renewal of an operation permit. This Order is intended to clarify particulate testing requirements for those fossil fuel steam generators which primarily burn gaseous fuels including, but not necessarily limited to natural gas.

Having considered the provisions of Rule 62-296.405(1), F.A.C., Rule 62-297.310(7), F.A.C., and all supporting documentation, the following Findings of Fact, Conclusions of Law, and Order are entered:

FINDINGS OF FACT

1. The Florida Electric Power Coordinating Group, Incorporated, petitioned the Department to exempt those fossil fuel steam generators which have a heat input of more than 250 million Btu per hour and burn solid and/or liquid fuel less than 400 hours during the year from the requirement to conduct an annual particulate matter compliance test. [Exhibit 1]

2. Rule 62-296.405(1)(a), F.A.C., applies to those fossil fuel steam generators that are not subject to the federal standards of performance for new stationary sources (NSPS) in 40 CFR 60 and which have a heat input of more than 250 million Btu per hour.

3. Rule 62-296.405(1)(a), F.A.C., limits visible emissions from affected fossil fuel steam generators to, "20 percent opacity except for either one six-minute period per hour during which

required for any six-month period in which liquid and/or solid fuel is not burned for more than 400 hours other than during startup."

11. Rule 297.310(7)(a)7., F.A.C., states, "For emissions units electing to conduct particulate matter emission compliance testing quarterly pursuant to Rule 62-296.405(2)(a), F.A.C., a compliance test shall not be required for any quarter in which liquid and/or solid fuel is not burned for more than 100 hours other than during startup." [Note: The reference should be to Rule 62-296.405(1)(a), F.A.C., rather than Rule 62-296.405(2)(a), F.A.C.]

12. The fifth edition of the U. S. Environmental Protection Agency's Compilation of Air Pollutant Emission Factors, AP-42, that emissions of filterable particulate from gas-fired fossil fuel steam generators with a heat input of more than about 10 million Btu per hour may be expected to range from 0.001 to 0.006 pound per million Btu. [Exhibit 2]

13. Rule 62-296.405(1)(b), F.A.C. and the federal standards of performance for new stationary sources in 40 CFR 60.42, Subpart D, limit particulate emissions from uncontrolled fossil fuel fired steam generators with a heat input of more than 250 million Btu to 0.1 pound per million Btu.

CONCLUSIONS OF LAW

1. The Department has jurisdiction to consider the matter pursuant to Section 403.061, Florida Statutes (F.S.), and Rule 62-297.620, F.A.C.

2. Pursuant to Rule 62-297.310(7), F.A.C., the Department may require Petitioner to conduct compliance tests that identify the nature and quantity of pollutant emissions, if, after investigation, it is believed that any applicable emission standard or condition of the applicable permits is being violated.

3. There is reason to believe that a fossil fuel steam generator which does not burn liquid and/or solid fuel (other than during startup) for a total of more than 400 hours in a federal fiscal year and complies with all other applicable limits and permit conditions is in compliance with the applicable particulate mass emission limiting standard.

ORDER

Having considered the requirements of Rule 62-296.405, F.A.C., Rule 62-297.310, F.A.C., and supporting documentation, it is hereby ordered that:

1. 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;

the Florida Statutes, or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-5.207 of the Florida Administrative Code.

A petition must contain the following information:

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department File Number, and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by each petitioner, if any;

(e) A statement of facts that the petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement identifying the rules or statutes each petitioner contends require reversal or modification of the Department's action or proposed action; and,

(g) A statement of the relief sought by each petitioner, stating precisely the action each petitioner wants the Department to take with respect to the Department's action or proposed action in the notice of intent.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this Order. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A person whose substantial interests are affected by the Department's proposed decision, may elect to pursue mediation by asking all parties to the proceeding to agree to such mediation and by filing with the Department a request for mediation and the written agreement of all such parties to mediate the dispute. The request and agreement must be filed in (received by) the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, by the same deadline as set forth above for the filing of a petition.

A request for mediation must contain the following information:

specify the deadlines that then will apply for challenging the agency action and electing remedies under those two statutes.

In addition to the above, a person subject to regulation has a right to apply for a variance from or waiver of the requirements of particular rules, on certain conditions, under section 120.542 of the Florida Statutes. The relief provided by this state statute applies only to state rules, not statutes, and not to any federal regulatory requirements. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have in relation to the action proposed in this notice of intent.

The application for a variance or waiver is made by filing a petition with the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000.

The petition must specify the following information:

(a) The name, address, and telephone number of the petitioner;

(b) The name, address, and telephone number of the attorney or qualified representative of the petitioner, if any;

(c) Each rule or portion of a rule from which a variance or waiver is requested;

(d) The citation to the statute underlying (implemented by) the rule identified in (c) above;

(e) The type of action requested;

(f) The specific facts that would justify a variance or waiver for the petitioner;

(g) The reason why the variance or waiver would serve the purposes of the underlying statute (implemented by the rule); and

(h) A statement whether the variance or waiver is permanent or temporary and, if temporary, a statement of the dates showing the duration of the variance or waiver requested.

The Department will grant a variance or waiver, when the petition demonstrates both that the application of the rule would create a substantial hardship or violate principles of fairness, as each of those terms is defined in section 120.542(2) of the Florida Statutes, and that the purpose of the underlying statute will be or has been achieved by other means by the petitioner. Persons subject to regulation pursuant to any federally delegated or approved air program should be aware that Florida is specifically not authorized to issue variances or waivers from any requirements of any such federally delegated or approved program. The requirements of the program remain fully

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that a copy of the foregoing was mailed to Rich Piper, Chair, Florida Power Coordinating Group, Inc., 405 Reo Street, Suite 100, Tampa, Florida 33609-1004, on this 18th day of March 1997.

Clerk Stamp

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to §120.52(7), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Martha O'Bryan 3-18-97
Clerk Date

ORIDA ELECTRIC POWER COORDINATING GROUP, INC. (FCG)
S REO STREET, SUITE 100 • (813) 289-5644 • FAX (813) 289-5648
MPA, FLORIDA 33609-1004

January 28, 1997

Clair H. Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
2600 Blair Stone Road, MS 5505
Tallahassee, FL 32301

RECEIVED
JAN 2 8 1997
BUREAU OF
AIR REGULATION

RE: Comments Regarding Draft Title V Permits

Dear Mr. Fancy:

The Florida Electric Power Coordinating Group, Inc. (FCG), which is made up of 36 utilities owned by investors, municipalities, and cooperatives, has been following the implementation of Title V in Florida and recently submitted comments to you on draft Title V permit conditions by letter dated December 4, 1996. As indicated in that letter, representatives from the FCG would like to meet with you and other members of your air permitting staff to discuss some significant concerns that FCG member companies have regarding conditions that may be included in Title V permits issued by your office. While we will be discussing these issues with you and your staff in greater detail at that meeting, we would like to explain some of our concerns in this letter.

Primarily, the FCG members are concerned that the Title V permits may contain conditions that are much different in important respects than those conditions currently included in existing air permits. During the rulemaking workshops and seminars conducted by the Department to discuss the rules implementing the Title V permitting program, representations were made on several occasions that industry could expect to see permit conditions that were substantively similar to existing permit conditions and that primarily the format was changing. Representations were also made to industry that Title V did not impose additional substantive requirements beyond what was already required under the Department's rules. Based on the first draft Title V permit that we have reviewed, we are concerned that there may be some attempt to change the substantive requirements on existing facilities through the Title V permitting process, and we would like to discuss this with you at the meeting we have scheduled for January 30, 1997.

1. Federal Enforceability--The FCG has long been concerned about the designation of non-federally enforceable permit terms and conditions. We are concerned about this issue because the Department's first draft Title V permits have included language stating that *all* terms and conditions would become federally enforceable once the permit is issued. This approach is consistent with the Department's guidance memorandum dated September 13, 1996 (DARM-PER/V-18), but we understand that the Department may now intend to remove all references to

Exhibit 1

excess emissions and because these rules have been approved as part of Florida's State Implementation Plan, the permit conditions are appropriate to be included in the permit. We understand that the Department intends to include as applicable requirements in Title V permit conditions the provisions of Rule 62-210.700, F.A.C. If the Department receives any further adverse comments regarding the excess emissions rule under 62-210.700, F.A.C., we would appreciate your contacting us. Because this issue is so important to us, we would like to discuss it with you in greater detail at our meeting on January 30.

4. Compliance Testing for Combustion Turbines--While the Department's November 22, 1995, guidance regarding the compliance testing requirements for combustion turbines clearly states that the use of heat input curves based on ambient temperatures and humidities is to be included as a permit condition *only* if requested by a permittee, we understand that the Department may intend to include this requirement in Title V permits for all combustion turbines. As we are sure you recall, the FCG worked over a period of several months with the Department on the development of the guidance memorandum and it was clearly understood by FCG members that the heat input curves would not be mandated but would remain voluntary for any existing combustion turbine. It was also understood by FCG members that the requirement to conduct testing at 95 to 100 percent of capacity would be required only if the permit applicant requested the use of heat input curves. We understand that the Department may be interpreting the requirement to use heat input curves and to test at 95 to 100 percent of permitted capacity to be mandatory for all combustion turbines. We would like to clarify this with you during our meeting. Also, we would like to confirm that, regardless of whether a combustion turbine uses heat input curves or tests at 95 to 100 percent of permitted capacity, it is necessary to test at four load points and correct to ISO *only* to determine compliance with the nitrogen oxides (NOx) standard under New Source Performance Standard Subpart GG under 40 CFR § 60.332 and not annually thereafter.

5. Test Methods--The FCG is concerned about the possibility of the Department requiring a full permit revision to authorize the use of an approved test method not specifically identified in a Title V permit, even though the Department may have separately approved the use of the particular test method for a unit (i.e., through a compliance test protocol). It is the FCG's position that language should be included in all Title V permits indicating that other test methods approved by the Department may be used. Further, a full permit revision (including public notice) should *not* be necessary when a test method not previously identified in the permit is approved for use by a unit. The Department's subsequent approval of test methods should simply be included in the next permit renewal cycle. The FCG understands that the Department planned to confirm this approach with the U.S. Environmental Protection Agency Region IV, and we would like to discuss this issue with you at the January 30 meeting to learn of the agency's response.

Title V implementation process, and we look forward to our meeting later this week. If you have any questions in the meantime, please call me at 561-625-7661.

Sincerely,

Rich Piper

Rich Piper, Chair
FCG Air Subcommittee

Enclosures

cc: Howard L. Rhodes, DEP
John Brown, DEP
Pat Comer, DEP OGC
Scott M. Sheplak, DEP
Edward Svec, DEP
FCG Air Subcommittee
Angela Morrison, HGSS

SS601

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AP-42
FIFTH EDITION
JANUARY 1995

COMPILATION OF AIR POLLUTANT EMISSION FACTORS

VOLUME I: STATIONARY POINT AND AREA SOURCES

Office Of Air Quality Planning And Standards
Office Of Air And Radiation
U. S. Environmental Protection Agency
Research Triangle Park, NC 27711

January 1995

Exhibit 2

recirculation is normally used in combination with low NO_x burners. When used in combination, these techniques are capable of reducing uncontrolled NO_x emissions by 60 to 90 percent.

Two post-combustion technologies that may be applied to natural gas-fired boilers to reduce NO_x emissions by further amounts are selective noncatalytic reduction and selective catalytic reduction. These systems inject ammonia (or urea) into combustion flue gases to reduce inlet NO_x emission rates by 40 to 70 percent.

Although not measured, all particulate matter (PM) from natural gas combustion has been estimated to be less than 1 micrometer in size. Particulate matter is composed of filterable and condensable fractions, based on the EPA sampling method. Filterable and condensable emission rates are of the same order of magnitude for boilers; for residential furnaces, most of the PM is in the form of condensable material.

The rates of CO and trace organic emissions from boilers and furnaces depend on the efficiency of natural gas combustion. These emissions are minimized by combustion practices that promote high combustion temperatures, long residence times at those temperatures, and turbulent mixing of fuel and combustion air. In some cases, the addition of NO_x control systems such as FGR and low NO_x burners reduces combustion efficiency (due to lower combustion temperatures), resulting in higher CO and organic emissions relative to uncontrolled boilers.

Emission factors for natural gas combustion in boilers and furnaces are presented in Tables 1.4-1, 1.4-2, and 1.4-3.[6] For the purposes of developing emission factors, natural gas combustors have been organized into four general categories: utility/large industrial boilers, small industrial boilers, commercial boilers, and residential furnaces. Boilers and furnaces within these categories share the same general design and operating characteristics and hence have similar emission characteristics when combusting natural gas. The primary factor used to demarcate the individual combustor categories is heat input.

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Table 1.4-2 (Metric And English Units). EMISSION FACTORS FOR SULFUR DIOXIDE (SO_2), NITROGEN OXIDES (NO_x), AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (Size, 10^6 Btu/hr Heat Input) (SCC)[b]	SO_2[c]			NO_x[d]			CO[e]		
	kg/10^6 m^3	lb/10^6 ft^3	RATING	kg/10^6 m^3	lb/10^6 ft^3	RATING	kg/10^6 m^3	lb/10^6 ft^3	RATING
Utility/large Industrial Boilers (>100) (1-01-006-01, 1-01-006-04)									
Uncontrolled	9.6	0.6	A	8800	550[f]	A	640	40	A
Controlled - Low NO_x burners	9.6	0.6	A	1300	81[f]	D	ND	ND	NA
Controlled - Flue gas recirculation	9.6	0.6	A	850	53[f]	D	ND	ND	NA
Small Industrial Boilers (10 - 100) (1-02-006-02)									
Uncontrolled	9.6	0.6	A	2240	140	A	560	35	A
Controlled - Low NO_x burners	9.6	0.6	A	1300	81[f]	D	980	61	D
Controlled - Flue gas recirculation	9.6	0.6	A	480	30	C	590	37	C
Commercial Boilers (0.3 - <10) (1-03-006-03)									
Uncontrolled	9.6	0.6	A	1600	100	B	330	21	C
Controlled - Low NO_x burners	9.6	0.6	A	270	17	C	425	27	C
Controlled - Flue gas recirculation	9.6	0.6	A	580	36	D	ND	ND	NA
Residential Furnaces (<0.3) (No SCC)									
Uncontrolled	9.6	0.6	A	1500	94	B	640	40	B

[a] Units are kg of pollutant/10^6 cubic meters natural gas fired and lb of pollutant/10^6 cubic feet natural gas fired. Based on an average natural gas fired higher heating value of 8270 kcal/m^3 (1000 Btu/scf). The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. ND = no data. NA = not applicable.

[b] SCC = Source Classification Code.

[c] Reference 7. Based on average sulfur content of natural gas, 4600 g/10^6 Nm^3 (2000 gr/10^6 scf).

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Table 1.4-3 (Metric And English Units). EMISSION FACTORS FOR CARBON DIOXIDE (CO_2) AND TOTAL ORGANIC COMPOUNDS (TOC) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (Size, 10^6 Btu/hr Heat Input) (SCC)[b]	CO_2[c]			TOC[d]		
	kg/10^6 m^3	lb/10^6 ft^3	RATING	kg/10^6 m^3	lb/10^6 ft^3	RATING
Utility/large industrial boilers (> 100) (1-01-006-01, 1-01-006-04)	ND[e]	ND	NA	28[f]	1.7[f]	C
Small industrial boilers (10 - 100) (1-02-006-02)	1.9 E+06	1.2 E+05	D	92[g]	5.8[g]	C
Commercial boilers (0.3 - < 10) (1-03-006-03)	1.9 E+06	1.2 E+05	C	128[h]	8.0[h]	C
Residential furnaces (No SCC)	2.0 E+06	1.3 E+05	D	180[h]	11[h]	D

[a] All factors represent uncontrolled emissions. Units are kg of pollutant/10^6 cubic meters and lb of pollutant/10^6 cubic feet. Based on an average natural gas higher heating value of 8270 kcal/m^3 (1000 Btu/scf). The emission factors in this table may be converted to other natural gas heating values by multiplying the given factor by the ratio of the specified heating value to this average heating value. NA = not applicable.

[b] SCC = Source Classification Code.

[c] References 10,22-23.

[d] References 9-10,18.

[e] ND = no data.

[f] Reference 8:. methane comprises 17% of organic compounds.

[g] Reference 8: methane comprises 52% of organic compounds.

[h] Reference 8: methane comprises 34% of organic compounds.

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9. J. L. Muhlbaier, "Particulate and Gaseous Emissions From Natural Gas Furnaces and Water Heaters", *Journal of the Air Pollution Control Association*, December 1981.

10. *Field Investigation of Emissions From Combustion Equipment for Space Heating*, EPA-R2-73-084a, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1973.

11. N. F. Suprenant, *et al.*, *Emissions Assessment of Conventional Stationary Combustion Systems, Volume I: Gas and Oil Fired Residential Heating Sources*, EPA-600/7-79-029b, U. S. Environmental Protection Agency, Washington, DC, May 1979.

12. C. C. Shih, *et al.*, *Emissions Assessment of Conventional Stationary Combustion Systems, Volume III: External Combustion Sources for Electricity Generation*, EPA Contract No. 68-02-2197, TRW, Inc., Redondo Beach, CA, November 1980.

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14. N. F. Suprenant, *et al.*, *Emissions Assessment of Conventional Stationary Combustion Systems, Volume V: Industrial Combustion Sources*, EPA Contract No. 68-02-2197, GCA Corporation, Bedford, MA, October 1980.

15. *Emission Test on 200 HP Boiler at Kaiser Hospital in Woodland Hills*, Energy Systems Associates, Tustin, CA, June 1986.

16. *Results From Performance Tests: California Milk Producers Boiler No. 5*, Energy Systems Associates, Tustin, CA, November 1984.

17. *Source Test For Measurement of Nitrogen Oxides and Carbon Monoxide Emissions From Boiler Exhaust at GAF Building Materials*, Pacific Environmental Services, Inc., Baldwin Park, CA, May 1991.

18. J. P. Kesselring and W. V. Krill, "A Low-NO_x Burner For Gas-Fired Firetube Boilers", *Proceedings: 1985 Symposium on Stationary Combustion NO_x Control*, Volume 2, EPRI CS-4360, Electric Power Research Institute, Palo Alto, CA, January 1986.

19. *NO_x Emission Control Technology Update*, EPA Contract No. 68-01-6558, Radian Corporation, Research Triangle Park, NC, January 1984.

20. *Background Information Document For Small Steam Generating Units*, EPA-450/3-87-000, U. S. Environmental Protection Agency, Research Triangle Park, NC, 1987.

21. *Evaluation of the Pollutant Emissions From Gas-Fired Forced Air Furnaces: Research Report No. 1505*, American Gas Association Laboratories, Cleveland, OH, May 1975.

22. *Thirty-day Field Tests of Industrial Boilers: Site 5 - Gas-fired Low-NO_x Burner*, EPA-600/7-81-095a, U. S. Environmental Protection Agency, Research Triangle Park, NC, May 1981.

23. Private communication from Kim Black (Industrial Combustion) to Ralph Harris (MRI), Independent Third Party Source Tests, February 7, 1992.

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Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Mr. J. M. Parent
Plant General Manager
Florida Power & Light Company
11770 U.S. Highway One
North Palm Beach, FL 33408

ORDER EXTENDING PERMIT EXPIRATION DATE
Manatee Plant, **Facility ID No.:** 0810010

Section 403.0872(2)(b), Florida Statutes (F.S.), specifies that any facility which submits to the Department of Environmental Protection (Department) a timely and complete application for a Title V permit "is entitled to operate in compliance with its existing air permit pending the conclusion of proceedings associated with its application."

Section 403.0872(6), F.S., provides that a proposed Title V permit which is not objected to by the United States Environmental Protection Agency (EPA) "must become final no later than fifty-five (55) days after the date on which the proposed permit was mailed" to the EPA.

Pursuant to the Federal Acid Rain Program as defined in rule 62-210.200, Florida Administrative Code (F.A.C.), all Acid Rain permitting must become effective on January 1 of a given year.

This facility which will be permitted pursuant to section 403.0872, F.S., (Title V permit) will be required to have a permit effective date subsequent to the final processing date of the facility's Title V permit.

To prevent misunderstanding and to assure that the above identified facility continues to comply with existing permit terms and conditions until its Title V permit becomes effective, it is necessary to extend the expiration date(s) of its existing valid permit(s) until the effective date of its Title V permit. Therefore, under the authority granted to the Department by section 403.061(8), F.S., **IT IS ORDERED:**

1. The expiration date(s) of the existing valid permit(s) under which the above identified facility is currently operating is (are) hereby extended until the effective date of its permit issued pursuant to section 403.0872, F.S., (Title V permit);
2. The facility shall comply with all terms and conditions of its existing valid permit(s) until the effective date of its Title V permit;
3. The facility will continue to comply with the requirements of Chapter 62-214, F.A.C., and the Federal Acid Rain Program, as defined in rule 62-210.200, F.A.C., pending final issuance of its Title V permit.

PETITION FOR ADMINISTRATIVE REVIEW

The Department will take the action described in this Order unless a timely petition for an administrative hearing is filed pursuant to sections 120.569 and 120.57 of the Florida Statutes (F.S.). Mediation under Section 120.573, F.S., will not be available for this proposed action.

A person whose substantial interests are affected by the Department's proposed decision may petition for an administrative hearing in accordance with sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. Petitions must be filed within 21 days of receipt of this Order. A petitioner must mail a copy of the petition to the applicant at the address indicated above, at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 of the Florida

Statutes, or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with rule 28-5.207 of the Florida Administrative Code.

A petition must contain the following information:

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department File Number, and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by the petitioner, if any;

(e) A statement of the facts that the petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement identifying the rules or statutes that the petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take with respect to the action or proposed action addressed in this notice of intent.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this Order. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

In addition to the above, a person subject to regulation has a right to apply for a variance from or waiver of the requirements of particular rules, on certain conditions, under section 120.542 of the Florida Statutes. The relief provided by this state statute applies only to state rules, not statutes, and not to any federal regulatory requirements. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have in relation to the action proposed in this notice of intent.

The application for a variance or waiver is made by filing a petition with the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. The petition must specify the following information:

(a) The name, address, and telephone number of the petitioner;

(b) The name, address, and telephone number of the attorney or qualified representative of the petitioner, if any;

(c) Each rule or portion of a rule from which a variance or waiver is requested;

(d) The citation to the statute underlying (implemented by) the rule identified in (c) above;

(e) The type of action requested;

(f) The specific facts that would justify a variance or waiver for the petitioner;

(g) The reason why the variance or waiver would serve the purposes of the underlying statute (implemented by the rule); and

(h) A statement whether the variance or waiver is permanent or temporary and, if temporary, a statement of the dates showing the duration of the variance or waiver requested.

The Department will grant a variance or waiver when the petition demonstrates both that the application of the rule would create a substantial hardship or violate principles of fairness, as each of those terms is defined in section 120.542(2) of the Florida Statutes, and that the purpose of the underlying statute will be or has been achieved by other means by the petitioner.

Persons subject to regulation pursuant to any federally delegated or approved air program should be aware that Florida is specifically not authorized to issue variances or waivers from any requirements of any such federally delegated or approved program. The requirements of the program remain fully enforceable by the Administrator of EPA and by any person under the Clean Air Act unless and until the Administrator separately approves any variance or waiver in accordance with the procedures of the federal program.

This Order constitutes final agency action unless a petition is filed in accordance with the above paragraphs.

RIGHT TO APPEAL

Any party to this Order has the right to seek judicial review of the Order 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 Department in the Office of General Counsel, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000; 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 days from the date the Notice of Agency Action is filed with the Clerk of the Department.

DONE AND ORDERED this 28th day of May 1998 in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Howard L Rhodes

HOWARD L. RHODES, Director
Division of Air Resources Management
Twin Towers Office Building
Mail Station 5500
2600 Blair Stone Road
Tallahassee, Florida 32399-2400
850/488-0114

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this order and all copies were sent by certified mail before the close of business on 5/29/98 to the person(s) listed:

Mr. J. M. Parent

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. Boutwell 5/29/98
(Clerk) (Date)

Copy by Regular Mail To:

Mr. Bill Thomas, P.E., DEP Southwest District, Air Section

APPENDIX 10.4.2

INDUSTRIAL WASTEWATER PERMIT

PERMIT NUMBER: FL0032174
FACILITY NAME: FLORIDA POWER & LIGHT CO. - MANATEE PLANT

SWD-IW-41-FL0032174-FLORIDA PO-R
Mr. RANDALL R. LABAUVE, DIRECTOR OF ENVIRONMENTAL SERVICES
FLORIDA POWER & LIGHT COMPANY
POST OFFICE BOX 025576
MIAMI FL 33102

NOTICE OF MINOR PERMIT REVISION

In accordance with rules 62-4.080(1), and 62-620.325(2), Florida Administrative Code (F.A.C.), your current Department wastewater permit is hereby revised to clarify the procedures for reporting unauthorized discharges under rules 62-620.610(20) and 62-621.250(14), F.A.C., as applicable. This minor permit revision is not applicable to facilities subject only to the general conditions for general permits issued pursuant to rules 62-660.801, 62-660.802, 62-660.803, 62-660.804, 62-660.805, 62-660.820, and 62-660.821, F.A.C.

These procedures are being provided for your wastewater facility as part of an effort to enhance communications and coordination in response to spills or releases that may endanger health or the environment. To this end, we are revising your wastewater permit to include instructions for reporting certain spills or unauthorized discharges to the State Warning Point Toll Free Number. ***The clarifying instructions are contained in paragraph b. of the enclosed permit revision.***

The enclosed revision shall be attached to your existing Wastewater Permit. To the extent that this revision may conflict with any provision of your existing permit, these revised requirements shall govern. All other conditions of your existing wastewater permit shall remain in effect. The issuance of this permit modification does not authorize any infringement of federal, state, or local laws or regulations which may specify other requirements for reporting incidents as herein described.

If you have any questions about this permit revision, please contact your local DEP regulatory district office.

The Department's proposed agency action shall become final unless a timely petition for an administrative hearing is filed under sections 120.569 and 120.57 of the Florida Statutes before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed agency action may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received by the clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000.

Petitions filed by the permittee or any of the parties listed below must be filed within fourteen days of receipt of this written notice. Petitions filed by any persons other than those entitled to written notice under section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the notice or within fourteen days of receipt of the written notice, whichever occurs first.

Under section 120.60(3) of the Florida Statutes, however, any person who has asked the Department for notice of agency action may file a petition within fourteen days of receipt of such notice, regardless of the date of publication.

The petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition or request for mediation within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 of the Florida Statutes. Any subsequent intervention (in a proceeding initiated by another party) will only be at the discretion of the presiding officer upon the filing of a motion in compliance with rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information:

(a) The name, address, and telephone number of each petitioner; the name, address, and telephone number of the petitioner's representative, if any; the Department case or identification number and the county in which the subject matter or activity is located;
(b) A statement of when and how each petitioner received notice of the Department action;
(c) A statement of how each petitioner's substantial interests are affected by the Department action;
(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
(e) A statement of facts that the petitioner contends warrant reversal or modification of the Department action;
(f) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and
(g) Demand for relief (sought by the petitioner, stating precisely the action that the petitioner wants the Department to take).

A petition that does not dispute the material facts on which the Department's action is based shall state that no such facts are in dispute and otherwise contain the same information as set forth above, as required by rule 28-106.301.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department on the petitions have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation is not available for this proceeding.

This action is final and effective on the date filed with the Clerk of the Department unless a petition is filed in accordance with the above. Upon the timely filing of a petition this order will not become effective until further order from the Department.

A party to this order has the right to seek judicial review of it under section 120.68 of the Florida Statutes, by filing a notice of appeal under rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, 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 thirty days from the date when the final order is filed with the clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Mimi Drew

Mimi Drew, Director
Division Water Resource Management

FILING AND ACKNOWLEDGEMENT FILED, on this date, pursuant to §120.52 Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Charles Bright
Clerk

3/21/01
Date

Minor Permit Revision for Reporting Noncompliance

The permittee shall report to the Department any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain: a description of the noncompliance and its cause; the period of noncompliance including exact dates and time, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

a. The following shall be included as information which must be reported within 24 hours under this condition:

   1. Any unanticipated bypass which causes any reclaimed water or effluent to exceed any permit limitation or results in an unpermitted discharge,

   2. Any upset which causes any reclaimed water or the effluent to exceed any limitation in the permit,

   3. Violation of a maximum daily discharge limitation for any of the pollutants specifically listed in the permit for such notice, and

   4. Any unauthorized discharge to surface or ground waters, not otherwise reported in accordance with b. below.

b. **The permittee shall report all unauthorized releases or spills of untreated or treated wastewater in excess of 1,000 gallons per incident, or where public health or the environment may be endangered, to the STATE WARNING POINT TOLL FREE NUMBER (800) 320-0519, as soon as practical, but no later than 24 hours from the time the permittee becomes aware of the discharge. The permittee, to the extent known, shall provide the following information to the State Warning Point:**

   1. **Name, address, and telephone number of person reporting.**

   2. **Name, address, and telephone number of permittee or responsible person for the discharge.**

   3. **Date and time of the discharge and status of discharge (ongoing or ceased).**

   4. **Characteristics of the wastewater spilled or released (untreated or treated, industrial or domestic wastewater).**

   5. **Estimated amount of the discharge.**

   6. **Location or address of the discharge.**

   7. **Source and cause of the discharge.**

   8. **Whether the discharge was contained on-site, and cleanup actions taken to date.**

   9. **Description of area affected by the discharge, including name of water body affected, if any.**

   10. **Other persons or agencies contacted.**

c. If the oral report has been received within 24 hours, the noncompliance has been corrected, and the noncompliance did not endanger health or the environment, the Department shall waive the written report.

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Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

NOTICE OF PERMIT

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

In the Matter of an
Application for Permit by:

Florida Power & Light Company
19050 SR 62
Parrish, Florida 34219

DEP File No. FL0032174-001-IW1S
Manatee Plant

Attention: Plant General Manager

Enclosed is Permit Number FL0032174 to Florida Power & Light Company, Post Office Box 14000, Juno Beach, Florida 33408 for continued operation of Units 1 and 2 of the Manatee Plant, issued under Section 403.0885, Florida Statutes and DEP Rule 62-620, Florida Administrative Code.

Any party to this permit has the right to seek judicial review of the permit under section 120.68 of the Florida Statutes, by the filing of a Notice of Appeal under rule 9.110 of the Florida Rules of Appellate Procedure, with the Clerk of the Department of Environmental Protection, Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000 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 thirty days after this notice is filed with the Clerk of the Department.

Executed in Talllahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Mimi Drew
Director
Division of Water Resource Management

2600 Blair Stone Road
Tallahassee, FL 32399-2400
(850) 487-1855

"More Protection, Less Process"

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT and all copies were mailed before the close of business on July 21, 2000 to the listed persons.

[Clerk Stamp]

FILING AND ACKNOWLEDGMENT

FILED, on this date, under section 120.52(7), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

S. Shields July 21, 2000
(Clerk) (Date)

Copies furnished to:

Chairman, Manatee County Board of County Commissioners (w/o attachment)
Betsy Hewitt - DEP Tallahassee (w/o attachment)
Douglas Mundrick - EPA
Henry Dominick - DEP Tampa

Department of
Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

STATE OF FLORIDA
INDUSTRIAL WASTEWATER FACILITY PERMIT

PERMITTEE:

Florida Power & Light Company
Manatee Plant
19050 SR 62
Parrish, Florida 34219

Attention: Plant General Manager

PERMIT NUMBER: FL0032174 - Major
ISSUANCE DATE: July 21, 2000
EXPIRATION DATE: July 20, 2005

FACILITY:

Manatee Plant
19050 SR 62
Manatee County
Parrish, Florida 34219

Latitude: 27° 36' 29" Longitude: 82° 20' 46"

This permit is issued under the provisions of Chapter 403, Florida Statutes, and applicable rules of the Florida Administrative Code and constitutes authorization to discharge to waters of the state under the National Pollutant Discharge Elimination System. The above named permittee is hereby authorized to operate the facilities shown on the application and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

OPERATION: The facility consists of two 859 Megawatt oil-fired electrical generating units which are cooled by recirculating water from a 4,400-acre fresh water cooling pond. The cooling pond has been constructed with a concrete spillway (to a drainage canal) which is opened for periodic gate testing and for lowering the cooling pond water level if the design water level is exceeded or for emergency discharge. The discharge from the spillway enters a stilling basin at the bottom of the spillway and then discharges over Weir 10 to the Little Manatee River via the drainage canal. Seepage along the outside of the cooling pond enters a seepage return system that has been designed to return all pond seepage back to the cooling pond. Under normal operating conditions cooling pond seepage that enters sumps along the outside of the cooling pond is returned to the cooling pond.

TREATMENT FACILITIES: Low volume wastewater including water treatment system wastewater and boiler blowdown are discharged to the neutralization basin for neutralization and settling prior to discharge to the cooling pond. Equipment area runoff for the first inch of rainfall and runoff from diked areas related to fuel oil storage and transfer are routed through oil/water separators prior to discharge to the cooling pond. Metal cleaning wastewater including boiler chemical rinses and fire side wash, stack wash, and various other equipment washes are discharged to the precipitation basins for chemical precipitation and settling prior to discharge to the cooling pond.

Operation and treatment of domestic wastewater consists of the following:

Operation of an existing 0.005 mgd 3 month average daily flow Type III extended aeration domestic wastewater treatment plant (WWTP) consisting of the following units: a headworks consisting of a below grade structure with a single aerated basin of approximately 2,200 gallons capacity, which functions as a pre-aeration basin, flow equalization basin and master lift station combined; a comminutor; a single aeration basin of 6,700 gallons volume; a single clarifier

of 1,200 gallons capacity and a surface area of 25 ft^2; a weir box where the flow measurement system is located; a single cell manually backwashable dual media (sand and anthracite) filter of 10 ft^2 surface area; a single 1,040 gallon chlorine contact chamber, using liquid chlorination; a single effluent pumping station; and a single aerobic digester basin of 870 gallons capacity. Effluent from the plant is pressure dosed to the disposal systems described below. Residuals from the plant are disposed of by transport to a permitted Residuals Management Facility.

EFFLUENT DISPOSAL:

Surface Water Disposal:

This permit authorizes the discharge from Outfall D-001- Cooling Pond Discharge; Outfall D-003 - Intake Screen Washwater; Outfall 1-004 - Recovered Service Water Sump (includes low volume wastewater, metal cleaning wastewater, and stormwater runoff from equipment and fuel oil storage/transfer areas); Outfall I-005 - Metal Cleaning Wastewater; and Outfall D-02G -Uncontaminated Storm Water. Outfalls D-001 and D-003 discharge to the Little Manatee River, a Class III fresh water. Outfall D-02G discharges to Gamble Creek.

Outfall D-001 - Latitude: 27° 38' 08", Longitude: 82° 19' 46"
Outfall D-02G - Latitude: 27° 36' 00", Longitude: 82° 49' 30"
Outfall D-003 - Latitude: 27° 38' 19", Longitude: 82° 19' 39"

Discharge of Treated Domestic Wastewater:

Land Application: R001 - An existing 0.005 mgd annual average daily flow permitted capacity land application system consisting of a single cell absorption bed with a wetted area of approximately 6,100 ft^2. This system is used as an alternative discharge system to R002, and when in use, is dosed at an application rate of approximately 1.31 inches per day. Land application system R001 is located at the domestic WWTP site.

Industrial Reuse: R002 - An existing 0.005 mgd annual average daily flow permitted capacity industrial reuse system consisting of a 4,400 acre power plant cooling pond containing in excess of 14.0 billion gallons of cooling water. This is an industrial usage allowed under Rule 62-610.650, F.A.C. in which the effluent is used to augment industrial process waters. Reuse system R002 is located approximately at latitude 27° 36' 28" N, longitude 82° 20' 33".

IN ACCORDANCE WITH: The limitations, monitoring requirements and other conditions set forth in Part I through Part VIII on page 2 through 25 of this permit.

PERMITTEE:
Florida Power & Light Company
Manatee Plant
19050 SR 62
Parrish, Florida 34219

PERMIT NUMBER: FL0032174 Major
ISSUANCE DATE: July 21, 2000
EXPIRATION DATE: July 20, 2005

I. Effluent Limitations and Monitoring Requirements

A. Surface Water Discharges

1. During the period beginning on the issuance date of this permit and lasting through the expiration date, the permittee is authorized to discharge from **Outfall D-001 - Cooling Pond Discharge,** to the Little Manatee River.

   a. Such discharges shall be limited and monitored by the permittee as specified below[1]:

	DISCHARGE LIMITATIONS	MONITORING REQUIREMENTS		
EFFLUENT CHARACTERISTIC	Daily Maximum	Measurement Frequency	Sample Type	Sample Point
Flow, MGD	Report	1/week[2]	Calculation	EFF-1
Temperature, °F	92.0	1/week[2]	Grab	EFF-1
Total Residual Chlorine, mg/l	0.01	1/week[2]	Grab	EFF-1
pH, standard units	See Item d. below	1/week[2]	Grab	EFF-1
Dissolved Oxygen, mg/l	Report	1/week[2]	Grab	EFF-1
Specific Conductance, µmhos/cm	Report	1/week[2]	Grab	EFF-1
Total Recoverable Iron, mg/l	Report	1/week[2]	Grab	EFF-1
Total Recoverable Copper, µg/l	Report	1/week[2]	Grab	EFF-1
Total Recoverable Zinc, µg/l	Report	1/week[2]	Grab	EFF-1
Hardness, mg/l as $CaCO_3$	Report	1/week[2]	Grab	EFF-1
Alkalinity, mg/l as $CaCO_3$	Report	1/week[2]	Grab	EFF-1

   b. The location of sampling points as specified above are as follows:

Sample Point	Description of Monitoring Location
EFF-1	Mouth of the cooling pond discharge spillway.

   c. There shall be no discharge of floating debris, scum, oil, or other matter in such amounts as to form nuisances or produce color, odor, taste, turbidity, or other conditions to such degree as to create a nuisance or otherwise interfere with the beneficial use of the receiving waters in accordance with FAC 62-302.500(1)(a) and 62-302.530(500)(b). Any such discharges to waters of the State shall be reported to the Department when submitting DMR's.

   d. The pH shall not be less that 6.0 standard units nor greater than 8.5 standard units.

   e. Discharge from this outfall is permitted in cases caused by extreme or cumulative rainfall in excess of the 10-year, 24-hour hydrologic event. Discharge from this outfall is permitted where unavoidable to prevent loss of life, severe property damage or damage to the physical integrity of the cooling pond or its structures. In addition, discharge from this outfall is permitted twice each year to test the spillway gates as specified in Item f. below.

[1] The monitoring requirements in I.A.1.a above are applicable only to discharges caused by extreme or cumulative rainfall events as defined in Condition I.A.1.e. and not to discharges resulting from bi-annual gate testing (see Condition I.A.1.f).

[2] Samples shall be taken during the first day of the discharge and once per week thereafter.

f. Prior to, but not more than two weeks before releasing cooling pond water during a spillway gate test, the cooling pond shall be sampled near the spillway at mid-depth for the parameters specified in I.A.1.a above. If the results of these analysis indicate that during the spillway gate test any of these parameters would exceed limitations specified in I.A.1.a above or the applicable water quality standard for that particular parameter (at the hardness of the effluent), the stilling basin (located at the bottom of the spillway) shall be tested and a volumetric dilution calculation performed to ensure that those parameters will not exceed water quality standards in the combined effluent as it is released from the stilling basin via Weir 10. The results of the cooling pond sampling and stilling basin sampling, if applicable, shall be submitted to the Department's Southwest District Office. Dilution calculations, if applicable, shall also be submitted along with sampling results. Every effort shall be made by the facility to release the minimum amount of water necessary to perform the spillway gate testing.

g. In the event of a discharge, other than semi-annual gate testing, a written report including the reason for discharging, duration, and volume shall be submitted to the Department and the Manatee County Public Health Unit.

2. During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from **Outfall D-003, Intake Screen Wash Water** to the Little Manatee River.

a. Such discharge is authorized without monitoring requirements, except there shall be no discharge of floating debris, scum, oil, or other matter in such amounts as to form nuisances or produce color, odor, taste, turbidity, or other conditions to such degree as to create a nuisance or otherwise interfere with the beneficial use of the receiving waters in accordance with FAC 62-302.500(1)(a) and 62-302.530(500)(b). Any such discharges to waters of the State shall be reported to the Department when submitting DMR's.

3. During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from **Outfall D-002G -Uncontaminated Storm Water** to Gamble Creek.

a. Such discharges shall be limited and monitored by the permittee as specified below:

	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
EFFLUENT CHARACTERISTIC	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Point
Oil & Grease, mg/l	NA	5.0	Annually	Grab	EFF-2

b. The location of sampling points as specified above are as follows:

Sample Point	Description of Monitoring Location
EFF-2	At the nearest accessible point after discharge but prior to mixing with the tributary to Gamble Creek.

4. During the period beginning on the issuance date of this permit and lasting through the expiration date, the permittee is authorized to discharge from **Outfall 1-004 - Recovered Service Water Basin** (includes low volume wastewater, metal cleaning wastewater, and stormwater runoff from equipment and fuel oil storage/transfer areas) to the cooling pond.

a. Such discharges shall be limited and monitored by the permittee as specified below:

	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
EFFLUENT CHARACTERISTIC	Maximum Monthly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Point
Flow, MGD	Report	Report	1/month	Calculated	EFF-3
Oil & Grease, mg/l	15.0	20.0	1/6 months	Grab	EFF-3
Total Suspended Solids, mg/l	30.0	100.0	1/6 months	8-hour Composite	EFF-3
Specific Conductance, µmhos/cm	Report	Report	1/month	Grab	EFF-3
Total Recoverable Iron, mg/l	Report	Report	1/quarter	Grab	EFF-3
Total Recoverable Copper, µg/l	Report	Report	1/quarter	Grab	EFF-3
pH, standard units	See Item c. below		1/week	Grab	EFF-3
Total Recoverable Zinc, µg/l	Report	Report	1/quarter	Grab	EFF-3
Total Recoverable Arsenic, µg/l	NA	Report	1/quarter	Composite[3]	EFF-3
Total Recoverable Barium, µg/l	NA	Report	1/quarter	Composite[3]	EFF-3
Total Recoverable Cadmium, µg/l	NA	Report	1/quarter	Composite[3]	EFF-3
Total Recoverable Chromium, µg/l	NA	Report	1/quarter	Composite[3]	EFF-3
Total Recoverable Lead, µg/l	NA	Report	1/quarter	Composite[3]	EFF-3
Total Recoverable Mercury, µg/l	NA	Report	1/quarter	Composite[3]	EFF-3
Total Recoverable Selenium, µg/l	NA	Report	1/quarter	Composite[3]	EFF-3
Total Recoverable Silver, µg/l	NA	Report	1/quarter	Composite[3]	EFF-3

b. The dischage of hydrazine in boiler blowdown and in plant lay-up water via Outfall 1-004 is authorized without limitations or monitoring requirements.

Sample Point	Description of Monitoring Location
EFF-3	At the point of discharge from the recovered service water basin to the cooling pond.

c. The pH shall not be less that 6.0 standard units nor greater than 9.0 standard units.

[3] 5-day composite, i.e. daily sample collection for five days and composited on a flow weighted basis.

5. During the period beginning on the issuance date of this permit and lasting through the expiration date, the permittee is authorized to discharge from **Outfall I-005 - Metal Cleaning Wastewater**, to the recovered service water basin.

   a. Such discharges shall be limited and monitored by the permittee as specified below:

	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
EFFLUENT CHARACTERISTIC	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Point
Flow, MGD	Report	Report	1/week[4]	Calculated[5]	EFF-4
Total Recoverable Copper, Total, mg/l	NA	1.0	1/week[4]	Grab	EFF-4
Total Recoverable Iron, Total , mg/l	NA	1.0	1/week[4]	Grab	EFF-4

   b. The location of sampling points as specified above are as follows:

Sample Point	Description of Monitoring Location
EFF-4	At the mid-depth of the precipitation basin.

   c. Metal cleaning wastes shall mean any wastewater resulting from cleaning (with or without chemical cleaning compounds) any metal process equipment, including, but not limited to, cleaning of boiler tubes, boiler fireside cleaning, air preheater cleaning, stack cleaning, and preoperational chemical cleaning and rinse waters of any process equipment where chemical cleaning agents are used (does not include preoperational water wash cleaning wastes). Waste treated and discharged via this outfall shall not include any stream which does not meet this definition.

B. Underground Injection Control Systems

This section is not applicable to this facility.

[4] During discharge.

[5] The flow rate shall be calculated based on the volume of metal cleaning wastewater discharged during a single day.

C. Reuse and Land Application Systems

1. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to land apply reclaimed water from the domestic WWTP to Land Application System **R001**. Such reclaimed water shall be limited and monitored by the permittee as specified below:

			Reclaimed Water Limitations				Monitoring Requirements			
Parameter	Units	Max./Min.	Annual Average	Monthly Average	Weekly Average	Single Sample	Monitoring Frequency	Sample Type	Sample Point	Notes
Flow (R001)	mgd	Maximum	0.005	-	-	-	Daily, 5/wk	Calculated Rolling Annual Avg.	EFF-5	See Condition I.C.5
Carbonaceous Biochemical Oxygen Demand (5 day)	mg/L	Maximum	20.0	30.0	45.0	60.0	Monthly	Grab	EFF-6	-
Total Suspended Solids	mg/L	Maximum	-	-	-	10.0	Monthly	Grab	EFF-6	-
Fecal Coliform Bacteria	See Permit Condition I.C.6.						Monthly	Grab	EFF-6	-
pH	std. units	Range	-	-	-	6.0-8.5	Daily, 5/wk	Grab	EFF-6	-
Total Residual Chlorine (For Disinfection)	mg/L	Minimum	-	-	-	0.5	Daily, 5/wk	Grab	EFF-6	See Condition I.C.7.
Nitrate	mg/L	Minimum	-	-	-	12.0	Monthly	Grab	EFF-6	-

PERMITTEE:
Florida Power & Light Company
Manatee Plant
19050 SR 62
Parrish, Florida 34219

PERMIT NUMBER: 0032174 Major
ISSUANCE DATE: July 21, 2000
EXPIRATION DATE: July 20, 2005

2. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to discharge reclaimed water from the Domestic WWTP to Industrial Reuse System **R002.** Such reclaimed water shall be limited and monitored by the permittee as specified below:

			Reclaimed Water Limitations				Monitoring Requirements			
Parameter	Units	Max./Min.	Annual Average	Monthly Average	Weekly Average	Single Sample	Monitoring Frequency	Sample Type	Sample Point	Notes
Flow (R002)	mgd	Maximum	0.005	-	-	-	Daily, 5/wk	Calculated Rolling Annual Avg.	EFF-5	See Condition I.C.5
Carbonaceous Biochemical Oxygen Demand (5 day)	mg/L	Maximum	20.0	30.0	45.0	60.0	Monthly	Grab	EFF-6	-
Total Suspended Solids	mg/L	Maximum	20.0	30.0	45.0	60.0	Monthly	Grab	EFF-6	-
Fecal Coliform Bacteria	See Permit Condition I.C.6.						Monthly	Grab	EFF-6	-
pH	std. units	Range	-	-	-	6.0-8.5	Daily, 5/week	Grab	EFF-6	-
Total Residual Chlorine (For Disinfection)	mg/L	Minimum	-	-	-	0.5	Daily, 5/week	Grab	EFF-6	See Condition I.C.7.

3. During the period beginning on the issuance date and lasting through the expiration date of this permit, the domestic WWTP shall be limited and monitored by the permittee as specified below:

			Limitations				Monitoring Requirements			
Parameter	Units	Max/Min	Annual Average	Monthly Average	Weekly Average	Single Sample	Monitoring Frequency	Sample Type	Sample Point	Notes
Flow (Total Plant)	mgd	Maximum	-	0.005 3 Month Avg	-	-	Daily, 5/week	Calculated Rolling 3 Mo Avg	EFF-5	See Cond. I.C.5
Carbonaceous Biochemical Oxygen Demand (5 day)	mg/L	Report	-	-	-	Report	Annually	Grab	INF-1	See Cond. I.C.8
Total Suspended Solids	mg/L	Report	-	-	-	Report	Annually	Grab	INF-1	See Cond. I.C.8

4. The location of sampling points as specified in C.1 , C.2 and C.3 above are as follows:

Sample Point	Description of Monitoring Location
EFF-5	Flow measurement point at outlet from clarifier (weir box).
EFF-6	Final effluent, after disinfection at outlet from Chlorine Contact Chamber, and prior to discharge to R001 or R002.
INF-1	At or prior to inlet to aeration basin, prior to treatment and ahead of any return flows.

5. V-notch weir and ultrasonic meter shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17)and .500(6), 12-24-96]*

6. The arithmetic mean of the monthly fecal coliform values collected during an annual period shall not exceed 200 per 100 mL of sample. The geometric mean of the fecal coliform values for a minimum of 10 samples, each collected on a separate day during a period of 30 consecutive days (monthly), shall not exceed 200 per 100 mL of sample. No more than 10 percent of the samples collected (the 90th percentile value) during a period of 30 consecutive days shall exceed 400 fecal coliform values per 100 mL of sample. Any one sample shall not exceed 800 fecal coliform values per 100 mL of sample. Note: To report the 90th percentile value, list the fecal coliform values obtained during the month in ascending order. Report the value of the sample that corresponds to the 90th percentile (multiply the number of samples by 0.9). For example, for 30 samples, report the corresponding fecal coliform number for the 27th value of ascending order. *[62-600.440(4)(c), 12-24-96]*

7. A minimum of 0.5 mg/L total residual chlorine must be maintained for a minimum contact time of 15 minutes based on peak hourly flow. *[62-600.440(4)(b), 12-24-96]*

8. Influent samples shall be collected so that they do not contain digester supernatant or return activated sludge, or any other plant process recycled waters. *[62-601.500(4), 12-24-96]*

D. Other Methods of Disposal or Recycling

There shall be no discharge of industrial wastewater from this facility to ground or surface waters, except as authorized by this permit.

E. Other Limitations and Monitoring and Reporting Requirements

1. The sample collection, analytical test methods and method detection limits (MDLs) applicable to this permit shall be in accordance with Rule 62-4.246, Chapters 62-160 and 62-601, F.A.C., and 40 CFR 136, as appropriate. The list of Department established analytical methods, and corresponding MDLs (method detection limits) and PQLs (practical quantification limits), which is titled "Florida Department of Environmental Protection Table as Required By Rule 62-4.246(4) Testing Methods for Discharges to Surface Water" dated June 21, 1996, is available from the Department on request. The MDLs and PQLs as described in this list shall constitute the minimum acceptable MDL/PQL values and the Department shall not accept results for which the laboratory's MDLs or PQLs are greater than those described above unless alternate MDLs and/or PQLs have been specifically approved by the Department for this permit. Any method included in the list may be used for reporting as long as it meets the following requirements:

   a) The laboratory's reported MDL and PQL values for the particular method must be equal or less than the corresponding method values specified in the Department's approved MDL and PQL list;

   b) The laboratory reported PQL for the specific parameter is less than or equal to the permit limit or the applicable water quality criteria, if any, stated in Chapter 62-302, F.A.C. Parameters that are listed as "report only" in the permit shall use methods that provide a PQL, which is equal to or less than the applicable water quality criteria stated in 62-302 FAC; and

   c) If the PQLs for all methods available in the approved list are above the stated permit limit or applicable water quality criteria for that parameter, then the method with the lowest stated PQL shall be used.

   Where the analytical results are below method detection or practical quantification limits, the permittee shall report the actual laboratory MDL and/or PQL values for the analyses that were performed following the instructions on the applicable discharge monitoring report. Approval of alternate laboratory MDLs or PQLs are not necessary if the laboratory reported MDLs and PQLs are less than or equal to the permit limit or the applicable water quality criteria, if any, stated in Chapter 62-302, F.A.C. However, where necessary, the permittee may request approval for alternative methods or for alternative MDLs and PQLs for any approved analytical method, in accordance with the criteria of Rules 62-160.520 and 62-160.530, F.A.C.

2. Monitoring results obtained for each calendar month shall be summarized for that month and reported on a Discharge Monitoring Report (DMR), Form 62-620.910(10), postmarked no later than the 28th day of the month following the completed calendar month. For example, data for January shall be submitted by February 28. Signed copies of the DMR shall be submitted to the address specified below:

   Florida Department of Environmental Protection
   Mail Station 3551
   Twin Towers Office Building
   2600 Blair Stone Road
   Tallahassee, Florida 32399-2400

   If no discharge occurs during the reporting period, sampling requirements of this permit do not apply. The statement "No discharge" shall be written on the DMR form. If, during the term period of this permit, the facility ceases to discharge, the Department shall be notified immediately upon cessation of discharge. Such notification shall be in writing.

3. Unless specified otherwise in this permit, all other reports and notifications required by this permit, including twenty-four hour notifications, shall be submitted to or reported to, as appropriate, the Department's Southwest District Office at the address specified below:

   Florida Department of Environmental Protection
   Southwest District Office
   3804 Coconut Palm Drive
   Tampa, Florida 33619

   Phone Number - (813) 744-6100
   FAX Number - (813) 744-8198
   Internet Address - Employee first name.last name @dep.state.fl.us

4. Parameters which must be monitored as a result of a ground water discharge (i.e. land application system) shall be analyzed in accordance with Chapter 62-601, F.A.C.

5. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

6. The permittee shall report all visible discharges of floating materials, such as ash or oil sheen, to the Department when submitting DMR's. Field data sheets shall have appropriate blank(s) to report observations.

7. The monitoring requirements of I.A and IC will become effective on the first day of the month following the issuance date of the permit.

8. Discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act to any waste stream which ultimately may be released to lakes, rivers, or other waters of the State is prohibited unless specifically authorized elsewhere in this permit. This requirement is not applicable to products used for lawn and agricultural purposes or to the use of herbicides if used in accordance with labeled instructions and any applicable State permit. Discharge of chlorine from the use of chlorine gas, sodium hypochlorite, or other similar chlorine compounds for disinfection in plant potable and service water systems, sewage treatment, and once-through cooling water is authorized. In addition, the discharge of Nalco RO Plus 7288 used as a biocide to periodically treat water treatment system RO membranes is authorized.

   Herbicides may be used within the cooling pond for the purpose of prevention of over accumulation of aquatic weeds that could inhibit cooling pond water circulation. Use shall be in accordance with labeled instructions. Not later than 90 days after the issuance date of this permit, the permittee shall provide the Department with a listing of all herbicides used in the previous 12 months. Other products shall not be used without prior approval.

A permit revision from the Department shall be required prior to the use of any biocide or chemical additive, other than those specified above, used in the cooling system or any other portion of the treatment system which may be toxic to aquatic life. The permit revision request shall include:

a. Name and general composition of biocide or chemical
b. Frequencies of use
c. Quantities to be used
d. Proposed effluent concentrations
e. Acute and/or chronic toxicity data (laboratory reports shall be prepared according to Section 12 of EPA document no. EPA/600/4-90/027 entitled, Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters for Freshwater and Marine Organisms, or most current addition.)
f. Product data sheet
g. Product label

The Department shall review the above information to determine if a major or minor permit revision is necessary. Discharge associated with the use of such biocide or chemical is not authorized without a permit revision by the Department. Permit revisions shall be processed in accordance with the requirements of Chapter 62-620, F.A.C.

9. The discharge of chemical metal cleaning waste resulting from cleaning operations that use CITRO-SOLV, EDTA, or equivalent cleaner and burn the metal chemical cleaning waste in an operating unit is authorized. Discharge of any other waste resulting from the combustion of toxic, hazardous, or metal cleaning wastes to any waste stream which ultimately discharges to waters of the State is prohibited, unless specifically authorized elsewhere in this permit.

10. The permittee shall be responsible for maintaining the performance and reliability of the cooling pond seepage return system at the current level and making improvements whenever feasible. Any unanticipated bypass discharge of the cooling pond seepage resulting from electrical or mechanical equipment malfunctions or power outages shall be reported to the Department in accordance with the bypass provision contained in General Condition 22 of this permit.

The number of outage or bypass events shall be maintained at no more than six bypass events per year. If more than six bypass events occur during a calendar year the permittee shall file a report with the Department assessing the necessity and feasibility of additional engineering features to reduce the frequency of bypasses. A bypass event is any single event at a given time resulting in a bypass discharge from one or more sumps.

11. This permit constitutes certification of compliance with State Water Quality Standards (Section 401, PL92-800).

II Sludge Management Requirements

1. The disposal of industrial sludge or other solids generated from the facility (other than domestic wastewater sludge as specified below) shall be reused, reclaimed, or otherwise disposed of in accordance with the requirements of Chapter 62-701, F.A.C.

2. The treatment, disposal, storage, and/or handling of residuals, septage, or other solids from the domestic wastewater treatment plant shall be in accordance with the following:

a) The method of residuals use or disposal by this facility is transport to the Blue Septic Lime Stabilization Residuals Management Facility (FLA016189) or other facility with prior approval by the Department for further treatment and disposal, or disposal in a Class I or II solid waste landfill.

b) The permittee shall be responsible for proper treatment, management, use, and land application or disposal of its residuals. *[62-640.300(5), 3-30-98]*

c) The permittee shall not be held responsible for treatment, management, use, or land application violations that occur after its residuals have been accepted by a permitted residuals management facility with which the source

facility has an agreement in accordance with Rule 62-640.880(1)(c), F.A.C., for further treatment, management, use or land application. *[62-640.300(5), 3-30-98]*

d) Disposal of residuals, septage, and other solids in a solid waste landfill, or disposal by placement on land for purposes other than soil conditioning or fertilization, such as at a monofill, surface impoundment, waste pile, or dedicated site, shall be in accordance with Chapter 62-701, F.A.C. *[62-640.100(6)(k)3&4, 3-30-98]*

f) If the permittee intends to accept residuals from other facilities, a permit revision is required pursuant to Rule 62-640.880(2)(d), F.A.C. *[62-640.880(2)(d), 3-30-98]*

g) Storage of residuals or other solids at the permitted facility shall require prior written notification to the Department. *[62-640.300(4), 3-30-98]*

h) The permittee shall keep hauling records to track the transport of residuals between facilities. The hauling records shall contain the following information:

1. Date and Time Shipped
2. Amount of Residuals Shipped
3. Degree of Treatment (if applicable)
4. Name and ID Number of Residuals Management Facility or Treatment Facility
5. Signature of Responsible Party at the Source Facility
6. Signature of Hauler and name of Hauling Firm

These records shall be kept for five years and shall be made available for inspection upon request by the Department. A copy of the hauling records information maintained by the source facility shall be provided upon delivery of the residuals to the residuals management facility or treatment facility. *[62-640.880(4), 3-30-98]*

III. Ground Water Monitoring Requirements - This section is not applicable to this facility.

IV. Additonal Reuse and Land Application Requirements

Absorption Fields:

1. All ground water quality criteria specified in Chapter 62-520, F.A.C., shall be met at the edge of the zone of discharge. The zone of discharge for this project shall extend horizontally to the site property line and vertically to the base of the surficial aquifer. *[62-520.200(23), 12-9-96] [62-522.400 and 62-522.410, 12-9-96]*

2. Advisory signs shall be posted around the site boundaries to designate the nature of the project area. *[62-610.518, 8-8-99]*

3. The permittee may allow public access to the absorption field site. *[62-610.518, 8-8-99]*

4. The absorption field shall be operated to preclude saturated conditions from developing at the ground surface. *[62-610.500(2), 8-8-99]*

5. The annual average hydraulic loading rate shall be limited to a maximum of 1.31 inches per day (as applied to the entire bottom area of the absorption field trenches or spreading areas). *[62-610.523(3), 8-8-99]*

6. Overflows from absorption fields or from emergency discharge facilities on storage ponds shall be reported as an abnormal event to the Southwest District within 24 hours of an occurrence as an abnormal event. The provisions of Rule 62-610.800(9), F.A.C., shall be met. *[62-610.800(9), 8-8-99]*

Industrial Uses of Reclaimed Water:

7. Advisory signs shall be posted around the portion of the industrial site in which reclaimed water is used and at the main entrances to the industrial site. *[62-610.658(1), 8-8-99]*

8. Cross-connections to the potable water system are prohibited. *[62-610.660(1), 8-8-99]*

9. There shall be readily identifiable "non-potable" or "do not drink" notices, marking, or coding on application/distribution facilities and appurtenances. *[62-610.660(2), 8-8-99]*

V. Operation and Maintenance Requirements

A. Domestic Wastewater Treatment Plant

1. During the period of operation authorized by this permit, the wastewater facilities shall be operated under the supervision of a(n) operator(s) certified in accordance with Chapter 61E12-41, F.A.C., or 62-602, F.A.C. In accordance with Chapter 62-699, F.A.C., this facility is a Category III, Class D facility and, at a minimum, operators with appropriate certification must be on the site as follows:

   Class D or higher operator for 2 non-consecutive visits per week, for a total of 1 hour per week. The lead operator must be a Class D operator, or higher.

2. A certified operator shall be on call during periods the plant is unattended. Daily checks of the plant shall be performed by the permittee or his representative or agent 5 days per week. On those days when the facility is not staffed by a certified operator the permittee shall ensure that flow rate, pH, and total residual chlorine are monitored in accordance with Part I of this permit. *[62-699.311(1), 5-20-92]*

3. An updated capacity analysis report shall be submitted to the Department at time of renewal of this permit or upon request of the Department. The updated capacity analysis report shall be prepared in accordance with Rule 62-600.405, F.A.C. *[62-600.405(5), 12-24-96]*

4. The application to renew this permit shall include a detailed operation and maintenance performance report prepared in accordance with Rule 62-600.735, F.A.C. *[62-600.735(1), 12-24-96]*

B. Operation of Industrial Treatment and Disposal Facilities

1. The permittee shall ensure that the operation of this facility is as described in the application and supporting documents.
2. The operation of the pollution control facilities described in this permit shall be under the supervision of a person who is qualified by formal training and/or practical experience in the field of water pollution control appropriate for those facilities.

C. Record keeping Requirements:

1. The permittee shall maintain the following records on the site of the permitted facility and make them available for inspection:

a. Records of all compliance monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, including, if applicable, a copy of the laboratory certification showing the certification number of the laboratory, for at least three years from the date the sample or measurement was taken;

b. Copies of all reports required by the permit for at least three years from the date the report was prepared, unless otherwise specified by Department rule;

c. Records of all data, including reports and documents used to complete the application for the permit for at least three years from the date the application was filed, unless otherwise specified by Department rule;

d. Monitoring information, including a copy of the laboratory certification showing the laboratory certification number, related to the residuals use and disposal activities for the time period set forth in Chapter 62-640, F.A.C., for at least three years from the date of sampling or measurement;

e. A copy of the current permit;

f. A copy of the current domestic operation and maintenance manual as required by Chapter 62-600, F.A.C.;

g. A copy of the facility record drawings;

h. Copies of the licenses of the current certified operators; and

i. Copies of the logs and schedules showing plant operations and equipment maintenance for three years from the date of the logs or schedules. The logs shall, at a minimum, include identification of the plant; the signature and certification number of the operator(s) and the signature of the person(s) making any entries; date and time in and out; specific operation and maintenance activities; tests performed and samples taken; and major repairs made. The logs shall be maintained on-site in a location accessible to 24-hour inspection, protected from weather damage, and current to the last operation and maintenance performed.
[62-620.350, 12-24-96][61E12-41.010(1)(e), 11-02-93] [62-602, 12-30-99]

VI. Compliance Schedules and Self- imposed Improvement Schedules

A. Schedule of Compliance

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

   a. Operational level attained..... Issuance Date (ID) of permit.

   b. Best Management Practices Pollution Prevention(BMP3) Plan . (See Part VII. Subpart D)

      1) Develop or Update plan..... ID of permit plus 6 months.
      2) Implement plan..... ID of permit plus 12 months.

2. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by an identified date, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

VII. Other Specific Conditions

A. Specific Conditions Applicable to all permits

1. Drawings, plans, documents or specifications submitted by the permittee, not attached hereto, but retained on file with the Department, are made a part hereof.

2. If significant historical or archaeological artifacts are discovered at any time within the project site, the permittee shall immediately notify the District Office and the Bureau of Historic Preservation, Division of Archives, History and Records Management, R.A. Gray Building, Tallahassee, Florida 32301.

3. Where required by Chapter 471 (P.E.) or Chapter 492 (P.G.) Florida Statutes, applicable portions of reports to be submitted under this permit, shall be signed and sealed by the professional(s) who prepared them.

4. This permit satisfies industrial wastewater program permitting and does not authorize operation of this facility prior to obtaining any other permits required by local, state or federal agencies.

B. Duty to Reapply

1. The permittee shall submit an application to renew this permit at least 180 days before the expiration date of this permit.
2. The permittee shall apply on the appropriate form listed in Rule 62-620.910, F.A.C., and in the manner established in Rules 62-620.400 , 62-620.410, F.A.C. and the Department of Environmental Protection Guide to Wastewater Permitting including submittal of the appropriate processing fee set forth in Rule 62-4.050, F.A.C.
3. An application filed in accordance with subsections 1. and 2. of this part shall be considered timely. When an application for renewal of a permit is timely and sufficient, the existing permit shall not expire until the Department has taken final action on the application for renewal or until the last day for seeking judicial review of the agency order or a later date fixed by order of the reviewing court.
4. The late submittal of a renewal application shall be considered timely and sufficient for the purpose of extending the effectiveness of the expiring permit only if it is submitted and made complete before the expiration date.

C. Reopener Clause

1. The permit shall be modified, or alternatively, revoked and reissued to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2) and 307(a)(2) of the Clean Water Act (the Act), as amended, if the effluent standard or limitation so issued or approved:
   a.) Contains different conditions or is otherwise more stringent than any condition in the permit/or;
   b.) Controls any pollutant, or disposal method not in the permit.

   The permit as modified or reissued under this paragraph shall contain any other requirements of the Act then applicable.

2. The permit may be reopened to adjust effluent limitations or monitoring requirements should future wasteload allocation determinations, water quality studies, DEP approved changes in water quality standards, or other information show a need for a different limitation or monitoring requirement.

D. Specific Conditions Related to Best Management Practices Condition

1. Best Management Practices Plan :

In accordance with Rule 62-620.620(1)(n), the permittee shall develop and implement a Best Management Practices incorporating pollution prevention measures. References which may be used in developing the plan are "Criteria and Standards for Best Management Practices Authorized Under Section 304(e) of the Act", found at 40 CFR Section 122.44(k), the Storm Water Management Industrial Activities Guidance Manual, EPA/833-R92-002 and other EPA documents relating to Best Management Practice guidance.

2. Definitions:

a. The term "pollutants" refers to conventional, non-conventional and toxic pollutants, as appropriate for the NPDES storm water program and toxic pollutants.

b. Conventional pollutants are: biochemical oxygen demand (BOD), suspended solids, pH, fecal coliform bacteria and oil & grease.

c. Non-conventional pollutants are those which are not defined as conventional or toxic, such as phosphorus, nitrogen or ammonia. (Ref: 40 CFR Part 122, Appendix D, Table IV)

d. For purposes of this part, Toxic pollutants include, but are not limited to: a) any toxic substance listed in Section 307(a)(1) of the CWA, any hazardous substance listed in Section 311 of the CWA, and b) any substance (that is not also a conventional or non-conventional pollutant) for which EPA has published an acute or chronic toxicity criterion, or that is a pesticide regulated by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

e. "Pollution prevention" refers to the first category of EPA's preferred hazardous waste management strategy - source reduction.

f. "Significant Materials" is defined as raw materials; fuels; materials such as solvents and detergents; hazardous substances designated under Section 101(14) of CERCLA; and any chemical the facility is required to report pursuant to EPCRA, Section 313; fertilizers; pesticides; and waste products such as ashes, slag and sludge.

g. "Source reduction" means any practice which: i) reduces the amount of any pollutant entering a waste stream prior to recycling, treatment or disposal; and ii) reduces the hazards to public health and the environment associated with the release of such pollutant. The term includes equipment or technology modifications, process or procedure modifications, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control. It does not include any practice which alters the physical, chemical, or biological characteristics or the volume of a pollutant through a process or activity which itself is not integral to, or previously considered necessary for, the production of a product or the providing of a service.

h. "BMP3" means a Best Management Pollution Prevention Plan incorporating the requirements of 40 CFR § 125, Subpart K, plus pollution prevention techniques, except where other existing programs are deemed equivalent by the permittee. The permittee shall certify the equivalency of the other referenced programs.

i. "Reportable Quantity (RQ) Discharge" A RQ release occurs when a quantity of a hazardous substance or oil is spilled or released within a 24-hour period of time and exceeds the RQ level assigned to that substance under CERCLA or the Clean Water Act. These levels or quantities are defined in terms of gallons or pounds. Regulations listing these quantities are contained at 40 CFR 302.4, 40 CFR 117.21 and 40 CFR 110.

j. The term "material" refers to chemicals or chemical products used in any plant operation (i.e., caustic soda, hydrazine, degreasing agents, paint solvents, etc.). It does not include lumber, boxes, packing materials, etc.

3. Best Management Practices/Pollution Prevention Plan:

The permittee shall develop and implement a BMP3 plan for the facility which is the source of wastewater and storm water discharges. The plan shall be directed toward reducing those pollutants of concern which discharge, or could discharge, to surface waters to and shall be prepared in accordance with good engineering and good housekeeping practices. For the purposes of this permit, pollutants of concern shall be limited to toxic pollutants and significant materials, as defined above, known to the discharger. The plan shall address all activities which could or do contribute these pollutants to the surface water discharge, including storm water, water and waste treatment, and plant ancillary activities.

In addition, the BMP3 plan shall include procedures to be implemented by the facility to minimize and monitor mechanical cleaning device losses that may occur during condenser tube cleaning. At a minimum, the plan shall include provisions for:

a) Procedures for minimizing and tracking cleaning device losses for each cleaning event.

b) Notification of any significant cleaning device losses pursuant to Section I.E.3. This notification should include the date and approximate number of cleaning devices lost.

4. Signatory Authority & Management Responsibilities:

A copy of the BMP3 plan shall be retained at the facility and shall be made available to the permit issuing authority upon request.

The BMP3 plan shall contain a written statement from corporate or plant management indicating management's commitment to the goals of the BMP3 program. The BMP3 plan shall be signed and reviewed by the plant management.

5. BMP3 Plan Requirements:

The following requirements may be incorporated by reference from existing facility procedures:

a. Name and description of facility

b. A site map - At a minimum the site map must include information of the following: discharge points ("outfalls"); drainage patterns; identification of the types of pollutants likely to be discharged from each drainage area; direction of flow; surface water bodies, including any proximate stream, river, lake, or other waterbody receiving storm water discharge from the site; structural control measures (physically constructed features used to control storm water flows); locations of "significant materials" exposed to storm water; locations of industrial activities (such as fueling stations, loading and unloading areas, vehicle or equipment maintenance areas, waste disposal areas, storage areas).

c. A materials inventory including the types of materials that are handled, stored, or processed onsite, particularly significant materials. To complete the materials inventory, the permittee must list materials that have been exposed to storm water in the past 3 years (focus on areas where materials are stored, processed, transported, or transferred and provide a narrative description of methods and location of storage and disposal areas, materials management practices, treatment practices, and any structural/nonstructural control measures.

d. A list of significant spills and leaks of toxic or hazardous materials that have occurred in the past 3 years. "Significant spills" includes releases in excess of reportable quantities.

e. A summary of any existing storm water sampling data and a description of the sample collection procedures used.

f. A site evaluation summary - The Site Evaluation Summary should provide a narrative description of activities with a high potential to contaminate storm water at the site, including those associated with materials loading and unloading, outdoor storage, outdoor manufacturing or processing, onsite disposal, and significant dust or particulate generating activities. The summary should also include a description of any pollutants of concern that may be associated with such activities.

g. A narrative description of the following BMP's:

(i) - Good Housekeeping Practices

(ii) - Preventive Maintenance The permittee must develop a preventive maintenance program that involves inspections and maintenance of storm water management devices and routine inspections of facility operations to detect faulty equipment. Equipment (such as tanks, containers, and drums) should be checked regularly for signs of deterioration.

(iii) - Visual Inspections Regular inspections shall be performed by qualified, trained plant personnel. Reports shall note when inspections were done, the name of the person who conducted the inspection, which areas were inspected, what problems were found, and what steps were taken to correct any problems.

(iv) - Spill Prevention and Responses Areas where spills are likely to occur and their drainage points must be clearly identified in the BMP3 plan. Employees shall be made aware of response procedures, including material handling and storage requirements, and should have access to appropriate cleanup equipment.

(v) - Sediment and Erosion Control The BMP3 must identify activities that present a potential for significant soil erosion and measures taken to control such erosion.

(vi) - Management of Runoff The permittee must describe existing storm water controls found at the facility and any additional measures that can be implemented to improve the prevention and control of polluted storm water. Examples include: vegetative swales, reuse of collected storm water, infiltration trenches, and detention ponds.

6. Best Management Practices & Pollution Prevention Committee:

A Best Management Practices Committee (Committee) should be established to direct or assist in the implementation of the BMP3 plan. The Committee should be comprised of individuals within the plant organization who are responsible for developing, implementing, monitoring of success, and revision of the BMP3 plan. The activities and responsibilities of the Committee should address all aspects of the facility's BMP3 plan. The scope of responsibilities of the Committee should be described in the plan.

7. Employee Training:

Employee training programs shall inform appropriate personnel of the components & goals of the BMP3 plan and shall describe employee responsibilities for implementing the plan. Training shall address topics such as good housekeeping, materials management, recordkeeping and reporting, spill prevention & response, as well as specific waste reduction practices to be employed. The plan shall identify periodic dates for such training.

8. Plan Review & Modification:

If following review by the Permit Issuing Authority, or authorized representative, the BMP3 plan is determined insufficient, he/she may notify the permittee that the BMP3 plan does not meet one or more of the minimum requirements of this Part. Upon such notification from the Permit Issuing Authority, or authorized representative, the permittee shall amend the plan and shall submit to the Permit Issuing Authority a written certification that the requested changes have been made. The permittee shall have 30 days after such notification to make the necessary changes. A longer period of time may be granted by the Permit Issuing Authority if warranted due to the complexity of the change.

The permittee shall modify the BMP3 plan whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to surface waters of the State or if the plan proves to be ineffective in achieving the general objectives of reducing pollutants in wastewater or storm water discharges. Modifications to the plan may be reviewed by Permit Issuing Authority in the same manner as described above.

9. Annual Site Compliance Evaluation:
Qualified personnel must conduct site compliance evaluations at appropriate intervals, but at least once a year. Compliance evaluations shall include:

- Inspection of storm water drainage areas for evidence of pollutants entering the drainage system;
- Evaluation of the effectiveness of BMP's;
- Observations of structural measures, sediment controls, and other storm water BMP's to ensure proper operation;
- Revision of the plan as needed within 2 weeks of the inspection, and implementation of any necessary changes within 12 weeks of the inspection; and
- Preparation of a report summarizing inspection results and follow-up actions, identifying the date of inspection and personnel who conducted the inspection.
- The inspection report shall be signed by the plant environmental engineering staff and plant management and kept with the BMP3 plan.

10. Recordkeeping and Internal Reporting:
For at least one year after the expiration of this permit, the permittee shall record and maintain records of spills, leaks, inspections, and maintenance activities. For spills and leaks, records should include information such as the date and time of the incident, weather conditions, cause, and resulting environmental problems.

E. Specific Conditions Related to Existing Manufacturing, Commercial, Mining, and Silviculture Wastewater Facilities or Activities

1. Existing manufacturing, commercial, mining, and silvicultural wastewater facilities or activities that discharge into surface waters shall notify the Department as soon as they know or have reason to believe: [62-620.624(1)]

   (a) That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following levels
   (1) One hundred micrograms per liter,
   (2) Two hundred micrograms per liter for acrolein and acrylonitrile; five hundred micrograms per liter for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter for antimony, or
   (3) Five times the maximum concentration value reported for that pollutant in the permit application.

   (b) That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following levels

(1) Five hundred micrograms per liter.
(2) One milligram per liter for antimony, or
(3) Ten times the maximum concentration value reported for that pollutant in the permit application.

VIII General Conditions

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit are binding and enforceable pursuant to Chapter 403, Florida Statutes. Any permit noncompliance constitutes a violation of Chapter 403, Florida Statutes, and is grounds for enforcement action, permit termination, permit revocation and reissuance, or permit revision. [62-620.610(1)]

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviations from the approved drawings, exhibits, specifications or conditions of this permit constitutes grounds for revocation and enforcement action by the Department. [62-620.610(2)]

3. As provided in Subsection 403.087(6), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor authorize any infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit or authorization that may be required for other aspects of the total project which are not addressed in this permit. [62-620.610(3)]

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title. [62-620.610(4)]

5. This permit does not relieve the permittee from liability and penalties for harm or injury to human health or welfare, animal or plant life, or property caused by the construction or operation of this permitted source; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department. The permittee shall take all reasonable steps to minimize or prevent any discharge, reuse of reclaimed water, or residuals use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. [62-620.610(5)]

6. If the permittee wishes to continue an activity regulated by this permit after its expiration date, the permittee shall apply for and obtain a new permit. [62-620.610(6)]

7. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control, and related appurtenances, that are installed and used by the permittee to achieve compliance with the conditions of this permit. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to maintain or achieve compliance with the conditions of the permit. [62-620.610(7)]

8. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit revision, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. [62-620.610(8)]

9. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, including an authorized representative of the Department and authorized EPA personnel, when applicable, upon presentation of credentials or other documents as may be required by law, and at reasonable times, depending upon the nature of the concern being investigated, to

a. Enter upon the permittee's premises where a regulated facility, system, or activity is located or conducted, or where records shall be kept under the conditions of this permit;
b. Have access to and copy any records that shall be kept under the conditions of this permit;
c. Inspect the facilities, equipment, practices, or operations regulated or required under this permit; and
d. Sample or monitor any substances or parameters at any location necessary to assure compliance with this permit or Department rules. [62-620.610(9)]

10. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data, and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except as such use is proscribed by Section 403.111, Florida Statutes, or Rule 62-620..302, Florida Administrative Code. Such evidence shall only be used to the extent that it is consistent with the Florida Rules of Civil Procedure and applicable evidentiary rules. [62-620.610(10)]

11. When requested by the Department, the permittee shall within a reasonable time provide any information required by law which is needed to determine whether there is cause for revising, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also provide to the Department upon request copies of records required by this permit to be kept. If the permittee becomes aware of relevant facts that were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be promptly submitted or corrections promptly reported to the Department. [62-620.610(11)]

12. Unless specifically stated otherwise in Department rules, the permittee, in accepting this permit, agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. A reasonable time for compliance with a new or amended surface water quality standard, other than those standards addressed in Rule 62-302.500, F.A.C., shall include a reasonable time to obtain or be denied a mixing zone for the new or amended standard. [62-620.610(12)]

13. The permittee, in accepting this permit, agrees to pay the applicable regulatory program and surveillance fee in accordance with Rule 62-4.052, F.A.C. [62-620.610(13)]

14. This permit is transferable only upon Department approval in accordance with Rule 62-620.340, F.A.C. The permittee shall be liable for any noncompliance of the permitted activity until the transfer is approved by the Department. [62-620.610(14)]

15. The permittee shall give the Department written notice at least 60 days before inactivation or abandonment of a wastewater facility and shall specify what steps will be taken to safeguard public health and safety during and following inactivation or abandonment. [62-620.610(15)]

16. The permittee shall apply for a revision to the Department permit in accordance with Rules 62-620.300 and the Department Guide to Wastewater Permitting at least 90 days before construction of any planned substantial modifications to the permitted facility is to commence or with Rule 62-620.325(2) for minor modifications to the permitted facility. A revised permit shall be obtained before construction begins except as provided in Rule 62-620.300, F.A.C. [62-620.610(16)]

17. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The permittee shall be responsible for any and all damages which may result from the changes and may be subject to enforcement action by the Department for penalties or revocation of this permit. The notice shall include the following information:

    a. A description of the anticipated noncompliance;

b. The period of the anticipated noncompliance, including dates and times; and
c. Steps being taken to prevent future occurrence of the noncompliance. [62-620.610(17)]

18. Sampling and monitoring data shall be collected and analyzed in accordance with Rule 62-4.246, Chapter 62-160 and 62-601, F.A.C., and 40 CFR 136, as appropriate.

a. Monitoring results shall be reported at the intervals specified elsewhere in this permit and shall be reported on a Discharge Monitoring Report (DMR), DEP Form 62-620.910(10).
b. If the permittee monitors any contaminant more frequently than required by the permit, using Department approved test procedures, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.
c. Calculations for all limitations which require averaging of measurements shall use an arithmetic mean unless otherwise specified in this permit.
d. Any laboratory test required by this permit for domestic wastewater facilities shall be performed by a laboratory that has been certified by the Department of Health (DOH) under Chapter 10D41, F.A.C., to perform the test. In domestic wastewater facilities, on-site tests for dissolved oxygen, pH, and total chlorine residual shall be performed by a laboratory certified to test for those parameters or under the direction of an operator certified under Chapter 61E12-41, F.A.C. or 62-602, F.A.C.
e. Under Chapter 62-160, F.A.C., sample collection shall be performed by following the protocols outlined in "DEP Standard Operating Procedures for Laboratory Operations and Sample Collection Activities" (DEP-QA-001/92). Alternatively, sample collection may be performed by an organization who has an approved Comprehensive Quality Assurance Plan (CompQAP) on file with the Department. The CompQAP shall be approved for collection of samples from the required matrices and for the required tests. [62-620.610(18)]

19. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule detailed elsewhere in this permit shall be submitted no later than 14 days following each schedule date. [62-620.610(19)]

20. The permittee shall report to the Department any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain: a description of the noncompliance and its cause; the period of noncompliance including exact dates and time, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

a. The following shall be included as information which must be reported within 24 hours under this condition:

(1). Any unanticipated bypass which causes any reclaimed water or the effluent to exceed any permit limitation or results in an unpermitted discharge,
(2). Any upset which causes any reclaimed water or the effluent to exceed any limitation in the permit,
(3). Violation of a maximum daily discharge limitation for any of the pollutants specifically listed in the permit for such notice, and
(4). Any unauthorized discharge to surface or ground waters.

b. If the oral report has been received within 24 hours, the noncompliance has been corrected, and the noncompliance did not endanger health or the environment, the Department shall waive the written report [62-620.610(20)]

21. The permittee shall report all instances of noncompliance not reported under Conditions VIII.18 and .19 of this permit at the time monitoring reports are submitted. This report shall contain the same information required by Condition VIII.20 of this permit. [62-620.610(21)]

22. Bypass Provisions.

a. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless the permittee affirmatively demonstrates that:

(1). Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; and
(2). There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
(3). The permittee submitted notices as required under Condition VIII.22.b. of this permit.

b. If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least 10 days before the date of the bypass. The permittee shall submit notice of an unanticipated bypass within 24 hours of learning about the bypass as required in Condition VIII. 20. of this permit. A notice shall include a description of the bypass and its cause; the period of the bypass, including exact dates and times; if the bypass has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass.

c. The Department shall approve an anticipated bypass, after considering its adverse effect, if the permittee demonstrates that it will meet the three conditions listed in Condition VIII.22. a. of this permit.

d. A. permittee may allow any bypass to occur which does not cause reclaimed water or effluent limitations to be exceeded if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of Condition VIII.22. a. through c. of this permit [62-620.610(22)].

23. Upset Provisions

a. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:

(1). An upset occurred and that the permittee can identify the cause(s) of the upset;
(2). The permitted facility was at the time being properly operated;
(3). The permittee submitted notice of the upset as required in Condition VIII. 20. of this permit; and
(4). The permittee complied with any remedial measures required under Condition VIII.5. of this permit.

b. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

c. Before an enforcement proceeding is instituted, no representation made during the Department review of a claim that noncompliance was caused by an upset is final agency action subject to judicial review. [62-620.610(23)]

Executed in Tallahassee, Florida.

STATE OF FLORIDA
DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Mimi Drew
Director
Division of Water Resource Management

2600 Blair Stone Road
Tallahassee, FL 32399-2400
(850) 487-1855

When Comp[illegible]il this report to: Department of Environmental Protection, Wastewater Facilities Mana[illegible] Section, MS 3551, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

PERMITTEE NAME: Florida Power & Light Company
MAILING ADDRESS: 19050 SR 62
Parrish, FL 34219

FACILITY: Manatee Plant
LOCATION: 19050 SR 62
Parrish, FL 34219

COUNTY: Manatee

PERMIT NUMBER FL0032174
MONITORING PERIOD From: _____ To: _____
LIMIT: Final REPORT: Monthly
CLASS SIZE: GROUP: Industrial

MONITORING GROUP NUMBER: D-001
PLANT SIZE/TREATMENT TYPE:

☐ **- check if no discharge for reporting period**

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Flow	Sample Measurement										
PARM Code 50050 1 Mon. Site No. EFF-1	Permit Requirement		Report Daily Maximum	mgd						Weekly[2]	Calculation
Temperature, Water	Sample Measurement										
PARM Code 00011 1 Mon. Site No. EFF-1	Permit Requirement						92.0 Daily Maximum	deg.F		Weekly[2]	Grab
Chlorine, Total Residual	Sample Measurement										
PARM Code 50060 1 Mon. Site No. EFF-1	Permit Requirement						0.01 Daily Maximum	mg/l		Weekly[2]	Grab
pH	Sample Measurement										
PARM Code 00400 1 Mon. Site No. EFF-1	Permit Requirement				6.0 Daily Minimum		8.5 Daily Maximum	su		Weekly[2]	Grab
Oxygen, Dissolved (DO)	Sample Measurement										
PARM Code 00300 1 Mon. Site No. EFF-1	Permit Requirement				Report Daily Minimum			mg/l		Weekly[2]	Grab
Specific Conductance	Sample Measurement										
PARM Code 00095 1 Mon. Site No. EFF-1	Permit Requirement						Report Daily Maximum	umhos/cm		Weekly[2]	Grab

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein; and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

NAME/TITLE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	TELEPHONE NO	DATE (YY/MM/DD)

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here):

[2] Samples shall be taken during the first day of the discharge and once per week thereafter.

FACILITY [redacted] Manatee Plant PERMIT [redacted]ER: FL0032174 MONITORING GROUP NUMBER: D-001

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Iron, Total Recoverable	Sample Measurement										
PARM Code 00980 1 Mon. Site No. EFF-1	Permit Requirement						Report Daily Maximum	mg/l		Weekly[2]	Grab
Copper, Total Recoverable	Sample Measurement										
PARM Code 01119 1 Mon. Site No. EFF-1	Permit Requirement						Report Daily Maximum	ug/l		Weekly[2]	Grab
Zinc, Total Recoverable	Sample Measurement										
PARM Code 01094 1 Mon. Site No. EFF-1	Permit Requirement						Report Daily Maximum	ug/l		Weekly[2]	Grab
Hardness, (as CaCO3)	Sample Measurement										
PARM Code 00900 1 Mon. Site No. EFF-1	Permit Requirement						Report Daily Maximum	mg/l		Weekly[2]	Grab
Alkalinity, Total (as CaCO3)	Sample Measurement										
PARM Code 00410 1 Mon. Site No. EFF-1	Permit Requirement						Report Daily Maximum	mg/l		Weekly[2]	Grab

[2] *Samples shall be taken during the first day of the discharge and once per week thereafter.*

BEST AVAILABLE COPY

When Complete, mail this report to: Department of Environmental Protection, Wastewater Facilities Management Section, MS 3551, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

PERMITTEE NAME: Florida Power & Light Company
MAILING ADDRESS: 19050 SR 62
Parrish, FL 34219

FACILITY: Manatee Plant
LOCATION: 19050 SR 62
Parrish, FL 34219

COUNTY: Manatee

PERMIT NUMBER FL0032174
MONITORING PERIOD From: _____ To: _____
LIMIT: Final REPORT: Annual
CLASS SIZE: GROUP: Industrial

MONITORING GROUP NUMBER: D-002G
PLANT SIZE/TREATMENT TYPE:

☐ **- check if no discharge for reporting period**

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Oil and Grease	Sample Measurement										
PARM Code 00556 1 Mon. Site No. EFF-2	Permit Requirement						5.0 Daily Maximum	mg/l		Annually	Grab

When Complete, mail this report to: Department of Environmental Protection, Wastewater Facilities Management Section, MS 3551, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

PERMITTEE NAME: Florida Power & Light Company
MAILING ADDRESS: 19050 SR 62
Parrish, FL 34219

FACILITY: Manatee Plant
LOCATION: 19050 SR 62
Parrish, FL 34219

COUNTY: Manatee

PERMIT NUMBER FL0032174
MONITORING PERIOD From: _____ To: _____
LIMIT: Final REPORT: Monthly
CLASS SIZE: GROUP: Industrial

MONITORING GROUP NUMBER: I-004
PLANT SIZE/TREATMENT TYPE:

☐ - check if no discharge for reporting period

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Flow	Sample Measurement										
PARM Code 50050 1 Mon. Site No. EFF-3	Permit Requirement	Report Max Mo Avg	Report Daily Maximum	mgd						Monthly	Calculated
Specific Conductance	Sample Measurement										
PARM Code 00095 1 Mon. Site No. EFF-3	Permit Requirement					Report Max Mo Avg	Report Daily Maximum	umhos/cm		Monthly	Grab
pH	Sample Measurement										
PARM Code 00400 1 Mon. Site No. EFF-3	Permit Requirement				6.0 Daily Minimum		9.0 Daily Maximum	su		Weekly	Grab

BEST AVAILABLE COPY

DEPARTMENT OF ENVIRONMENTAL PROTECTION

When Complete, Mail this report to: Department of Environmental Protection, Wastewater Facilities Management Section, MS 3551, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

PERMITTEE NAME: Florida Power & Light Company
MAILING ADDRESS: 19050 SR 62
Parrish, FL 34219

FACILITY: Manatee Plant
LOCATION: 19050 SR 62
Parrish, FL 34219

COUNTY: Manatee

PERMIT NUMBER FL0032174
MONITORING PERIOD From: _____ To: _____
LIMIT: Final REPORT: 1/6 months
CLASS SIZE: GROUP: Industrial

MONITORING GROUP NUMBER: I-004
PLANT SIZE/TREATMENT TYPE:

☐ - check if no discharge for reporting period

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Solids, Total Suspended	Sample Measurement										
PARM Code 00530 1 Mon. Site No. EFF-3	Permit Requirement					30.0 Max Mo Avg	100.0 Daily Maximum	mg/l		1/6 months	8-hr Composite
Oil and Grease	Sample Measurement										
PARM Code 00556 1 Mon. Site No. EFF-3	Permit Requirement					15.0 Max Mo Avg	20.0 Daily Maximum	mg/l		1/6 months	Grab

When Comple[illegible] this report to: Department of Environmental Protection, Wastewater Facilities Manag[illegible]ection, MS 3551, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

PERMITTEE NAME: Florida Power & Light Company
MAILING ADDRESS: 19050 SR 62
Parrish, FL 34219

FACILITY: Manatee Plant
LOCATION: 19050 SR 62
Parrish, FL 34219

COUNTY: Manatee

PERMIT NUMBER FL0032174
MONITORING PERIOD From: _____ To: _____
LIMIT: Final REPORT: Quarterly
CLASS SIZE: GROUP: Industrial

MONITORING GROUP NUMBER: I-004
PLANT SIZE/TREATMENT TYPE:

☐ **- check if no discharge for reporting period**

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Iron, Total Recoverable	Sample Measurement										
PARM Code 00980 1 Mon. Site No. EFF-3	Permit Requirement					Report Max Mo Avg	Report Daily Maximum	mg/l		Quarterly	Grab
Copper, Total Recoverable	Sample Measurement										
PARM Code 01119 1 Mon. Site No. EFF-3	Permit Requirement					Report Max Mo Avg	Report Daily Maximum	ug/l		Quarterly	Grab
Zinc, Total Recoverable	Sample Measurement										
PARM Code 01094 1 Mon. Site No. EFF-3	Permit Requirement					Report Max Mo Avg	Report Daily Maximum	ug/l		Quarterly	Grab
Arsenic, Total Recoverable	Sample Measurement										
PARM Code 00978 1 Mon. Site No. EFF-3	Permit Requirement						Report Daily Maximum	ug/l		Quarterly	Composite[3]
Barium, Total Recoverable	Sample Measurement										
PARM Code 01009 1 Mon. Site No. EFF-3	Permit Requirement						Report Daily Maximum	ug/l		Quarterly	Composite[3]
Cadmium, Total Recoverable	Sample Measurement										
PARM Code 01113 1 Mon. Site No. EFF-3	Permit Requirement						Report Daily Maximum	ug/l		Quarterly	Composite[3]
Chromium, Total Recoverable	Sample Measurement										
PARM Code 01118 1 Mon. Site No. EFF-3	Permit Requirement						Report Daily Maximum	ug/l		Quarterly	Composite[3]

[3] 5-days composite, i.e. daily sample collection for five days and composited on flow weighted basis.

FACILITY NA[redacted]natee Plant PERMIT N[redacted]R: FL0032174 MONITORING GROUP NUMBER: I-004

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Lead, Total Recoverable	Sample Measurement										
PARM Code 01114 1 Mon. Site No. EFF-3	Permit Requirement						Report Daily Maximum	ug/l		Quarterly	Composite[1]
Mercury, Total Recoverable	Sample Measurement										
PARM Code 71901 1 Mon. Site No. EFF-3	Permit Requirement						Report Daily Maximum	ug/l		Quarterly	Composite[1]
Selenium, Total Recoverable	Sample Measurement										
PARM Code 00981 1 Mon. Site No. EFF-3	Permit Requirement						Report Daily Maximum	ug/l		Quarterly	Composite[1]
Silver, Total Recoverable	Sample Measurement										
PARM Code 01079 1 Mon. Site No. EFF-3	Permit Requirement						Report Daily Maximum	ug/l		Quarterly	Composite[1]

[1] 5-days composite, i.e. daily sample collection for five days and composited on a flow weighted basis.

When Complete, mail this report to: Department of Environmental Protection, Wastewater Facilities Management Section, MS 3551, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

PERMITTEE NAME: Florida Power & Light Company
MAILING ADDRESS: 19050 SR 62
Parrish, FL 34219

FACILITY: Manatee Plant
LOCATION: 19050 SR 62
Parrish, FL 34219

COUNTY: Manatee

PERMIT NUMBER FL0032174
MONITORING PERIOD From: _____ To: _____
LIMIT: Final REPORT: Monthly
CLASS SIZE: GROUP: Industrial

MONITORING GROUP NUMBER: I-005
PLANT SIZE/TREATMENT TYPE:

☐ **- check if no discharge for reporting period**

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Flow	Sample Measurement										
PARM Code 50050 1 Mon. Site No. EFF-4	Permit Requirement	Report Monthly Average	Report Daily Maximum	mgd						Weekly[4]	Calculated
Copper, Total Recoverable	Sample Measurement										
PARM Code 01119 1 Mon. Site No. EFF-4	Permit Requirement						1.0 Daily Maximum	mg/l		Weekly[4]	Grab
Iron, Total Recoverable	Sample Measurement										
PARM Code 00980 1 Mon. Site No. EFF-4	Permit Requirement						1.0 Daily Maximum	mg/l		Weekly[4]	Grab

[4] during discharge

When Complete[illegible] this report to: Department of Environmental Protection, Wastewater Facilities Manag[illegible]ection, MS 3551, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

PERMITTEE NAME: Florida Power & Light Company
MAILING ADDRESS: 19050 SR 62
Parrish, FL 34219

FACILITY: Manatee Plant
LOCATION: 19050 SR 62
Parrish, FL 34219

COUNTY: Manatee

PERMIT NUMBER FL0032174
MONITORING PERIOD From: _____ To: _____
LIMIT: Final REPORT: Monthly
CLASS SIZE: GROUP: Industrial

MONITORING GROUP NUMBER: R-001
PLANT SIZE/TREATMENT TYPE:

☐ - check if no discharge for reporting period

Parameter		Quantity or Loading		Unit s	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Flow	Sample Measurement										
PARM Code 50050 Y Mon. Site No. EFF-5	Permit Requirement	0.005 Max Annual Avg		mgd						Daily, 5days /week	Calculated Rolling Annual Avg.
BOD, Carbonaceous 5 day, 20C	Sample Measurement										
PARM Code 80082 Y Mon. Site No. EFF-6	Permit Requirement				20.0 Max Annual Avg			mg/l		Monthly	Grab
BOD, Carbonaceous 5 day, 20C	Sample Measurement										
PARM Code 80082 1 Mon. Site No. EFF-6	Permit Requirement				30.0 Max Mo Avg	45.0 Mx Weekly Avg	60.0 Daily Maximum	mg/l		Monthly	Grab
Solids, Total Suspended	Sample Measurement										
PARM Code 00530 1 Mon. Site No. EFF-6	Permit Requirement						10.0 Daily Maximum	mg/l		Monthly	Grab
Fecal Coliform Bacteria	Sample Measurement										
PARM Code 74055 Y Mon. Site No. EFF-6	Permit Requirement				200 Max Annual Avg		800 Daily Maximum	#/100ml		Monthly	Grab
pH	Sample Measurement										
PARM Code 00400 1 Mon. Site No. EFF-6	Permit Requirement				6.0 Daily Minimum		8.5 Daily Maximum	su		Daily, 5 days/week	Grab
Chlorine, Total Residual	Sample Measurement										
PARM Code 50060 1 Mon. Site No. EFF-6	Permit Requirement				0.5 Daily Minimum			mg/l		Daily, 5 days/week	Grab
Nitrogen, Nitrate, Total (as N)	Sample Measurement										
PARM Code 00620 1 Mon. Site No. EFF-6	Permit Requirement						12.0 Daily Maximum	mg/l		Monthly	Grab

When Comple[illegible] this report to: Department of Environmental Protection, Wastewater Facilities Manag[illegible]ection, MS 3551, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

PERMITTEE NAME: Florida Power & Light Company
MAILING ADDRESS: 19050 SR 62
Parrish, FL 34219

FACILITY: Manatee Plant
LOCATION: 19050 SR 62
Parrish, FL 34219

COUNTY: Manatee

PERMIT NUMBER FL0032174
MONITORING PERIOD From: _____ To: _____
LIMIT: Final REPORT: Monthly
CLASS SIZE: GROUP: Industrial

MONITORING GROUP NUMBER: R-002
PLANT SIZE/TREATMENT TYPE:

☐ - check if no discharge for reporting period

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
Flow	Sample Measurement										
PARM Code 50050 Y Mon. Site No. EFF-5	Permit Requirement	0.005 Max Annual Avg		mgd						Daily, 5 days/week	Calculated Rolling Annual Avg.
BOD, Carbonaceous 5 day, 20C	Sample Measurement										
PARM Code 80082 Y Mon. Site No. EFF-6	Permit Requirement				20.0 Max Annual Avg			mg/l		Monthly	Grab
BOD, Carbonaceous 5 day, 20C	Sample Measurement										
PARM Code 80082 P Mon. Site No. EFF-6	Permit Requirement				30.0 Max Mo Avg	45.0 Mx Weekly Avg	60.0 Daily Maximum	mg/l		Monthly	Grab
Solids, Total Suspended	Sample Measurement										
PARM Code 00530 Y Mon. Site No. EFF-6	Permit Requirement				20.0 Max Annual Avg			mg/l		Monthly	Grab
Solids, Total Suspended	Sample Measurement										
PARM Code 00530 P Mon. Site No. EFF-6	Permit Requirement				30.0 Max Mo Avg	45.0 Mx Weekly Avg	60.0 Daily Maximum	mg/l		Monthly	Grab
Coliform, Fecal Bacteria	Sample Measurement										
PARM Code 74055 Y Mon. Site No. EFF-6	Permit Requirement				200.0 Max Annual Avg		800 Daily Maximum	#/100 ml		Monthly	Grab
pH	Sample Measurement										
PARM Code 00400 1 Mon. Site No. EFF-6	Permit Requirement				6.0 Daily Minimum		8.5 Daily Maximum	su		Daily, 5 days/week	Grab
Chlorine, Total Residual	Sample Measurement										
PARM Code 50060 1 Mon. Site No. EFF-6	Permit Requirement				0.5 Daily Minimum			mg/l		Daily, 5 days/week	Grab
Flow (Total Plant)	Sample Measurement										
PARM Code 50050 1 Mon. Site No. EFF-5	Permit Requirement		.005 Max 3 Month Avg	mgd						Daily, 5days/week	Grab

DEPARTMENT OF ENVIRONMENTAL PROTECTION DISCHARGE MONITORING REPORT - PART A

When Completed mail this report to: Department of Environmental Protection, Wastewater Facilities Management Section, MS 3551, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

PERMITTEE NAME: Florida Power & Light Company
MAILING ADDRESS: 19050 SR 62
Parrish, FL 34219

FACILITY: Manatee Plant
LOCATION: 19050 SR 62
Parrish, FL 34219

COUNTY: Manatee

PERMIT NUMBER FL0032174
MONITORING PERIOD From: _____ To: _____
LIMIT: Final REPORT: Annual
CLASS SIZE: GROUP: Industrial

MONITORING GROUP NUMBER: R-002
PLANT SIZE/TREATMENT TYPE:

☐ **- check if no discharge for reporting period**

Parameter		Quantity or Loading		Units	Quality or Concentration			Units	No. Ex.	Frequency of Analysis	Sample Type
BOD, Carbonaceous 5 day, 20C	Sample Measurement										
PARM Code 80082 G Mon. Site No. INF-1	Permit Requirement						Report Daily Maximum	mg/l		Annually	Grab
Solids, Total Suspended	Sample Measurement										
PARM Code 00530 G Mon. Site No. INF-1	Permit Requirement						Report Daily Maximum	mg/l		Annually	Grab

Point	Description of Monitoring Loca
EFF-1	Mouth of the cooling pond discharge spillway.
EFF-2	At the nearest accessible point after discharge but prior to mixing with the tributary to Gamble Creek.
EFF-3	At the point of discharge from the recovered service water basin to the cooling pond.
EFF-4	At the mid-depth of the precipitation basin.
EFF-5	Flow measurement point at outlet from classifier (weir box).
EFF-6	Final effluent, after disinfection at outlet from chlorine contact chamber, and prior to discharge to R001 or R002.
INF-1	At or prior to inlet to aeration basin, prior to treatment and ahead of any return flows.

The DMR co[illegible]four parts--A, B, C, and D--all of which may or may not be applicable to every facility. [illegible]s may have one or more Part A's for reporting effluent data. All domestic wastewater f[illegible] will have a Part B for reporting[illegible]ample results. Part C is only applicable for domestic wastewater facilities with lim[illegible] weather discharges permitted under Chapter 62-610.860, F.A.C. Part D is used f[illegible]ng ground water monitoring well data.

Hard copies and/or electronic copies of the required parts of the DMR were provided with the permit. All required information shall be typed or printed in ink.

In addition to filling in numerical results on various parts of the DMR, the following codes should be used and an explanation provided where appropriate. Note: Codes used by the lab for raw data may be different.

CODE	DESCRIPTION/INSTRUCTIONS
ANC	Analysis not conducted.
DRY	Dry Well
FLD	Flood disaster.
IFS	Insufficient flow for sampling.
LS	Lost sample.
MNR	Monitoring not required this period since limit is conditional.

CODE	DESCRIPTION/INSTRUCTIONS
NOD	No discharge from/to site.
OPS	Operations were shutdown so no sample could be taken.
OTH	Other. Please enter an explanation of why monitoring data were not available.
SEF	Sampling equipment failure.
TNTC	Too numerous too count (for fecal coliform bacteria only).

When reporting analytical results that fall below a laboratory's reported method detection limits or practical quantification limits, the following instructions and code should be used:

CODE	DESCRIPTION/INSTRUCTIONS
<	If the sampled value is less than the method detection limit (MDL), enter a less than sign followed by the laboratory's MDL value, e.g. < 0.001. In cases where a laboratory reports a value which is less than the parameter's practical quantification limit (PQL), but, not less than the MDL, the value should be reported as the laboratory's MDL value. For example, where the MDL = 0.001, the PQL = 0.005 and the laboratory reports <0.005 (the PQL), the value of 0.001 should be reported on the DMR.

PART A -DISCHARGE MONITORING REPORT (DMR)

Part A of the DMR is comprised of one or more sections, each having its own header information. Facility information is preprinted in the header as well as the monitoring group number, whether the limits and monitoring requirements are interim or final, and the required submittal frequency (e.g. monthly, annually, quarterly, etc.) Submit Part A based on the required reporting frequency in the header and the instructions shown in the permit. The following blanks in the header should be completed by the permittee or authorized representative:

No Discharge From Site: Check this box if no discharge occurs and, as a result, there are no data or codes to be entered for all of the parameters on the DMR for the entire monitoring group number. If there was no discharge of effluent for a particular outfall, reuse, or land application system and the DMR monitoring group includes other monitoring locations (e.g., influent sampling); the "NOD" code should be used to individually denote those parameters for which there was no discharge.
Monitoring Period: Enter the month, day, and year for the first and last day of the monitoring period (i.e. the month, the quarter, the year, etc.) during which the data on this report were collected and analyzed.
Sample Measurement: Before filling in sample measurements in the table, check to see that the data collected correspond to the limit indicated on the DMR (i.e. interim or final) and that the data correspond to the monitoring group number in the header. Enter the data or calculated results for each parameter on this row. Be sure the result being entered corresponds to the appropriate statistical base code (e.g. annual average, monthly average, single sample maximum, etc.).
No. Ex.: Enter the number of sample measurements during the monitoring period that exceeded the permit limit for each parameter. If none, enter zero.
Frequency of Analysis: The shaded areas in this column contain the minimum number of times the measurement is required to be made according to the permit. Enter the actual number of times the measurement was made in the space above the shaded area.
Sample Type: The shaded areas in this column contain the type of sample (e.g. grab, composite, continuous) required by the permit. Enter the actual sample type that was taken in the space above the shaded area.
Signature: This report must be signed in accordance with Rule 62-620.305, F.A.C. Type or print the name and title of the signing official. Include the telephone number where the official may be reached in the event there are questions concerning this report. Enter the date when the report is signed.
Comment and Explanation of Any Violations: Use this area to explain any exceedances, any upset or by-pass events, or other items which require explanation. If more space is needed, reference all attachments in this area.

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Month/Year: Enter the month and year during which the data on this report were collected and analyzed.
Three-month Average Daily Flow: Calculate and enter the three-month average daily flow to the treatment facility.
(TMADF/Permitted Capacity) x 100: Divide the three-month average daily flow by the permitted capacity of the treatment facility, multiply by 100, and enter this value.
Daily Monitoring Results: Record the results of daily monitoring for the parameters required to be sampled by your permit. Record the data in the units indicated.
Plant Staffing: List the name, certificate number, and class of all state certified operators operating the facility during the monitoring period. Use additional sheets as necessary.
Type of Effluent Disposal or Reclaimed Water Reuse: Enter the type of effluent disposal or reclaimed water reuse (e.g. surface water discharge, ocean outfall, slow rate land application-public access, slow rate land application-restricted public access, rapid rate land application, absorption field, underground injection).
Limited Wet Weather Discharge Activated: If this plant does not have a limited wet weather discharge permitted under the provision of Rule 62-610.860, F.A.C., check 'Not Applicable.' If the plant activated the wet weather discharge during the reporting month, check 'Yes' and attach PART C - LIMITED WET WEATHER DISCHARGE.

PART C - LIMITED WET WEATHER DISCHARGE

This part is to be completed and submitted each month reclaimed water or effluent is discharged by a limited wet weather discharge permitted under Rule 62-610.860, F.A.C. For months with no discharge, Part C need not be submitted. All information is to be provided for each day on which the limited wet weather discharge was activated.

Month/Year: Enter the month and year during which the data on this report were collected and analyzed.
Rainfall Information: Enter the name and location of the rainfall gauging station, the source of climatological (normal rainfall) data, the cumulative rainfall for the average rainfall year, and the cumulative rainfall to date for this calendar year. The cumulative rainfall for the average rainfall year is the amount of rain, in inches, which falls during an average rainfall year from January through the month for which this part contains data. The cumulative rainfall to date for this calendar year is the total amount of rain, in inches, that has been recorded since January 1 of the current year through the month for which this DMR contains data.
Date: Enter the date on which the discharge occurred.
Duration of Discharge: Enter the number of hours, to the nearest 0.1 of an hour (0.1 hr. = 6 min.) during each day of discharge that reclaimed water was actually discharged to surface waters.
Gallons Discharged: Enter the quantity in millions of gallons of reclaimed water discharged during the period shown in duration of discharge. Show the units as millions of gallons (mg), accurate to the nearest 0.01.
Average Discharge Flow Rate: Divide gallons discharged by duration of discharge (converted into days). Record in million gallons per day (MGD).
Average Upstream Flow Rate: Enter the average flow rate in the receiving stream upstream from the point of discharge for the period shown in duration of discharge. The average flow rate can be calculated based on two measurements: one made at the start and one made at the end of the discharge period. Measurements are to be made at the upstream gauging station described in the permit.
Stream Dilution Factor: Enter the actual stream dilution ratio accurate to the nearest 0.1. To calculate the factor, divide the average upstream flow rate by the average discharge flow rate.
$CBOD_5$: Enter the average $CBOD_5$ of the reclaimed water discharged during the period shown in duration of discharge.
TKN: Enter the average TKN of the reclaimed water discharged during the period shown in duration of discharge.
Total P: Enter the cumulative number of days since January 1 of the current year during which the limited wet weather discharge was activated divided by the total number of days since January 1 of the current year multiplied by 100%.
Reason for Discharge: Provide a brief explanation of the factors contributing to the need to activate the limited wet weather discharge.

PART D - GROUND WATER MONITORING REPORT

Monitoring Period: Enter the month, day, and year for the first and last day of the monitoring period (i.e. the month, the quarter, the year, etc.) during which the data on this report were collected and analyzed.
Date Sample Obtained: Enter the date the sample was taken. Also, check whether or not the well was purged before sampling.
Sampling Methods: Indicate the procedure used to collect the sample (e.g. airlift, bucket/bailer, centrifugal pump, etc.)
Samples Filtered: Indicate whether the sample obtained was filtered by laboratory (L), filtered in field (F), or unfiltered (N).
Preservatives Added: State what preservatives were added to the sample.
Analysis Method: Indicate the analytical method used. Record the method number from Chapter 62-160 or Chapter 62-601, F.A.C., or from other sources.
Analysis Result/Units: Record the results of the analysis. If the result was below the minimum detection limit, indicate that. Enter the units associated with the results of the analysis.
Detection Limits/Units: Record the detection limits of the analytical methods used and the units associated with them.
Comments and Explanations: Use this space to make any comments on or explanations of results which are unexpected. If more space is needed, reference all attachments in this area.

APPENDIX 10.4.3

POTABLE WATER SYSTEM

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Original - Jo
Copy - M.A

STATE OF FLORIDA

DEPARTMENT OF
Health & Rehabilitative Services

Reubin O'D Askew, Governor

District Six
202 SIXTH AVENUE, EAST, BRADENTON, FLORIDA 33505

MANATEE COUNTY HEALTH DEPT.

RECEIVED
NOV 8 1976
Mgr. Envtl. Affairs

November 3, 1976

Mr. W. Samuel Tucker, Jr., Manager
Environmental Affairs
Florida Power & Light Company
Post Office Box 013100
Miami, Florida 33101

Re: Manatee Power Plant, Potable Water System
DER Serial No. WC-41-1033

Dear Mr. Tucker:

Reference is made to your letter of October 27th addressed to Mr. E. G. Snipes of the Department of Environmental Regulation in which you stated that the potable water supply system at the Manatee Power Plant has been completed in accordance with specifications and so certified by the engineer.

Mr. Snipes, by telephone, has requested this office to respond to your request. Accordingly since all requirements have been met including bacteriological testing, this letter constitutes the clearance for the facility.

Very truly yours,

Martin S. Werngren

Martin S. Werngren
Ass't Pollution Control Director

MSW:vf
FYI Copy To:
G. G. Cobb
J. C. Walden
W. J. Waylett, Jr.
M. C. Mears
Doc. Files

BEST AVAILABLE COPY

FLORIDA POWER & LIGHT COMPANY

October 27, 1976

Mr. E. G. Snipes, P. E.
Southwest District
State of Florida
Department of Environmental
Regulation
9721 Executive Center Drive, North
Suite 200
St. Petersburg, Florida 33702

Dear Mr. Snipes:

Re: Manatee Power Plant, Potable Water System
DER Serial No. WC-41-1033

As required by Proviso No. 1 of the subject approval, enclosed please find the certification of the engineer of record that the potable water supply system to serve the Manatee Power Plant has been completed in accordance with the approved plans.

It is our understanding that bacteriological analyses have been made, as well as a chemical analysis, and that you have this data. The enclosed engineers report should provide the data required for issuance of a letter of clearance for the facility from the DER.

If any further information is needed, please let me know.

Sincerely,

W. Samuel Tucker, Jr.

W. Samuel Tucker, Jr., Manager
Environmental Affairs

WST:JBB
Enc.
cc: Manatee County Health Department
bcc: G. G. Cobb
J. C. Walden
W. J. Waylett, Jr.
M. C. Mears
M. A. Smith
Env. File PMT-R-13

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FLORIDA POWER & LIGHT COMPANY

CERTIFICATE OF ENGINEER

TO:
State of Florida
Department of Environmental
Regulation
9721 Executive Center Drive, No.
St. Petersburg, Florida 33742

This is to certify that construction of the potable water supply system to serve the Manatee Power Plant has been completed in accordance with the approved plans.

W. H. Rogers, Jr.
Registered Engineer No. 5921
Date Oct 22, 1976

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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
SOUTHWEST DISTRICT
EXECUTIVE CENTER DRIVE, NORTH, SUITE 200
~~P.O. BOX 20333~~ 33702
ST. PETERSBURG, FLORIDA ~~33742~~

REUBIN O'D ASKEW
GOVERNOR

JOSEPH

PMT/PMR
ROGERS
O'NEAL
SLEPOW
DIAZ
DONATELLI
DYR
HURST
SIGLER
FILE

DATE RECEIVED JUL 2 1976

ROGERS		DIEHL	
O'NEAL		SZEFO	
KENT		PADST	
BRAIN		GILBERT	
FRIES		VOGAN	
FLUGGER		HILLMAN	
CHRISTIAN			

June 29, 1976

Mr. Walter H. Rogers, Jr., P.E.
Florida Power and Light Company
Post Office Box 13100
Miami, Florida 33101

Manatee County
Florida Power and Light Co.

Dear Mr. Rogers:

This will acknowledge receipt of plans and related documents pertaining to water supply and treatment system to serve the Manatee Power Plant.

Effective June 29, 1976 the above project plans and documents are approved under Serial No. WC-41-1033 SUBJECT TO THE ATTACHED PROVISOS.

This approval pertains only to the water utilities serving this development and is not to be construed as approval of any other utility aspects. All concerned are reminded that sewerage facilities must be cleared separately through this office.

By copy of this letter to the owner, we are advising that approval is given functional aspects of this project on the basis of representations to and data furnished this department.

The engineer's certification as to construction of this project in accordance with the approved plans together with satisfactory bacteriological analyses shall be provided and a letter of clearance obtained from this agency before placing these facilities in service.

There may be county, municipal or other local regulations or restrictions to be complied with by the owner prior to construction of the facilities represented by the plans referred to above, and we, therefore, recommend that appropriate local agencies be consulted before starting construction.

Within the next few days, two sets of the approved materials will be returned to you. Thank you for your cooperation.

Yours very truly,

E. G. Snipes

E. G. Snipes P.E.

EGS/rs

cc: Manatee County Health Department

1. Construction of this project must be commenced within one year from the date of this application; otherwise plans and specifications must be resubmitted for approval by this department. The engineer of record in this application is responsible for supervision of the construction of this project and upon completion shall inspect for complete conformity to the plans and specifications as approved. A report of such inspection in writing and signed by the engineer shall be rendered to the interested County Health Department and this Agency.

2. This approval is given with the understanding that upon the installation of such works, its operation shall be placed under the care of a competent person, whose qualifications are approved by the Department of Environmental Regulation, and the operation shall be carried out according to best accepted practice and in accordance with the requirements of the Department of Environmental Regulation Chapter 10D-11, Florida Administrative Code. This includes not only the provision of continuing essential funds for maintaining equipment and supplying the needs of a suitable water plant laboratory which is required for proper operation of this water treatment facility.

3. Water supply facilities including mains shall be installed, cleaned, disinfected, and bacteriologically cleared for service, in accordance with the latest AWWA Standards and Chapter 10D-4, Florida Administrative Code.

4. Where water and sewer mains cross with less than 18" vertical clearance, the sewer will be 20' of either cast iron pipe or concrete encased vitrified clay pipe, centered on the point of crossing. When a water main parallels a sewer main, a separation of at least 10' should be maintained where practical.

5. If the proposed method of treatment does not provide an acceptable quality of water additional treatment shall be provided.

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STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHWEST DISTRICT

EXECUTIVE CENTER DRIVE, NORTH, SUITE 200

~~P.O. BOX 20555~~ 33702

ST. PETERSBURG, FLORIDA ~~33742~~

REUBIN O'D. ASKEW
GOVERNOR

JOSEPH

PMT/PMR
ROGERS
O'NEAL
SLEPOW
DIAZ
DONATELLI
DYR
HURST
SINGER
FILE

DATE RECEIVED JUL 2 1976

ROGERS		DIEHL	
O'NEAL		SZCZO	
KENT		PABST	
BRAIR		GILBERT	
FRIES		LOGAN	
FLUGGER		HILLMAN	
CHRISTIAN			

June 29, 1976

Mr. Walter H. Rogers, Jr.
Florida Power and Light Company
Post Office Box 13100
Miami, Florida 33101

Manatee County
Florida Power and Light Co.

Dear Mr. Rogers:

This will acknowledge receipt of plans and related documents pertaining to water supply and treatment system to serve the Manatee Power Plant.

Effective June 29, 1976 the above project plans and documents are approved under Serial No. WC-41-1033 SUBJECT TO THE ATTACHED PROVISOS.

This approval pertains only to the water utilities serving this development and is not to be construed as approval of any other utility aspects. All concerned are reminded that sewerage facilities must be cleared separately through this office.

By copy of this letter to the owner, we are advising that approval is given functional aspects of this project on the basis of representations to and data furnished this department.

The engineer's certification as to construction of this project in accordance with the approved plans together with satisfactory bacteriological analyses shall be provided and a letter of clearance obtained from this agency before placing these facilities in service.

There may be county, municipal or other local regulations or restrictions to be complied with by the owner prior to construction of the facilities represented by the plans referred to above, and we, therefore, recommend that appropriate local agencies be consulted before starting construction.

Within the next few days, two sets of the approved materials will be returned to you. Thank you for your cooperation.

Yours very truly,

E. G. Snipes

E. G. Snipes P.E.

EGS/rs

cc: Manatee County Health Department

1. Construction of this project must be commenced within one year from the date of this application; otherwise plans and specifications must be resubmitted for approval by this department. The engineer of record in this application is responsible for supervision of the construction of this project and upon completion shall inspect for complete conformity to the plans and specifications as approved. A report of such inspection in writing and signed by the engineer shall be rendered to the interested County Health Department and this Agency.

2. This approval is given with the understanding that upon the installation of such works, its operation shall be placed under the care of a competent person, whose qualifications are approved by the Department of Environmental Regulation, and the operation shall be carried out according to best accepted practice and in accordance with the requirements of the Department of Environmental Regulation Chapter 10D-11, Florida Administrative Code. This includes not only the provision of continuing essential funds for maintaining equipment and supplying the needs of a suitable water plant laboratory which is required for proper operation of this water treatment facility.

3. Water supply facilities including mains shall be installed, cleaned, disinfected, and bacteriologically cleared for service, in accordance with the latest AWWA Standards and Chapter 10D-4, Florida Administrative Code.

4. Where water and sewer mains cross with less than 18" vertical clearance, the sewer will be 20' of either cast iron pipe or concrete encased vitrified clay pipe, centered on the point of crossing. When a water main parallels a sewer main, a separation of at least 10' should be maintained where practical.

5. If the proposed method of treatment does not provide an acceptable quality of water additional treatment shall be provided.

APPENDIX 10.4.4

DOMESTIC WASTEWATER

Department of Environmental Protection

Jeb Bush
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

David B. Struhs
Secretary

May 27, 1999
Manatee County-DW
Florida Power & Light
Manatee WWTP
Site No. FLA012625

Larry L. Leskovjan, Manager
Environmental Affairs Department
Florida Power and Light Company
P.O. Box 088801
North Palm Beach, FL 33408-8801

Re: Minor Revision of Wastewater
Permit No. DO41-191563

Dear Mr. Leskovjan:

We are in receipt of your request, application # 41-FLA012625-001-DW4/MR, for a minor revision of the above referenced wastewater permit for a domestic facility, originally issued on March 23, 1992, revised ("A") on April 10, 1992, ("B") on March 1, 1996, and administratively extended.

The permit is revised as follows:

Specific Condition	From	To
S.C #8	Delete existing S.C. #8	Replace with attached new S.C. #8

This letter constitutes minor revision "C" of the above wastewater permit and therefore shall be appended to it. All future correspondence should reference the original Permit Number DO41-191563.

Sincerely,

for E. S. Snyder

Michael S. Hickey, P.E.
Water Facilities Administrator
Southwest District

Attachment

cc: Blue Septic Tank Service, Inc.
FP&L Manatee Plant-Lynn French

8. **Residuals Management Requirements**

Basic Management Requirements

a. The method of residuals use or disposal by this facility is transport to the Blue Septic Lime Stabilization Residuals Management Facility (FLA016189) for further treatment and disposal, or disposal in a Class I or II solid waste landfill.

b. The permittee shall be responsible for proper treatment, management, use, and land application or disposal of its residuals. *[62-640.300(5), 3-30-98]*

c. The permittee shall not be held responsible for treatment, management, use, or land application violations that occur after its residuals have been accepted by a permitted residuals management facility with which the source facility has an agreement in accordance with Rule 62-640.880(1)(c), F.A.C., for further treatment, management, use or land application. *[62-640.300(5), 3-30-98]*

d. Disposal of residuals, septage, and other solids in a solid waste landfill, or disposal by placement on land for purposes other than soil conditioning or fertilization, such as at a monofill, surface impoundment, waste pile, or dedicated site, shall be in accordance with Chapter 62-701, F.A.C. *[62-640.100(6)(k)3&4, 3-30-98]*

e. If the permittee intends to accept residuals from other facilities, a permit revision is required pursuant to Rule 62-640.880(2)(d), F.A.C. *[62-640.880(2)(d), 3-30-98]*

f. Storage of residuals or other solids at the permitted facility shall require prior written notification to the Department if the storage lasts longer than 30 days. *[62-640.300(4), 3-30-98]*

g. The permittee shall keep hauling records to track the transport of residuals between facilities. The hauling records shall contain the following information:

1. Date and Time Shipped
2. Amount of Residuals Shipped
3. Degree of Treatment (if applicable)
4. Name and ID Number of Residuals Management Facility

These records shall be kept for five years and shall be made available for inspection upon request by the Department. A copy of the hauling records information maintained by the source facility shall be provided upon delivery of the residuals to the residuals management facility. The permittee shall report to the Department within 24 hours of discovery any discrepancy in the quantity of residuals leaving the source facility and arriving at the residuals management facility. *[62-640.880(4), 3-30-98]*

h. In the event that the treatment facilities or equipment no longer function as intended, are no longer safe in terms of public health and safety, or odor, noise, aerosol drift, or lighting adversely affects neighboring developed areas at the levels prohibited by Rule 62-600.400(2)(a), F.A.C., corrective action (which may include additional maintenance or modifications of the permitted facilities) shall be taken by the permittee. Other corrective action may be required to ensure compliance with rules of the Department. Additionally, the treatment, management, use or land application of residuals shall not cause a violation of the odor prohibition in Rule 62-296.320(2), F.A.C. *[62-600.410(8),12-24-96 and 62-640.400(6), 3-30-98]*

i. Disposal of screenings and grit from preliminary treatment components of wastewater treatment facilities, solids from sewer line cleaning operations, and solids from lift stations and pump stations shall be in accordance with Chapter 62-701, F.A.C. *[62-640.100(6)(k)8., 3-30-98 and 62-701.300(1)(a),4-23-97]*

Florida Power & Light Company, 19050 State Road 62, Parrish, FL 34219-9220

FPL

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
P 119 084 461

December 12, 1996

Mr. Craig Diltz
State of Florida
Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

FPL - Manatee Plant
State Wastewater Permit Number FL0032174
Request for Minor Revision

Dear Mr. Diltz

Enclosed please find the following items to support a request for a Minor Revision to the Florida Power & Light Company(FPL) Manatee Plant's "combined" State Wastewater Permit

1. FPL Check Number 9170006361 made payable to the DEP for the amount of $250.

2. Three (3) completed copies of DEP Form 62-620.910(9) - Application for a Minor Revision to a Wastewater Facility Permit with attachments.

FPL is requesting that the facility's State Wastewater Permit, which currently consists of the former EPA NPDES Permit and the State Industrial Wastewater Permit, be modified to include its Domestic Wastewater Permit (Permit Number DO-41-191563). You have previously received a copy of the renewal application for the domestic wastewater permit and FPL requests that this renewal application be addressed, at the appropriate time, in conjunction with the renewal of the State Wastewater Permit.

If you have any questions on this matter or need additional information, please contact Ron Hix at (561) 625-7605.

Sincerely,

J. M. Parent
Plant General Manager

Enclosures

Florida Department of Environmental Regulation
Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347
Lawton Chiles, Governor 813-620-6100 Carol M. Browner, Secretary

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PERMIT ISSUANCE

In the Matter of an Application for Permit by:

Dr. M.A. Smith, Manager
Florida Power & Light Co.
Environ. Permitt. & Programs
P.O. Box 078768
West Palm Beach, FL 33407

DER File No. DO41-191563
FPL Manatee Plant

RECEIVED
MAR 27 1992
MANAGER
ENVIRONMENTAL AFFAIRS

Dear Dr. Smith:

Enclosed is Permit Number DO41-191563 to operate a domestic wastewater treatment plant, issued pursuant to Section 403.087(1), Florida Statutes.

A person whose substantial interests are affected by this permit may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within 14 days of receipt of this permit. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The petition shall contain the following information:

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number, and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this permit. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

This permit is final and effective on the date filed with the Clerk of the Department unless a petition is filed in accordance with the above paragraphs or unless a request for extension of time in which to file a petition is filed within the time specified for filing a petition and conforms to Rule 17-103.070, F.A.C. Upon timely filing of a petition or a request for an extension of time, this permit will not be effective until further order of the Department.

PERMITTEE: Florida Power & Light Co.
PERMIT NO.: DO41-191563

When the order (permit) is final, any party to the order has the right to seek judicial review of the order pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, 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 days from the date the Final Order is filed with the Clerk of the Department.

Executed in Tampa, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION
DOMESTIC WASTE PROGRAM

cc: Engineer of Record
Manatee County PHU

/cw

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT ISSUANCE and all copies were mailed before the close of business on March 23, 1992 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to §120.52(11), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Barbara L. Wagner (Clerk) 03-23-92 (Date)

Florida Department of Environmental Regulation

Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347

Lawton Chiles, Governor 813-620-6100 Carol M. Browner, Secretary

*See Revision dated 3/1/96 MODIFICATION "B"

PERMITTEE:
Florida Power & Light Co.
Environ. Permitt. & Programs
P.O. Box 078768
West Palm Beach, FL 33407

Attn: Dr. M. A. Smith
Manager

PERMIT/CERTIFICATION
GMS ID No: 4041P00894
Permit No: DO41-191563
Date of Issue: 03/23/92
Expiration Date: ~~05/30/96~~ *3/22/97
County: Manatee
Lat/Long: 27° 35' 55"
82° 20' 43"
Sec/Town/Range: 18/33S/20E
Project: FPL Manatee Plant
Processor: W.T. Washburn

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 17-3, 17-4 and 17-600 Series. 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 department and made a part hereof and specifically described as follows:

Operation of a 0.005 MGD Type III extended aeration wastewater treatment plant with chlorinated effluent to a cooling pond of 4000 acres, or to an alternate existing drainfield of approximately 6300 sq. ft. located on site.

Location: State Road 62, Parrish, Florida

Replaces Permit No.: DO41-115796 Expired: 03/24/91

SPECIFIC CONDITIONS:

1. Drawings, plans, documents or specifications submitted by the permittee, not attached hereto, but retained on file at the Southwest District Office, are made a part hereof.

2. The zone of discharge boundary shall extend horizontally to the installation's property boundary and vertically to the base of the shallow water table aquifer. (Rule 17-28.700, F.A.C.)

3. The water quality standards for Class G-II groundwater shall not be exceeded at the boundary of the zone of discharge. (Rule 17-3.402, Rule 17-3.404, F.A.C.)

4. In accordance with Chapter 17-602, F.A.C., the required certified operator on site time is: a Class D or better operator for 2 non-consecutive visits per week for 1 hour per week.

5. The discharge from the chlorine contact chamber shall be sampled in accordance with Chapter 17-601, F.A.C. and shall meet the following limitations:

Parameter	Unit	Min-imum	Maximum	Type Sample	Frequency
Permitted Capacity (flow)	mgd	.000	0.005		Daily,5/wk
pH	std un	6.00	8.50	grab	Daily,5/wk
CBOD5 & Total Suspended Solids	mg/L	0	20 annual avg. 30 monthly avg. 45 weekly avg. 60 any one sample	grab	Monthly
Cl2	mg/L	0.5	-	grab	Daily,5/wk
Fecal coliform	#/100	0	200 Annual Average 200 Monthly Avg.	grab	Monthly
(When alternative disposal drainfield is in use only)					
Nitrate (as N)	mg/L	0	12	grab	Monthly
Total Suspended Solids	mg/L	-	10	grab	Monthly

The results shall be reported monthly on DER Form 17-601.900(1).

See Permit MODIFICATION DO41-191563 A

6. Direct discharge from the cooling pond to area surface waters is not allowed except twice a year to test emergency release gates. The Domestic Wastewater Compliance Section of the Department's Southwest District Office shall be notified at least 24 hours prior to any planned discharge required for testing of the emergency release gates. Within ten (10) days following the discharge, the permittee shall provide DER in writing with the following information:

a. A description and cause of the discharge.

b. The period of discharge, to include exact dates and times.

c. The volume of water discharged.

In addition, within thirty (30) days after the discharge, the following additional information shall be provided:

d. The quality of the discharge ($CBOD_5$, TSS, TN, TP, and Fecal Coliform).

The permittee shall limit the volume of water released during the testing of the emergency release gates to 30000 gallons per event. Should this volume be exceeded, the permittee shall provide, along with the report required above, an explanation for the cause of the exceedance. In addition, if the volume of the discharge exceeds 30000 gallons per event, the permittee shall monitor the receiving stream for water quality impacts of the discharge, and shall include this information in the Thirty (30) day report required above. (D.O., pH, temperature, conductivity, $CBOD_5$, TN, TP, and Fecal Coliform.)

In both cases ($<$30000 gallons or $>$30000 gallons), the permittee shall monitor the water quality impacts to the receiving stream by sampling the required parameters:

a. 500 feet upstream of the discharge

b. At the point of discharge

c. 1000 feet downstream of the discharge

The frequency of the sampling shall be:

a. Before discharge

b. Within two (2) hours after discharge

c. Twenty-four(24) hours after discharge

7. If historical or archaeological artifacts, such as Indian canoes, are discovered at any time within the project site, the permittee shall notify the DER Southwest District office and the Bureau of Historic Preservation, Division of Archives, History and Records Management, R.A. Gray Building, Tallahassee, Florida 32301, telephone number (904) 487-2073.

8. The residuals from this treatment plant shall be disposed of only at the Sarasota County Septage Treatment Facility at the Bee Ridge Road Landfill site.

9. The permittee shall provide a weatherproof location for an on/site log book to monitor the daily activities of the certified operator. This log book shall record sign in/out times of the certified operator, list any maintenance performed and contain the signature and certification number of the operator.

10. A reduced pressure zone backflow preventer shall be installed on any potable water supply to the treatment facility. No potable water outlet intended for human contact shall be located down-line of the backflow preventer.

11. The disinfection system shall be operated to maintain a minimum chlorine residual of 0.5 mg/l at the outfall from the chlorine contact chamber. A metering device for dosing chlorine to the effluent shall be utilized and the chlorine supply tank shall be inspected regularly to ensure proper operation.

12. Prior to sixty days before the expiration of this permit, the permittee shall apply for a renewal of the permit on forms and in a manner prescribed by the Department of Environmental Regulation.

13. Prior to the use of the drainfield as an alternative disposal facility, the drainfield must be placed into trial service for 30 days to determine its integrity and functionality. The results of this trial period shall be reported qualitatively on the Monthly Operating Report for that period. Following the trial operation period, a routine maintenance program must be implemented for the drainfield system to insure its continued effectiveness and operational capability.

14. The permittee shall be aware of and operate under the attached "General Permit Conditions #1 thru #15". General Permit Conditions are binding upon the permittee and enforceable pursuant to Chapter 403 of the Florida Statutes.

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Richard D. Garrity, Ph.D.
Director of District Management

ATTACHMENT - GENERAL CONDITIONS:

The terms, conditions, requirements, limitations and restrictions set forth in this permit, are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, State, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in this permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, are required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the permitted activity is located or conducted to:

(a) Have access to and copy any records that must be kept under conditions of the permit;

(b) Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

14. The permittee shall comply with the following:

(a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

(b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

(c) Records of monitoring information shall include:

1. the date, exact place, and time of sampling or measurements;
2. the person responsible for performing the sampling or measurements;
3. the dates analyses were performed;
4. the person responsible for performing the analyses;
5. the analytical techniques or methods used;
6. the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

Department of Environmental Protection

CONTROLLED COPY

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

RECEIVED
MAR - 4 1996
ENVIRONMENTAL AFFAIRS

March 1, 1996
Manatee County-DW
FP&L Manatee Plant WWTP
GMS No. 4041P00894

Larry L. Leskovjan, Manager
Environmental Affairs Department
Florida Power and Light Company
P.O. Box 088801
North Palm Beach, FL 33408-8801

Minor Revision of Permit
Permit No. DO41-191563

Dear Mr. Leskovjan:

This is in response to your application # 284994 for extension of the expiration date of the above wastewater permit, originally issued March 23, 1992.

Please make note of the new expiration date of the permit on March 22, 1997, and of your responsibility to apply for a renewal of your wastewater permit at least 180 days before it expires. The permit is modified as follows:

Expiration Date	From	To
	May 30, 1996	March 22, 1997

This letter constitutes modification "B" of the above permit and, therefore, shall be appended to it. All future correspondence should reference the original permit number DO41-191563.

Your cooperation is appreciated.

Sincerely,

For Michael S. Hickey, P.E.
Water Facilities Administrator
Southwest District

MSH/ww

cc: Manatee County Environmental Management Department

Florida Department of Environmental Regulation

Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347

Lawton Chiles, Governor 813-620-6100 Carol M. Browner, Secretary

April 10, 1992

RECEIVED

APR 14 1992

MANAGER
ENVIRONMENTAL AFFAIRS

Dr. M. A. Smith, Manager
Florida Power & Light Co.
Environmental Permitting and Programs
P.O. Box 078768
West Palm Beach, FL 33407

Manatee County - DW

Dear Dr. Smith:

Modification of Conditions
Permit No. DO41-191563A

We are in receipt of your request for a modification of the permit conditions. The conditions are changed as follows:

Condition	From	To
Specific Condition # 6	Existing	See Attached

This letter must be attached to your permit and becomes a part of that permit.

Sincerely,

Richard D. Garrity, Ph.D.
Director of District Management
Southwest District

RDG/www

cc: Engineer of Record
Manatee County PHU

attachment:

Replace existing specific condition # 6 with the following:

6. Direct discharge from the cooling pond to area surface waters is not allowed except twice a year to test emergency release gates. The Domestic Wastewater Compliance Section of the Department's Southwest District Office shall be notified at least 24 hours prior to any planned discharge required for testing of the emergency release gates. Within ten (10) days following the discharge, the permittee shall provide DER in writing with the following information:

a. A description and cause of the discharge

b. The period of discharge, to include exact dates and times

c. The volume of water discharged

In addition, within thirty (30) days after the discharge, the following additional information shall be provided:

d. The quality of the discharge, sampled at the outfall from the cooling pond ($CBOD_5$, TSS, TN, TP, and Fecal Coliform)

The permittee shall limit the volume of water released during the testing of the emergency release gates to 30000 gallons per event. Should this volume be exceeded, the permittee shall provide, along with the report required above, an explanation for the cause of the exceedance. In addition, if the volume of the discharge exceeds 30000 gallons per event, the permittee shall monitor the receiving stream for water quality impacts of the discharge, and shall include this information in addition to the discharge quality information, in the Thirty (30) day report required above. (D.O., pH, temperature, conductivity, $CBOD_5$, TN, TP, and Fecal Coliform.)

When the quantity of the discharge exceeds 30000 gallons, the permittee shall monitor the water quality impacts to the receiving stream by sampling the required parameters:

a. 500 feet upstream of the discharge

b. At the point of discharge

c. 1000 feet downstream of the discharge

The frequency of the sampling shall be:

a. Before discharge

b. Within two (2) hours after discharge

c. Twenty-four(24) hours after discharge

APPENDIX 10.4.5

ERP

DEPARTMENT OF THE ARMY
TAMPA REGULATORY FIELD OFFICE, JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 19247
TAMPA, FLORIDA 33686- 9247

REPLY TO
ATTENTION OF

NATIONWIDE PERMIT VERIFICATION
ACTION ID: 199708261 (NW-PB)

Nationwide Permit Number(s): NW3

ISSUE DATE: December 31, 1997 **EXPIRATION DATE: December 31, 1999**

PERMITTEE

Florida Power & Light Company
Attn: James N. Arkerson
P.O. Box 14000
Juno Beach, FL 33408-0420

LOCATION

Willow Industrial Track, North of Parrish in Section 016, Township 33 South, Range 19 East, Manatee County, Florida.

DESCRIPTION OF ACTIVITY:

To replace drainage culverts along the Willow Industrial Railroad Track MP 358.5.

Your project has been reviewed in accordance with the letter and accompanying drawings dated November 6, 1997. This verifies that your proposal is authorized by this Nationwide Permit in accordance with the enclosed copy of our regulations as stated in December 13, 1996, Federal Register, Final Notice of Issuance, Reissuance, and Modification of Nationwide Permits (61 FR 65874). This verification is valid until the expiration shown above, unless this Nationwide Permit is modified, reissued, or revoked. It is incumbent on you to remain informed of changes in these nationwide permits. We will issue a public notice announcing any changes when they occur.

In the event that you have not completed construction of your project within the above time limit, a separate application or reverification will be required. A separate Department of the Army permit is not required providing the work is done in accordance with the drawings and information as provided in your request, the conditions listed in December 13, 1996, Federal Register, Final Issuance, Reissuance, and Modification of Nationwide Permits (61 FR 65874), Paragraph C (Nationwide Permit Conditions), and any appropriate regional conditions enclosed.

This letter does not obviate the necessity to obtain any State or local permits which may be necessary for your proposed work. You should check State permitting requirements with the Florida Department of Environmental Protection or the appropriate Water Management District.

If there are any questions regarding this verification please contact Pauline E. Baker at the letterhead address or by telephone at (813)840-2908.

Joseph R. Bacheler
Chief, Tampa Regulatory
Field Office

Enclosures

PERMITTEE: **Florida Power & Light Company**
APPLICATION NUMBER: **199708261 (NW-PB)**

MITIGATION REQUIREMENTS AND/OR OTHER SPECIAL CONDITIONS ISSUED WITH YOUR NATIONWIDE VERIFICATION

If any work is performed under this permit, the following special conditions must be performed:

MITIGATION: NONE

ADDED SPECIAL CONDITIONS: NONE

PERMITTEE: **Florida Power & Light Company**
APPLICATION NUMBER: **199708261 (NW-PB)**

GENERAL CONDITIONS
33 CFR PART 320-330
PUBLISHED FEDERAL REGISTER DATED 13 NOVEMBER 1986

1. The time limit for completing the work authorized ends on **December 31, 1999**. If you find that you need more time to complete the authorized activity, submit your requires for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office. which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow a representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

PERMITTEE: **Florida Power & Light Company**
APPLICATION NUMBER: **199708261 (NW-PB)**

NATIONWIDE PERMIT CONDITIONS
ADDITIONAL INFORMATION

1. Your nationwide permit verification is specifically conditioned by the State of Florida with the following language, "Projects qualifying for this nationwide permit must be individually reviewed by the State of Florida and receive water quality certification and coastal zone consistency as well as any authorizations required for the use of submerged lands".

2. This nationwide permit is being verified for the work described in your request. As owner of the property or as a party with the requisite property interest to do the work, you are considered liable for any activities that are not in compliance with this verification. If at some point you no longer have the requisite property interest for this project, you are required to transfer the nationwide verification to the new owner by having them sign at the bottom of this letter. Please send a copy of this transfer to the U.S. Army Corps of Engineers the letterhead address.

3. A general condition of all the nationwide permits is to provide a certification of compliance. This certifies that the work performed under this verification was in accordance with the Corps authorization, including any general or specific conditions. Once your project is completed, the attached compliance certification, along with the authorization letter, should be provided to the U.S. Army Corps of Engineers office at the letterhead address.

4. Flood Plain Information: A nationwide permit verification does not give absolute authority to perform the work as specified on your application. The proposed work may be subject to local building permits to determine if your site is located in a flood-prone or floodway area, and if you must comply with the local building requirements mandated by the National Flood Insurance Program. If the local office cannot provide you the necessary information, you may provide a letter with a small scale map showing the location of the site, requesting a flood-hazard evaluation of the site. The request should be addressed to the Chief, Flood Control and Floodplain Management Branch, Jacksonville District, U.S. Army Corps of Engineers, Post Office Box 4970, Jacksonville, Florida 32232-0019.

5. Enclosed are the specific conditions as listed in 33 CFR part 330, Appendix A, Subparagraphs B and C for the Nationwide Permits.

6. Enclosed, if applicable are any regional conditions established for the Nationwide Permit identified at the top of this verification letter.

PERMITTEE: **Florida Power & Light Company**
APPLICATION NUMBER: **199708261 (NW-PB)**

REQUEST FOR PERMIT TRANSFER:

When the structures or work verified by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ _____

(TRANSFEREE - SIGNATURE) (DATE)

_____

(NAME - PRINTED/TYPED)

Lot/Block: _____

_____

(STREET ADDRESS - PRINTED/TYPED)

_____

(CITY, STATE, ZIP CODE - PRINTED/TYPED)

PERMITTEE: **Florida Power & Light Company**
APPLICATION NUMBER: **199708261 (NW-PB)**

Nationwide Compliance Certification
Nationwide Permit Number: **NW3**

ISSUE DATE: January 2, 1998 **EXPIRATION DATE: December 31, 1999**

Name and Address: _____

_____

_____

Phone Number: _____

Description of the Work (e.g. bank stabilization, residential fill etc):

_____

_____

Type and acreage (or square feet) of the loss of Waters of the United States (jurisdictional wetlands)(e.g.1/10 acre of marsh and 50 square feet of a stream):

_____

Description of Mitigation Completed (if applicable):

_____

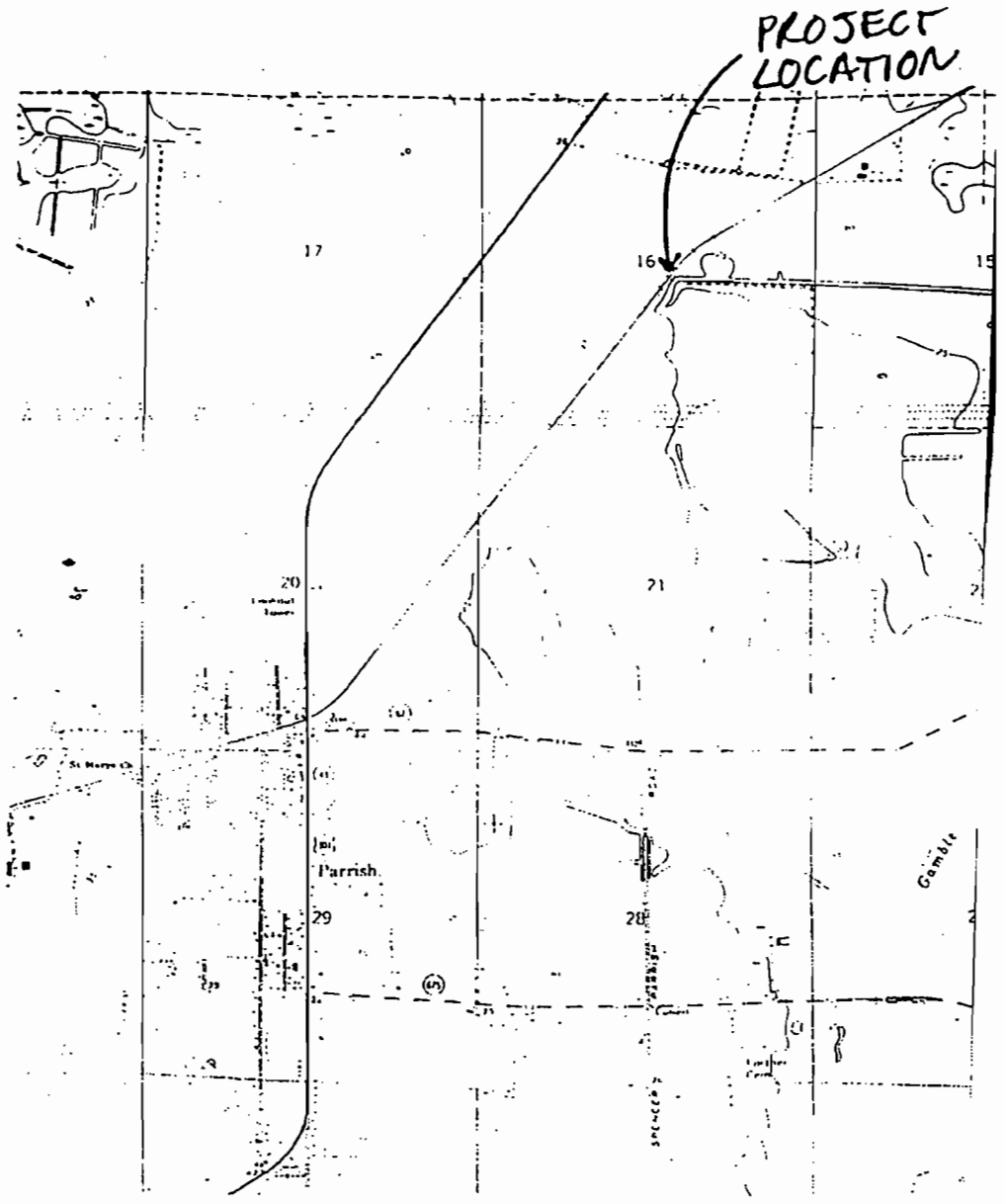
_____

I,_____, hereby certify that the work was done as described in the authorization letter. All work and required mitigation (if applicable) was completed in accordance with the permit conditions.

_____ _____

Signature of Permittee (date)

BEST AVAILABLE COPY



KEY PLAN

WALKDOWN INFORMATION	ORG	BY	DATE
AS-BUILT INFORMATION			

TECHNICAL ACCEPTANCE	ORG	BY	DATE
ENGINEERING ORGANIZATION			

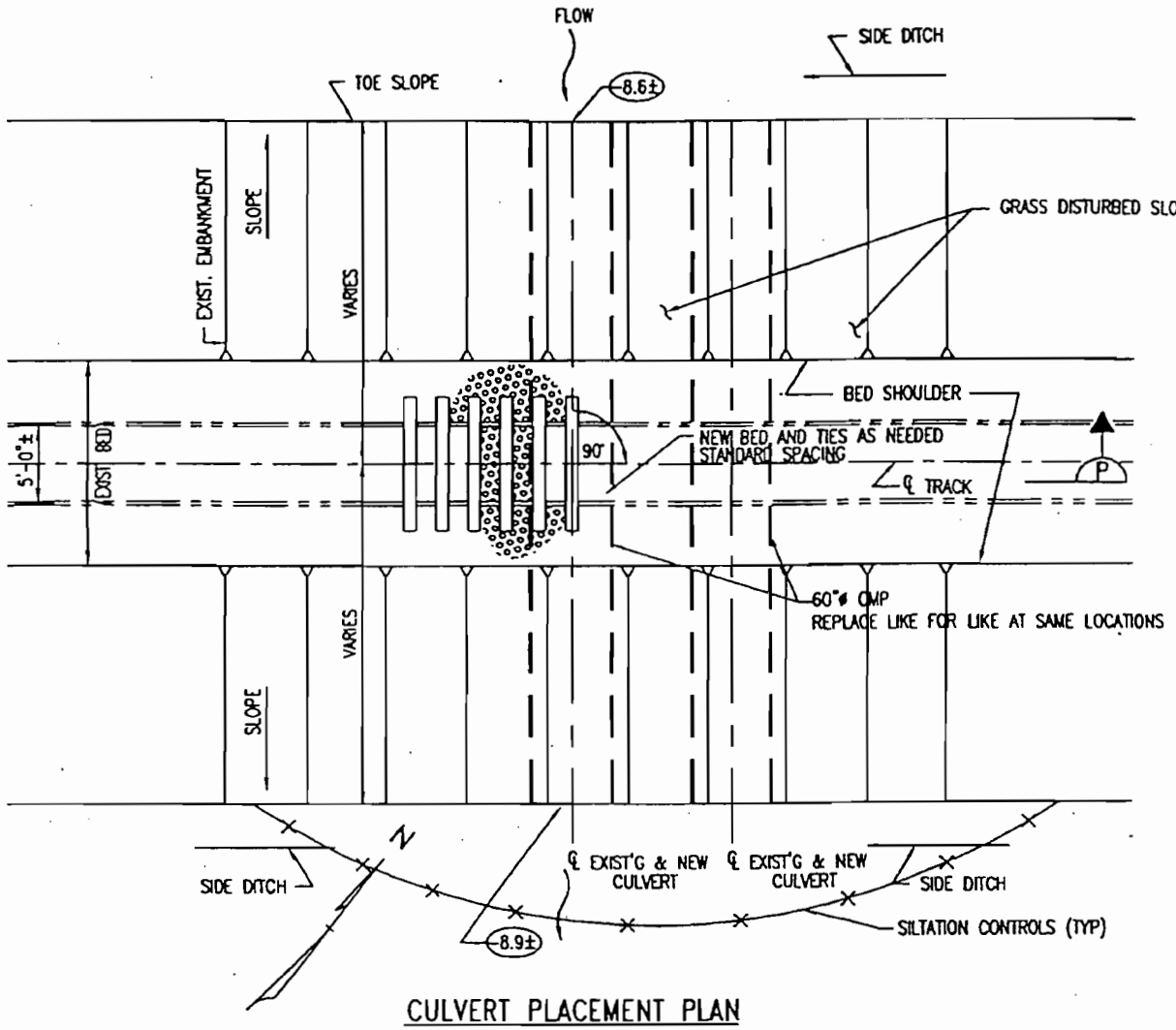
BAR CODE

REV	DATE	REVISION DESCRIPTION	NJH BY	MJG CK	COR	PTC APR	CPA ORG
A	10/14/97	ISSUED FOR REVIEW					

FPL

SYSTEM	DISCIPLINE: BOP	PLANT/UNIT: MANATEE
SCALE: N/A	CAD FILE NAME	TITLE: TWIN 60" CULVERT REPLACEMENT WILLOW INDUSTRIAL RAILROAD KEY PLAN
DRAWING SIZE: A (8.5X11)	FPL ARCHIVE NAME	
DRAWING NUMBER: SK	SHEET: 1 OF 1	REV: A

FPCSTN/FPCEDR-4



CULVERT PLACEMENT PLAN

TECHNICAL ACCEPTANCE | ORG | BY | DATE | ENGINEERING ORGANIZATION

WALKDOWN INFORMATION | ORG | BY | DATE | AS-BUILT INFORMATION

BAR CODE

MP 858.5/STA. 1611+25

PURPOSE: LIKE-FOR-LIKE CULVERT REPLACEMENT

DATUM: TOP OF RAIL ⬭
S16 T335 R19E, PARRISH FL, USGS QUAD

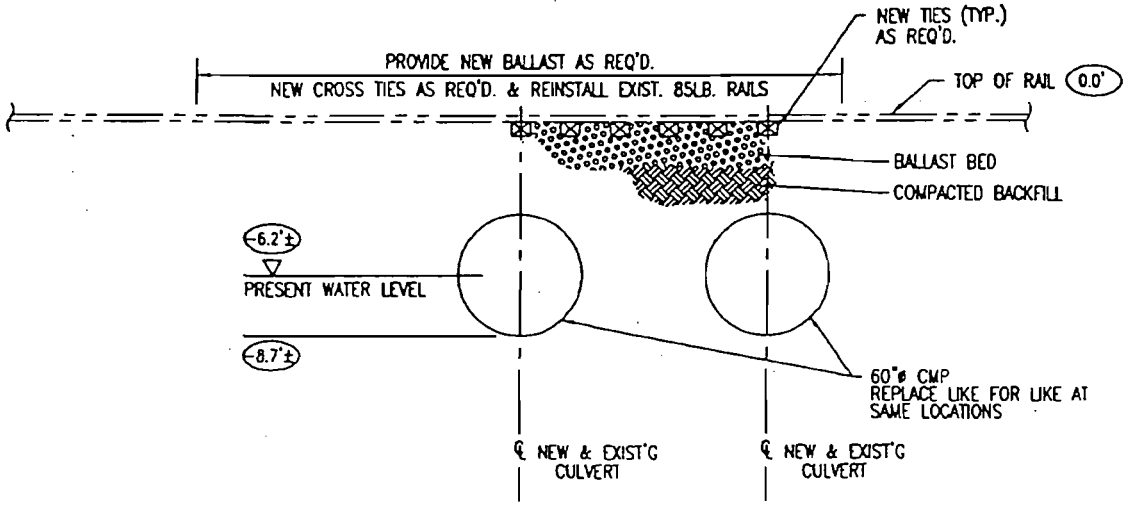
IN
NORTHERN MANATEE COUNTY
AT
WILLOW INDUSTRIAL TRACK
COUNTY OF: MANTATEE
STATE: FL
APPLICATION BY:
FPL

REV	DATE	REVISION DESCRIPTION	ELV BY	MJC CH	COR	PTC APR	GPA ORG
A	10/14/97	ISSUED FOR REVIEW					

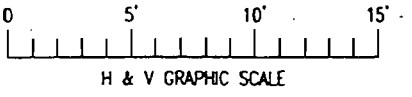
FPL

SYSTEM	DISCIPLINE: BOP	PLANT/UNIT: MANATEE
SCALE: N/A	CAD FILE NAME: RAIL1	TITLE: TWIN 60" DIAM. CULVERT REPLACEMENT WILLOW INDUSTRIAL RAILROAD PLAN, PROFILE, CROSS-SECTION
DRAWING SIZE: A (8.5X11)	FPL ARCHIVE NAME:	
DRAWING NUMBER: SK	SHEET: 1 OF 3	REV: A

FPCSYN/FPCBDR-A 9/90



SECTION P



MP 858.5/STA. 1611+25

PURPOSE: LIKE-FOR-LIKE CULVERT REPLACEMENT

DATUM: TOP OF RAIL

IN
NORTHERN MANATEE COUNTY
AT
WILLOW INDUSTRIAL TRACK
COUNTY OF MANATEE
STATE FL
APPLICATION BY:
FPL

REV	DATE	REVISION DESCRIPTION	ELV BY	MJC CH	COR	PTC APR	GPA ORG
A	10/14/97	ISSUED FOR REVIEW					

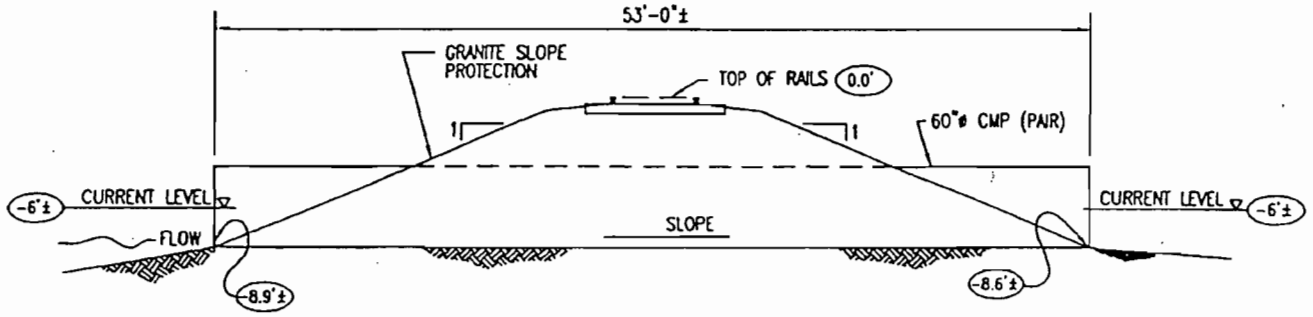
SYSTEM	DISCIPLINE BOP	PLANT/UNIT MANATEE	
SCALE N/A	CAD FILE NAME RAIL2	TITLE TWIN 60"DIAM.CULVERT REPLACEMENT WILLOW INDUSTRIAL RAILROAD PLAN, PROFILE, CROSS-SECTION	
DRAWING SIZE A (8.5X11)	FPL ARCHIVE NAME		
DRAWING NUMBER SK		SHEET 2	REV A

FPGSTN/FPGBDR-A 9/90

TECHNICAL ACCEPTANCE — ORG / BY / DATE — DISCIPLINE ORGANIZATION

WALKDOWN INFORMATION — ORG / BY / DATE — AS-BUILT INFORMATION

BAR CODE



LOOKING SOUTHWEST – UP STATIONING

CULVERT PROFILE

0 5' 10'

H & V GRAPHIC SCALE

NOTES:

1. FLOW CHANNEL DAMMED UP ON BOTH SIDES.
2. TWIN 60"ø CULVERTS ARE TO BE REPLACED LIKE-FOR-LIKE AT PRESENT LOCATIONS.
3. EROSION CONTROL SHALL BE PLACED AND MAINTAINED IN ACCORDANCE WITH FDOT INDEX 102 AND/OR 103.

MP 858.5/STA. 1611+25

PURPOSE: CULVERT REPLACEMENT

DATUM: TOP OF RAIL ⬭

IN
NORTHERN MANATEE COUNTY
AT
WILLOW INDUSTRIAL TRACK
COUNTY OF MANTATEE
STATE FL
APPLICATION BY:
FPL

TECHNICAL ACCEPTANCE
ORG | BY | DATE
ENGINEERING ORGANIZATION

WALKDOWN INFORMATION
ORG | BY | DATE
AS-BUILT INFORMATION

BAR CODE

REV	DATE	REVISION DESCRIPTION	ELV BY	MJG CH	COR	PTC APR	GPA ORG
A	10/14/97	ISSUED FOR REVIEW					

FPL

SYSTEM	DISCIPLINE	PLANT/UNIT
	BOP	MANATEE
SCALE: N/A	CAD FILE NAME: RAIL3	TITLE: TWIN 60" DIAM. CULVERT REPLACEMENT WILLOW INDUSTRIAL RAILROAD PLAN, PROFILE, CROS-SECTION
DRAWING SIZE: A (8.5X11)	FPL ARCHIVE NAME	
DRAWING NUMBER: SK	SHEET: 3	REV: A

FPCSW/FPCBDR-A 9/90

APPENDIX 10.4.6

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

WATER USE PERMIT

Southwest Florida
Water Management District

2379 Broad Street, Brooksville, Florida 34609-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
SUNCOM 628-4150 TDD only 1-800-231-6103 (FL only)
World Wide Web: http://www.swfwmd.state.fl.us

An Equal Opportunity Employer

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)
SUNCOM 578-2070

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)
SUNCOM 572-6200

Venice Service Office
115 Corporation Way
Venice, Florida 34292-3524
(941) 486-1212 or
1-800-320-3503 (FL only)
SUNCOM 526-6900

Lecanto Service Office
3600 West Sovereign Path
Suite 226
Lecanto, Florida 34461-8070
(352) 527-8131
SUNCOM 667-3271

Ronald C. Johnson
Chair, Lake Wales
Brenda Menendez
Vice Chair, Tampa
Sally Thompson
Secretary, Tampa
Ronnie E. Duncan
Treasurer, Safety Harbor
Monroe "Al" Coogler
Lecanto
Joe L. Davis, Jr.
Wauchula
Rebecca M. Eger
Sarasota
John P. Harllee, IV
Bradenton
Watson L. Haynes, II
St. Petersburg
John K. Renke, III
New Port Richey
Pamela Stinnette-Taylor
Tampa

E. D. "Sonny" Vergara
Executive Director
Gene A. Heath
Assistant Executive Director
Edward B. Helvenston
General Counsel

December 8, 1999

Florida Power and Light Company
19050 State Road 62
Parrish, FL 34219

Subject: **Final Agency Action Transmittal Letter - Approval Modification of Permit by Letter**

Project Name:	Florida Power and Light Company
WUP Permit No.:	205423.008
County:	Manatee
Sec/Twp/Rge:	1,10-15,23,24/33S/19E and 3-10,15-20/33S/20E

Reference: Chapter 40D-2, Florida Administrative Code (F.A.C.)
Section 40D-2.331(2)(b), F.A.C.

Dear Permittee:

This letter constitutes Final Agency Action (FAA) on the request received by the District on October 14, 1999, to modify Water Use Permit (WUP) No. 205423.007 by letter. The specific modifications are listed in Attachment A and are considered a part of your WUP.

You or any person whose substantial interests are affected by the District's action regarding a permit may request an administrative hearing in accordance with Sections 120.569 and 120.57, Florida Statutes (F.S.), and Chapter 28-106, F.A.C., of the Uniform Rules of Procedure. *A request for hearing must: (1) explain how the substantial interests of each person requesting the hearing will be affected by the District's action, or proposed action, (2) state all material facts disputed by the person requesting the hearing or state that there are no disputed facts, and (3) otherwise comply with Chapter 28-106, F.A.C.* Copies of Sections 28-106.201 and 28-106.301, F.A.C., are enclosed for your reference. A request for hearing must be filed with (received by) the Agency Clerk of the District at the District's Brooksville address within 21 days of receipt of this notice. Receipt is deemed to be the fifth day after the date on which this notice is deposited in the United States mail. Failure to file a request for hearing within this time period shall constitute a waiver of any right you or such person may have to request a hearing under Sections 120.569 and 120.57, F.S. Mediation pursuant to Section 120.573, F.S., to settle an administrative dispute regarding the District's action in this matter is not available prior to the filing of a request for hearing.

Enclosed is a "Noticing Packet" that provides information regarding District Rule 40D-1.1010, F.A.C., which addresses the notification of persons whose substantial interests may be affected by the District's action in this matter. The packet contains guidelines on how to provide notice of the District's action, and a notice that you may use.

If you have questions regarding this permit modification, please contact Scott T. Petersen, P.G., at the Venice Service Office, extension 6536. If you have any question regarding the Noticing Packet, please contact either Myra Ford or Adeline Wood in the Records and Data Department at the Brooksville office.

Sincerely,

James P. Guida, P.G., Director
Venice Regulation Department

JPG:STP:bxm
Enclosure: Attachment A
Noticing Packet
Sections 28-106.201 and 28-106.301, F.A.C.
cc/enc: File of Record
Data Room, Records & Data
P. Scott Laidlaw, P.G., Water Use Regulation Manager
Scott T. Petersen, P.G.

MODIFICATIONS

The following constitutes modifications to the terms and conditions of Water Use Permit No. 205423.007, effective December 8, 1999.

1. Total quantities authorized under this permit (in gpd) remain the same:

   Annual Average: 2,007,000
   Peak Month: 5,600,000
   Crop Protection: 1,596,000

2. Water Use: Agricultural and Industrial

3. This modification replaces District ID No. 10, (Permittee ID No. 10) with the proposed District ID No. 22, (Permittee ID No. 22). The water use and quantities associated with District ID No. 10 are transferred to the proposed District ID No. 22. The District ID No. 10 will be required to be plugged and abandoned under Special Condition No. 12.

4. The following withdrawal point is added:

I.D. NO. PERMITTEE/ DISTRICT	DIAM. (IN.)	DEPTH (FT.) TOTAL/CASED	USE	GALLONS PER DAY		
				ANNUAL AVERAGE	PEAK MONTH	CROP PROTECTION
22/22	5	360/170	I	10,000	12,500	N/A

5. Special Condition No. 11 is added:

The Permittee shall construct the proposed well according to the surface diameter and casing depth specifications below. The casing depth specified is to prevent the unauthorized interchange of water between different water bearing zones. If a total depth is listed below, this is an estimate, based on best available information, of the depth at which high producing zones are encountered. However, it is the Permittee's responsibility to have the water in the well sampled during well construction, before reaching the estimated total depth. Such sampling is necessary to ensure that the well does not encounter water quality that cannot be utilized by the Permittee, and to ensure that withdrawals from the well will not cause salt-water intrusion.

District ID No.	Permittee ID No.	Surface Diameter	Minimum Casing Depth	Estimated Total Depth
22	22	5"	170'	360'

a. The casing shall be continuous from land surface to the minimum depth stated above.
b. All well casing (including liners and/or pipe) must be sealed to the depth specified above.
c. The proposed well(s) shall be constructed of materials that are resistant to degradation of the casing/grout due to interaction with the water of lesser quality. A minimum grout thickness of two (2) inches is required on wells four (4) inches or more in diameter.
d. A minimum of twenty (20) feet overlap and two (2) centralizers is required for Public Supply wells, and all wells six (6) inches or more in diameter.

e. The finished well casing depth shall not vary from these specifications by greater than ten (10) percent unless advance approval is granted by the Regulation Department Director, or the Supervisor of the Well Construction Permitting Section in Brooksville.
f. Advance approval from the Regulation Department Director, is necessary should the Permittee propose to change the well location or casing diameter.

For Venice Permitting Department Only - The Permittee shall submit a copy of the well completion report as filed with the Manatee County Environmental Management Department to the District Permit Data Section within 30 days of well completion.

6. Special Condition No. 12 is added:

By May 1, 2000, or after District ID No. 22, Permittee ID No. 22 is constructed, District ID No. 10, Permittee ID No. 10, shall be properly abandoned (plugged bottom to top) by a licensed water well contractor in accordance with Chapter 62-532.500(4), F.A.C., under a Well Abandonment Permit issued by the Manatee County Environmental Management Department, unless an extension of time is granted by the Regulation Department Director.

All other terms and conditions of this permit shall remain as stated on WUP No. 205423.007, unless specifically modified by this Letter Modification, and this permit will expire on April 27, 2009.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
WATER USE
INDIVIDUAL
PERMIT NO. 205423.07

EXPIRATION DATE: April 27, 2009 PERMIT ISSUE DATE: April 27, 1999

THE PERMITTEE IS RESPONSIBLE FOR APPLYING FOR A RENEWAL OF THIS PERMIT PRIOR TO THE EXPIRATION DATE WHETHER OR NOT THE PERMITTEE RECEIVES PRIOR NOTIFICATION BY MAIL. FAILURE TO DO SO AND CONTINUED USE OF WATER AFTER EXPIRATION DATE IS A VIOLATION OF DISTRICT RULES AND MAY RESULT IN A MONETARY PENALTY AND/OR LOSS OF WATER. APPLICATION FOR RENEWAL PRIOR TO THE EXPIRATION DATE IS SUBJECT TO DISTRICT EVALUATION AND APPROVAL.

This permit, issued under the provision of Chapter 373, Florida Statutes and Florida Administrative Code 40D-2, authorizes the Permittee to withdraw the quantities outlined herein, and may require various activities to be performed by the Permittee as outlined by the Special Conditions. This permit, subject to all terms and conditions, meets all District permitting criteria.

PROJECT NAME: Manatee Plant

GRANTED TO: Florida Power and Light Company
19050 State Road 62
Parrish, FL 34219

ABSTRACT: This is a renewal of an existing industrial and agricultural water use permit located within the Most Impacted Area (MIA) of the Eastern Tampa Bay Water Use Caution Area (ETBWUCA), in Manatee County. The renewal combines contiguous property permitted under WUP No. 205946.02, with property permitted under WUP No. 205423.06. The combined annual average quantity decreased from 2,182,000 gallons per day (gpd) to 2,007,000 gpd (decrease of 175,000 gpd), the combined peak month quantity increased from 1,220,000 gpd to 5,600,000 gpd (increase of 4,380,000 gpd) and a crop protection quantity of 1,596,000 gpd is added. WUP No. 205423.06 was previously permitted a maximum daily quantity of 8,640,000 gpd, but no peak month quantity. Agricultural quantities were allocated by the District's agricultural water use calculation program, AGMOD. The decrease in the combined annual average quantity is due to a change in use. The increase in the combined peak month quantity is due to an AGMOD adjustment.

Special conditions require investigate feasibility of reuse; maintain existing meters; recording and reporting of monthly pumpage data; water quality sampling; capping of withdrawals not in use; implement irrigation conservation measures; crop protection reporting; irrigation allotments for crops; annual reporting of crops; and tailwater feasibility study.

TOTAL QUANTITIES AUTHORIZED UNDER THIS PERMIT (in gpd)

AVERAGE: 2,007,000 PEAK MONTHLY: 5,600,000

CROP PROTECTION: 1,596,000

Use	Average	Peak Monthly	Crop Protection
Agricultural:	1,984,000 gpd	5,571,000 gpd	1,596,000 gpd
Industrial/Commercial:	23,000 gpd	29,000 gpd	N/A

See Withdrawal Table for quantities permitted for each withdrawal point.

PROPERTY LOCATION: Manatee County, approximately 3 miles northeast of Parrish, approximately 3 miles east from the intersection of Highways 301 and 62.

TYPE OF APPLICATION: Renewal

WATER USE CAUTION AREA: Eastern Tampa Bay within the Most Impacted Area Southern

APPLICATION FILED: January 24, 1996

ACRES: 9,269 Owned

APPLICATION AMENDED: September 16, 1998

WATER USE: AGRICULTURAL

CROP/ USE TYPE	IRRIGATION METHOD(S)	IRRIGATION RATE	ACRES
Spring Tomatoes, Row Crops	Drip	33.9"/yr.	497
Citrus	Sprayjet or Spinner	16.0"/yr.	289
Fall Peppers, Row Crops	Seepage	19.9"/yr.	117
Spring Peppers, Row Crops	Seepage	28.9"/yr.	64
Fall Cucumbers, Row Crops	Seepage	16.0"/yr.	64

WATER USE: INDUSTRIAL OR COMMERCIAL

FACILITY NAME	USE TYPE
Manatee Plant	Personal Sanitary Cleaning and Maintenance

I.D. NO. PERMITTEE/ DISTRICT	DIAM. (IN.)	DEPTH TTL./CSD.	USE	GALLONS PER DAY AVERAGE	PEAK MONTHLY	CROP PROTECTION
1 / 1	8	1,054 / 183	AG	107,000	584,000	420,000
2 / 2	8	1,032 / 224	AG	129,000	697,000	420,000
4 / 4	6	182 / 180	I/C	10,000	12,000	N/A
5 / 5	4	483 / 185	I/C	1,000	1,500	N/A
6 / 6	8	699 / 263	I/C	1,500	2,000	N/A
7 / 7	8	500 / 360	I/C	286,000	480,000	N/A Standby
8 / 8	8	500 / 315	I/C	286,000	480,000	N/A Standby
9 / 9	8	505 /210	I/C	288,000	480,000	N/A Standby
10 / 10	6	510 / 205	I/C	10,000	12,500	N/A
12 / 12	10	430 / 415	AG	109,000	590,000	756,000
14 / 14	4	184 / 123	I/C	500	1,000	N/A
15 / 15	12	947 / 323	AG	313,000	890,000	N/A
16 / 16	12	836 / 272	AG	313,000	890,000	N/A
17 / 17	10	889 / 168	AG	313,000	890,000	N/A
18 / 18	8	870 / 144	AG	313,000	891,000	N/A
19 / 19	6	955 / 440	AG	387,000	1,008,000	N/A

AG=Agricultural
I/C = Industrial/Commercial

District I.D. No. 19 was formerly District I.D. No. 1 on Water Use Permit 205946.02.

DISTRICT I.D. NO.	SECTION/TOWNSHIP/RANGE	LOCATION LAT./LONG.
1	15/33/20	273614.96/821737.49
2	15/33/20	273622.41/821753.18
4	05/33/20	273815.21/821938.32
5	20/33/20	273600.93/821955.05
6	15/33/20	273609.03/821749.86
7	07/33/20	273726.15/822057.38
8	07/33/20	273741.51/822057.54
9	06/33/20	273756.57/822057.88

DISTRICT I.D. NO.	SECTION/TOWNSHIP/RANGE	LOCATION LAT./LONG.
10	18/33/20	273624.80/822048.08
12	17/33/20	273609.55/821924.96
14	20/33/20	273559.47/822000.78
15	12/33/19	273748.95/822107.16
16	12/33/19	273702.88/822106.87
17	13/33/19	273637.86/822107.74
18	13/33/19	273603.83/822143.22
19	03/33/20	273755.96/821734.38

SPECIAL CONDITIONS:

All conditions referring to approval by the Regulation Department Director, Resource Regulation, shall refer to the Director, Venice Regulation Department, Resource Regulation.

1. All reports required by the permit shall be submitted to the District on or before the tenth day of the month following data collection and shall be addressed to:

   Permit Data Section, Records and Data Department
   Southwest Florida Water Management District
   2379 Broad Street
   Brooksville, Florida 34609-6899

   Unless otherwise indicated, three copies of each plan or report, with the exception of pumpage, rainfall, evapotranspiration, water level or water quality data which require one copy, are required by the permit.

2. The Permittee shall investigate the feasibility of using reclaimed water as a water source and submit a report describing the feasibility to the Permit Data Section, Records and Data Department, by May 1, 2004. The report shall contain an analysis of reclaimed water sources for the area, including the relative location of these sources to the Permittee's property, the quantity of reclaimed water available, the projected date(s) of availability, costs associated with obtaining the reclaimed water, and an implementation schedule for reuse, if feasible. Infeasibility shall be supported with a detailed explanation.

3. The Permittee shall continue to maintain and operate the existing non-resettable, totalizing flow meter(s), or other flow measuring device(s) as approved by the Regulation Department Director, Resource Regulation, for District ID No(s). 1, 2, 7, 8, 9, 12, 15, 16, 17, 18, and 19, Permittee ID No(s). 1, 2, 7, 8, 9, 12, 15, 16, 17, 18, and 19. Such device(s) shall maintain an accuracy within five percent of the actual flow as installed. Total withdrawal and meter readings from each metered withdrawal shall be recorded on a monthly basis and reported to the Permit Data Section, Records and Data Department, (using District forms) on or before the tenth day of the following month. If a metered withdrawal is not utilized during a given month, a report shall be submitted to the Permit Data Section, Records and Data Department, indicating zero gallons.

4. Water quality samples shall be collected and analyzed, for parameter(s), and frequency(ies) specified below. Water quality samples from production wells shall be collected whether or not the well is being used, unless infeasible. If sampling is infeasible the Permittee shall indicate the reason for not sampling on the water quality data form. Water quality samples shall be analyzed by a Department of Health and Rehabilitative Services (DHRS) certified laboratory under Environmental Laboratory Certification General Category "1". At a minimum, water quality samples shall be collected after pumping the well at its normal rate for a pumping time specified in the table below, or to a constant temperature, pH, and conductivity. In addition, the Permittee's sampling procedure shall follow the handling and chain of custody procedures designated by the certified laboratory which will undertake the analysis. Any variance in sampling and/or analytical methods shall have prior approval of the Regulation Department Director, Resource Regulation. Reports of the analyses shall be submitted to the Permit Data Section, Records and Data Department, (using District forms) on or before the tenth day of the following month, and shall include the signature of an authorized representative and certification number of the certified laboratory which undertook the analysis. The parameters and frequency of sampling and analysis may be modified by the Regulation Department Director, Resource Regulation, as necessary to ensure the protection of the resource.

District ID No.	Permittee ID No.	Minimum Pumping Time (minutes)	Parameter	Sampling Frequency
12 and 19	12 and 19	25	Chlorides, Sulfates, and T.D.S.	January, April, July, and October

Water quality samples shall be collected based on the following timetable:

Weekly	Same day of each week
Monthly	Same week of each month
Quarterly	**Same week of months specified**
Semi-annually	Same week of months specified

Analyses shall be performed according to procedures outlined in the current edition of Standard Methods for the Examination of Water and Wastewater by the American Public Health Association-American Water Works Association-Water Pollution Control Federation (APHA-AWWA-WPCF) or Methods for Chemical Analyses of Water and Wastes by the U.S. Environmental Protection Agency (EPA).

5. Any wells not in use, and in which pumping equipment is not installed shall be capped or valved in a water tight manner in accordance with Chapter 62-532.500(3)(a)(4), F.A.C.

6. The Permittee shall:

   a. Incorporate best water management practices, specifically including but not limited to irrigation practices, as recommended for the permitted activities in reports and publications by the IFAS and/or the United States Natural Resources Conservation Service (NRCS).
   b. Limit daytime irrigation to the greatest extent practicable to reduce losses from evaporation. Daytime irrigation for purposes of system maintenance, control of heat stress, crop protection, plant establishment, or for other reasons which require daytime irrigation are permissible; but should be limited to the minimum amount necessary as indicated by best management practices.

c. Implement a leak detection and repair program as an element of an ongoing system maintenance program. This program shall include a system-wide inspection at least once per year.
d. Evaluate the feasibility of improving the efficiency of the current irrigation system or converting to a more efficient system. This condition includes implementation of the improvement(s) or conversion when determined to be operationally and economically feasible.

7. The Permittee shall document and report on District forms the beginning and ending hours of operation of each withdrawal source used for the protection of crops from frost or freeze damage. The report shall include the gallons per day pumped from each withdrawal source based on irrigation system capacity or, if available, totalizing flow meter readings. This report shall be submitted by the 10th day of the month following irrigation for crop protection. The crop protection daily quantities specified in this permit are solely for the purpose of crop protection, and do not apply to routine irrigation practices. Irrigation for crop protection shall not exceed the crop protection daily quantity listed on the permit and shall not cause water to go to waste.

8. The Permittee shall not exceed the quantity determined by multiplying the total irrigated acres by the total allocated inches per irrigated acre per season for each crop type. An irrigated acre, hereafter referred to as "acre," is defined as the gross acreage under cultivation, including areas used for water conveyance such as ditches, but excluding uncultivated areas such as wetlands, retention ponds, and perimeter drainage ditches.

Allocated inches per irrigated acre per season per crop for field preparation/crop establishment and supplemental irrigation (excluding nurseries, which are permitted on a case-by-case basis) are based on the minimum assigned efficiency standards listed in Table 1 below. These minimum standards shall remain in effect until modified by rule. However, for planning purposes, also listed are assigned efficiency goals for future management periods.

Table 1. Minimum assigned efficiency standards and goals.

Crop Type	Supplemental Irrigation		
	Eff. Req. 1993	Efficiency Goals 1997	2001
Citrus, Strawberries or Row Crops (with drip or unmulched, non-seepage irrigation)			
Existing Permits	**75%**	80%	85%
New Permits	**80%**	80%	85%
Other Crops			
Existing Permits	**60%**	65%	70%
New Permits	**70%**	70%	70%

Field preparation/crop establishment: 60%

Compliance with allocated quantities shall be determined by comparing actual use to the calculated quantities for each individual crop on a per season basis. Seasonal crops will be compared on a seasonal basis (e.g. spring tomato requirements based on the calculated inches per season), and perennial crops will be compared on an annual basis (e.g. citrus requirements based on the calculated inches per year).

The District will reassess the efficiency goals prior to implementation. As a result of this reassessment, these goals may be adjusted upward or downward through rulemaking.

9. All Permittees whose average daily permitted use is equal to or exceeds 100,000 gpd shall record the following information for all seasonal crops (example: vegetables) and nurseries; Annual crops (example: citrus) may omit items e. and f.:

   a. crop type;
   b. monthly irrigated acres per crop for seasonal crops, annual irrigated acres for annual crops;
   c. the dominant soil type;
   d. irrigation method(s);
   e. planting dates; and
   f. season length.

   Irrigation for field preparation/crop establishment and supplemental irrigation shall be documented separately by noting the beginning and ending dates for these activities. Additionally, quantities for crop protection shall be documented separately by noting the beginning and ending hour and date. The Permittee shall note whether tailwater recovery is used. This information shall be submitted to the Permit Data Section, Records and Data Department, on the Agricultural Water Use Form-Seasonal Crops within 60 days following the crop season. For annual crops, this information shall be submitted on the Annual Crops reporting form by March 1, for the preceding calendar year. If the Permittee exceeds the allocated quantities, which are determined by multiplying the total irrigated acres by the total allocated inches per acre per season per crop, the Permittee shall submit a report to the Permit Data Section, Records and Data Department, which shall include reasons why the allotted quantities were exceeded, measures taken to attempt meeting the allocated quantities, and a plan to bring the permit into compliance. Reports for Permittees not achieving the allotted quantities are subject to District approval. If the report is not approved, the Permittee is in violation of the Water Use Permit. The District will evaluate information submitted by Permittees who exceed their allocated quantities to determine whether the lack of achievement is justifiable and a variance is warranted. Permittees may justify lack of achievement by documenting unusual water needs, such as unusual soil or weather conditions creating greater irrigation needs than normal. However, even with such documented justification, phased reductions in water use shall be required unless the District determines that water usage was reasonable under the circumstances reported and that further reductions are not feasible. For such Permittees, on a case-by-case basis, individual efficiency criteria may be developed for each management period.

10. By May 1, 2001, the Permittee shall submit a detailed study regarding the feasibility of utilizing a tailwater recovery system on the property for the purposes of irrigation. The report shall address and include:

a. Economic factors, water quality, the total quantity of tailwater available, and other associated considerations; and
b. An implementation schedule for the tailwater reuse, if such use is determined by the Permittee and the District to be feasible.

If the use of a tailwater recovery system is found not to be feasible, information detailing why such an operation is not feasible will be included.

If the use of a tailwater recovery system for irrigation purposes is determined to be feasible by the Permittee and the District, the Permittee shall submit an implementation plan to the Permit Data Section, Records and Data Department, for review and approval, within 30 days after the feasibility report is approved in writing by the Regulation Department Director, Resource Regulation. The District will require the construction and implementation of the approved tailwater recovery system into the Permittee's irrigation operation within a period of time agreed upon by the District and the Permittee. A modification of the Water Use Permit may be required by the District after approval of the implementation plan.

STANDARD CONDITIONS:

1. The Permittee shall comply with the Standard Conditions attached hereto, incorporated herein by reference as Exhibit "A" and made a part hereof.

Authorized Signature
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

40D-2
Exhibit "A"

WATER USE PERMIT CONDITIONS

STANDARD CONDITIONS

1. If any of the statements in the application and in the supporting data are found to be untrue and inaccurate, or if the Permittee fails to comply with all of the provisions of Chapter 373, F.S., Chapter 40D, or the conditions set forth herein, the Governing Board shall revoke this permit in accordance with Rule 40D-2.341, following notice and hearing.

2. This permit is issued based on information provided by the Permittee demonstrating that the use of water is reasonable and beneficial, consistent with the public interest, and will not interfere with any existing legal use of water. If, during the term of the permit, it is determined by the District that the use is not reasonable and beneficial, in the public interest, or does impact an existing legal use of water, the Governing Board shall modify this permit or shall revoke this permit following notice and hearing.

3. The Permittee shall not deviate from any of the terms or conditions of this permit without written approval by the District.

4. In the event the District declares that a Water Shortage exists pursuant to Chapter 40D-21, the District shall alter, modify, or declare inactive all or parts of this permit as necessary to address the water shortage.

5. The District shall collect water samples from any withdrawal point listed in the permit or shall require the Permittee to submit water samples when the District determines there is a potential for adverse impacts to water quality.

6. The Permittee shall provide access to an authorized District representative to enter the property at any reasonable time to inspect the facility and make environmental or hydrologic assessments. The Permittee shall either accompany District staff onto the property or make provision for access onto the property.

7. Issuance of this permit does not exempt the Permittee from any other District permitting requirements.

8. The Permittee shall cease or reduce surface water withdrawal as directed by the District if water levels in lakes fall below applicable minimum water level established in Chapter 40D-8 or rates of flow in streams fall below the minimum levels established in Chapter 40D-8.

9. The Permittee shall cease or reduce withdrawal as directed by the District if water levels in aquifers fall below the minimum levels established by the Governing Board.

10. The Permittee shall practice water conservation to increase the efficiency of transport, application, and use, as well as to decrease waste and to minimize runoff from the property. At such time as the Governing Board adopts specific conservation requirements for the Permittee's water use classification, this permit shall be subject to those requirements upon notice and after a reasonable period for compliance.

11. The District may establish special regulations for Water Use Caution Areas. At such time as the Governing Board adopts such provisions, this permit shall be subject to them upon notice and after a reasonable period for compliance.

12. The Permittee shall mitigate, to the satisfaction of the District, any adverse impact to existing legal uses caused by withdrawals. When adverse impacts occur or are imminent, the District shall require the Permittee to mitigate the impacts. Adverse impacts include:

a. A reduction in water levels which impairs the ability of a well to produce water;
b. Significant reduction in levels or flows in water bodies such as lakes, impoundments, wetlands, springs, streams or other watercourses; or
c. Significant inducement of natural or manmade contaminants into a water supply or into a usable portion of any aquifer or water body.

13. The Permittee shall mitigate to the satisfaction of the District any adverse impact to environmental features or offsite land uses as a result of withdrawals. When adverse impacts occur or are imminent, the District shall require the Permittee to mitigate the impacts. Adverse impacts include the following:

a. Significant reduction in levels or flows in water bodies such as lakes, impoundments, wetlands, springs, streams, or other watercourses;
b. Sinkholes or subsidence caused by reduction in water levels;
c. Damage to crops and other vegetation causing financial harm to the owner; and
d. Damage to the habitat of endangered or threatened species.

14. When necessary to analyze impacts to the water resource or existing users, the District shall require the Permittee to install flow metering or other measuring devices to record withdrawal quantities and submit the data to the District.

15. A District identification tag shall be prominently displayed at each withdrawal point by permanently affixing the tag to the withdrawal facility.

16. The Permittee shall notify the District within 30 days of the sale or conveyance of permitted water withdrawal facilities or the land on which the facilities are located.

17. All permits issued pursuant to these Rules are contingent upon continued ownership or legal control of all property on which pumps, wells, diversions or other water withdrawal facilities are located.

Southwest Florida Water Management District

2379 Broad Street • Brooksville, Florida 34609-6899 • 1-800-423-1476 (Florida Only)
or (352) 796-7211 • SUNCOM 628-4150 • T.D.D. Number Only (Florida Only): 1-800-231-6103
Internet address: http://www.swfwmd.state.fl.us

7601 Highway 301 North
Tampa, Florida 33637-6759
1-800-836-0797 or (813) 985-7481
SUNCOM 578-2070

170 Century Boulevard
Bartow, Florida 33830-7700
1-800-492-7862 or (941) 534-1448
SUNCOM 572-6200

115 Corporation Way
Venice, Florida 34292-3524
1-800-320-3503 or (941) 486-1212
SUNCOM 526-6900

3600 West Sovereign Path, Suite 226
Lecanto, Florida 34461-8070
(352) 527-8131
SUNCOM 667-3271

An Equal Opportunity Employer

James L. Allen
Chairman, Bushnell
James E. Martin
Vice Chairman, St. Petersburg
Sally Thompson
Secretary, Tampa
Ronald C. Johnson
Treasurer, Lake Wales
Ramon F. Campo
Brandon
Joe L. Davis, Jr.
Wauchula
Pamela Jo Davis
Largo
Rebecca M. Eger
Sarasota
John P. Harllee, IV
Bradenton
Curtis L. Law
Land O'Lakes
Brenda Menendez
Tampa

E. D. "Sonny" Vergara
Executive Director
Gene A. Heath
Assistant Executive Director
Edward B. Helvenston
General Counsel

April 27, 1999

Florida Power and Light Company
19050 State Road 62
Parrish, FL 34219

Subject: Final Agency Action Transmittal Letter
Individual Water Use Permit No(s). 205423.07

Dear Sirs:

Your Water Use Permit(s) was/were approved by the District Governing Board subject to all terms and conditions set forth in the approved Permit(s).

Please be advised that the Governing Board has formulated a water shortage plan as referenced in Condition 4 of the Standard Water Use Permit Conditions (Exhibit A), and will implement such a plan during periods of water shortage. You will be notified during a declared water shortage of any change in the conditions of your Permit(s) or any suspension of your Permit(s), or of any restriction on your use of water for the duration of any declared water shortage.

The ID tag(s) for your withdrawal(s) shall be installed by a District representative. This representative will attempt to contact you within 30 days to discuss placement of your tags. If you have any questions or concerns regarding your tags, please contact Joe Madrak at extension 6523 in the Venice Regulation Department. If you have any questions or concerns regarding your permit or any other information, please contact this office at extension 4343.

Sincerely,

James P. Marshall, Supervisor
Records and Data Department

JPM:mlm

Enclosure: Approved Permit

Excellence Through Quality Service

APPENDIX 10.4.7

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
SURFACE WATER AGREEMENT

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Southwest Florida
Water Management District
P. O. BOX 457 BROOKSVILLE, FLORIDA 33512

00134

DERRILL McATEER, Chairman, Brooksville
S. C. BELLEY, JR. Vice Chairman, Land O'Lakes
JOHN A. ANDERSON, Treasurer, St. Petersburg
HERMAN BEVILLE, Bushnell
JOE E. HILL, Lemburg
PETER J. NEGRI, Ocala
THOMAS VAN der VEER, Tarkeetown
ROBERT [illegible] VALTEIN, Brandon
J. MASON [illegible], Lakeland

April 10, 1973

Mr. Wade L. Hopping
Suite 242
Barnett Bank Building
Tallahassee, Florida 32301

Dear Mr. Hopping:

We are enclosing an original and two copies of the Permit Agreement between the Southwest Florida Water Management District and Florida Power and Light Company. This agreement was approved by the Board of Governors at its meeting today and has been fully executed on the part of the District.

When the agreement has been dated and signed by officials of Florida Power and Light, please return the original and one copy for our records.

We appreciate your cooperation in the negotiation and execution of this agreement.

Very truly yours,

Don Feaster

DONALD R. FEASTER
Acting Executive Director

DRF:ce
Enclosures

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
BROOKSVILLE, FLORIDA 33512. 904-796-7211

PERMIT AGREEMENT TAG

FLORIDA POWER AND LIGHT COMPANY

Applicant

72-110 Withdrawals per Approved Diversion Plan

Number

LITTLE MANATEE RIVER DIVERSION FACILITY

To divert water from the Little Manatee River in excess of minimum flow according to Agreement dated 17 April, 1973 and First Amendment to Permit Agreement date 12, November 1975.

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00135

PERMIT AGREEMENT

THIS PERMIT AGREEMENT, made and entered into this 17th day of April, 1973, by and between ALAFIA RIVER BASIN BOARD, a subdivision of the Southwest Florida Water Management District, and the SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, a public corporation, and the SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (REGULATORY), a public corporation, hereinafter referred to collectively as "District," and FLORIDA POWER AND LIGHT COMPANY, a Florida corporation, hereinafter referred to as "Company."

W I T N E S S E T H:

WHEREAS, the Company is a Florida public utility corporation, subject to regulation by the State of Florida, which is engaged in the business of generating and distributing electricity to its customers within its territorial franchise in the State of Florida; and

WHEREAS, the Company is now constructing a 1700 megawatt steam electrical generating facility in Manatee County, Florida, which shall hereinafter be referred to as "Manatee Plant," and

WHEREAS, the Company must construct a closed circuit cooling system reservoir for the Manatee Plant which will be located in the vicinity of the Little Manatee River, in Manatee County, Florida, and which will be an integral part of the steam electrical generating facility of the Manatee Plant and which requires substantial quantities of fresh water for its operation; and

WHEREAS, the Company avers that it has previously secured the permits and approvals required for the construction and operation of the Manatee Plant from the various appropriate governmental bodies having jurisdiction, including, but not limited to, the Florida Department of Pollution Control, the Florida Game and Fresh Water Fish Commission, the Manatee County Commission, the United States Department of the Interior, the United States Corps of Engineers, the United States Environmental Protection Agency, the Florida Department of Natural Resources, the Trustees of the Internal Improvement Trust Fund; and

WHEREAS, the District, under Chapter 378, Florida Statutes 1972, is authorized to regulate withdrawals from those waters specifically named as "Works of the District;" and

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WHEREAS, the Little Manatee River and its tributaries have been duly declared to be a "Work of the District;" and

WHEREAS, the District under Chapter 373, Florida Statutes 1972, is empowered to authorize the capture, storage, use or diversion of water in any watercourse in excess of the average minimum flow at the point of capture provided that such capture, storage, use or diversion of water from the surface water source will not interfere with the reasonable uses existing at the time of the beginning of the capture, storage, use or diversion; and

WHEREAS, pursuant to such authority, the District and Florida Power and Light desire to enter into an agreement to permit a portion of the flow in excess of the average minimum flow of the Little Manatee River to be taken by the Company in Manatee County for the purpose of filling, replenishing and operating its closed system cooling reservoir, as hereinafter described; and

WHEREAS, the Company contends that the District has no legal jurisdiction to exercise any authority under Chapter 378 or 373, Florida Statutes 1972, as to the Little Manatee River where it intends to pump water from said river, because that portion of the river is not within the territorial boundaries of the District; and

WHEREAS, the District contends that it has legal jurisdiction to exercise any authority under Chapters 373 and 378, Florida Statutes, as to the entire length of the Little Manatee River, including those areas outside of the District boundaries; and

WHEREAS, the District recognizes that the use of the excess waters of the Little Manatee River for the Manatee Plant is better for the water resources of the area than the use of ground water for said purposes; and

WHEREAS, the parties believe that it is to the best interests of the public, which they both serve, that the Company agree to the concurrent jurisdiction of the District and the Department of Natural Resources and that this Permit Agreement be entered into by the parties hereto; and

WHEREAS, the District has agreed to authorize withdrawals of water from the Little Manatee River and to issue a permit for such withdrawals pursuant to the terms hereof.

NOW, THEREFORE, for and in consideration of the promises and mutual covenants herein contained, to be kept and performed by the parties hereto, and for other good and valuable considerations, it is hereby agreed as follows:

1. The District, pursuant to Chapters 373 and 378, Florida Statutes 1972,

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and the rules and regulations duly adopted by the District pursuant to said laws, has the authority and responsibility to determine the extent and manner in which surface water of the Little Manatee River may be withdrawn and used. At the date of execution of this agreement, the District, pursuant to Chapters 373 and 378, finds that:

a) The plan of diversion, set forth in Exhibit B, authorizes the capture, storage, use or diversion of waters from the Little Manatee River in excess of the average minimum flow at the point of capture.

b) Such capture, storage, use or diversion of water from the surface water source will not interfere with the reasonable uses existing at the time of the beginning of the capture, storage, use or diversion.

c) The use of such water is a reasonable use.

d) The use of such water is reasonable and consistent with property rights and with the public interest in the proper utilization of the water resources.

2. The Company may withdraw water from the Little Manatee River at the point on the said river described in Exhibit A, attached hereto and made a part hereof.

3. This Permit Agreement shall constitute a permit issued by the District to the Company, authorizing the withdrawal, capture, storage and use of water from the Little Manatee River, in Manatee County, Florida, for:

a) Initial filling of the Manatee Plant Reservoir; and

b) The replacement of such water, as is needed from time to time, to replenish the net loss due to seepage or evaporation from said reservoir; and

c) The replacement of such water, as is needed from time to time, to replenish the storage "reserve" in said reservoir.

d) Other reasonable purposes necessary in the operation of the Manatee Plant.

4. The District agrees that the Company may withdraw the waters of the Little Manatee River, in Manatee County, Florida, for the purpose set forth in paragraph 3 above for its operation of its 4000-acre Manatee Plant closed system cooling reservoir, which is an integral part of its 1700 megawatt steam electrical generating facilities, so long as such diversion is made pursuant to the plan of diversion set forth in Exhibit B, attached hereto and made a part hereof, and for no other purpose. At this time such withdrawal constitutes a reasonable use of the water of the Little Manatee River.

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5. The Company shall, at all times, keep the pumping facilities on the Little Manatee River open to inspection by the authorized personnel of the District, and the Company, when requested by the District, shall make available for inspection its facilities and production records on the water taken from the Little Manatee River, as provided for herein. All instrumentation necessary to determine and monitor water inputs and outputs, rates of evaporation and times of pump operations shall be furnished, installed and maintained by the Company, at its own expense, and periodic reports of such activities shall be forwarded to the District not less than quarterly, or, if necessity requires, the District may obtain information from the records of the Company at a lesser interval, provided said requests are reasonable in nature. The Company shall submit a description of the instrumentation it plans to install to the District for approval. The District shall approve or recommend changes, in writing, within thirty (30) days of the date of submission. If the Company disagrees with the District, it may have a hearing, as provided for in Chapter 373, Florida Statutes 1972, on the matter before the Governing Board of the District.

6. The Company shall maintain the premises of which it has the use that are subject to the permit herein, as described in Exhibit C, attached hereto, including all appurtenant structures and improvements, in a neat, clean and sanitary condition, and the Company shall maintain and otherwise keep, as nearly as practicable, all of its installation and facilities in a color, condition and manner as shall be compatible and harmonious with the existing natural condition of the lands surrounding said facilities.

7. The Company also agrees to assume all responsibility for, and to save harmless the District against all claims, or demands whatsoever for damages or for compensation for injuries or death to persons and animals and damage or destruction to property due or claimed to be due either directly or indirectly to its operations, or to the act, or omission to act, of or by itself, its agents, employees, workmen, contractors or subcontractors which it may employ, arising out of the establishing, constructing or using of the reservoir, pumping station supplying the reservoir or appurtenant facilities for the reservoir; or from any leaks or breaks or spillovers from the reservoir or through, around or under the dikes, levees and embankments of the reservoir, regardless of whether or not caused by negligence attributable to the Company provided, however, that the Company shall not be responsible for

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the negligence of the District or its employees. The Company further agrees should such aforesaid claims or demands be filed in any court of law as a suit or suits, that any judgments obtained against the District by reason of any accident, accidents, injuries or damages, in any such suit or suits at law against the District, shall be paid by the Company, which shall have the right to join in the defense of such suit or suits. The Company shall have the right to assist in the defense of any suit or action from the date a claim is made. The District shall notify the Company, in writing, within five (5) days from the receipt by the District of notice of any such claim or suit. In the event the Company does not assist in the defense and it is ultimately determined that the Company is liable for a judgment against the District, then the Company shall be liable for attorney fees, court costs and other legal expenses incurred by the District in defense of such action.

C. The Company may assign any of its rights, duties, or privileges hereunder to another licensed public utility for the uses provided herein. The Company shall not assign any of its rights, duties, or privileges hereunder, except as provided hereinbefore, without first obtaining the written consent of the District which written consent of the District shall not be unreasonably withheld. In the event that the Company shall, at any time in the future, abandon the pumping facilities or the reservoir of which the water is to be used, the Company shall notify the District of such plan of abandonment and the Company shall remove all of its facilities shown in Exhibit C.

9. It is the purpose and intent of the parties hereto that this use and operation of the waters from the Little Manatee River shall be continuing and permanent provided, however, notwithstanding any of the provisions contained herein, this agreement shall not estop or in any way prevent the District from the further regulation of the said withdrawals provided for herein as the District is authorized and directed to do under and pursuant to Chapters 373 and 378, Florida Statutes 1972, and the laws of the State of Florida.

10. The Company shall notify the District, in writing, at least fifteen (15) days prior to such time as it desires to begin the initial filling of its reservoir. The Company shall make every effort to formulate its construction plans and progress so that initial filling of the reservoir shall come at the time that the Little Manatee River has its highest annual flowage. The Company will notify the District, in writing, when the reservoir is filled to its operational capacity.

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11. The parties agree that, because of the overriding public interest in a sufficient and economic supply of electrical power for use by the District and by the citizens of the State, this Permit Agreement authorizing a plan of diversion of water from one of the "Works of the District" in a location outside the territorial jurisdiction of the District presents a unique situation, and the findings and determination that the Company's use of the water of the Little Manatee River, within the meaning of Chapters 373 and 378, Florida Statutes 1972, is solely related to the particular circumstances surrounding the location and need for the Manatee Plant, and this determination shall not be binding upon the District as to any other sites which the Company may desire for the purpose of establishing steam electrical generating power facilities and cooling systems, or as to any other parties the District may presently be regulating or which may be regulated by the District in the future.

12. Should the District adopt criteria or a policy of allocation of water resources to all reasonable beneficial users of the District's water resources, the District agrees that such policies and procedures will give full consideration to the Company's withdrawal of water permitted herein.

13. The District agrees to notify the Company, in writing, prior to approving any application for use of the waters of the Little Manatee River which would affect the Company's use of such water permitted herein.

14. This Permit Agreement constitutes the entire agreement between the parties hereto, and any change, supplement, modification or correction of this permit must be in writing and signed by the parties hereto.

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IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed in their names and seals the day and year first above written.

Signed, sealed and delivered in the presence of:

As to Alafia River Basin Board

ALAFIA RIVER BASIN BOARD

By _____
Chairman

As to Southwest Florida Water Management District and Southwest Florida Water Management District (Regulatory)

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, BY ITS GOVERNING BOARD

By _____
Chairman

Attest _____
Assistant Secretary

Approved
F.G.G.
4/10/73

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (REGULATORY), BY ITS GOVERNING BOARD

By _____
Chairman

Attest _____
Assistant Secretary

Frances M. Cheney

As to Company

FLORIDA POWER AND LIGHT COMPANY
Florida public utility corporation

By _____
Vice President

Attest _____
Assistant Secretary

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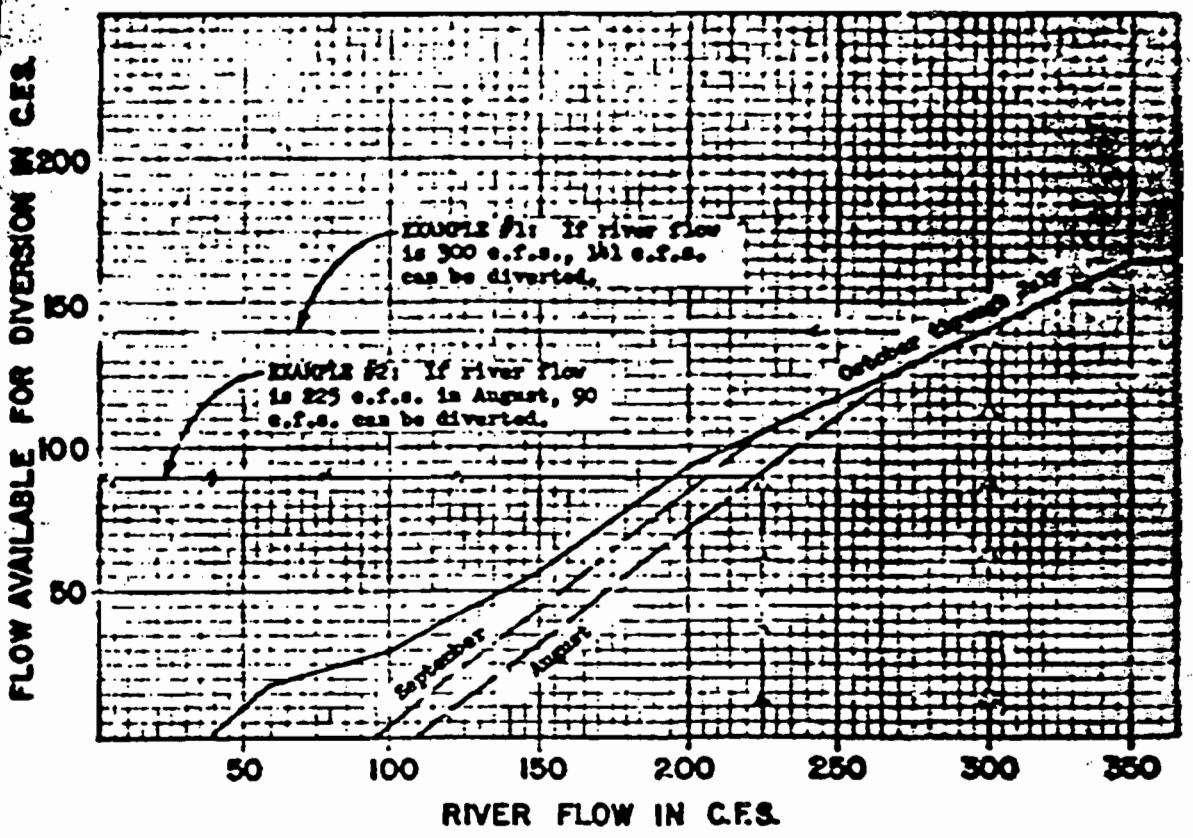
EXHIBIT B
PLAN OF DIVERSION
FLORIDA POWER & LIGHT MANATEE PLANT

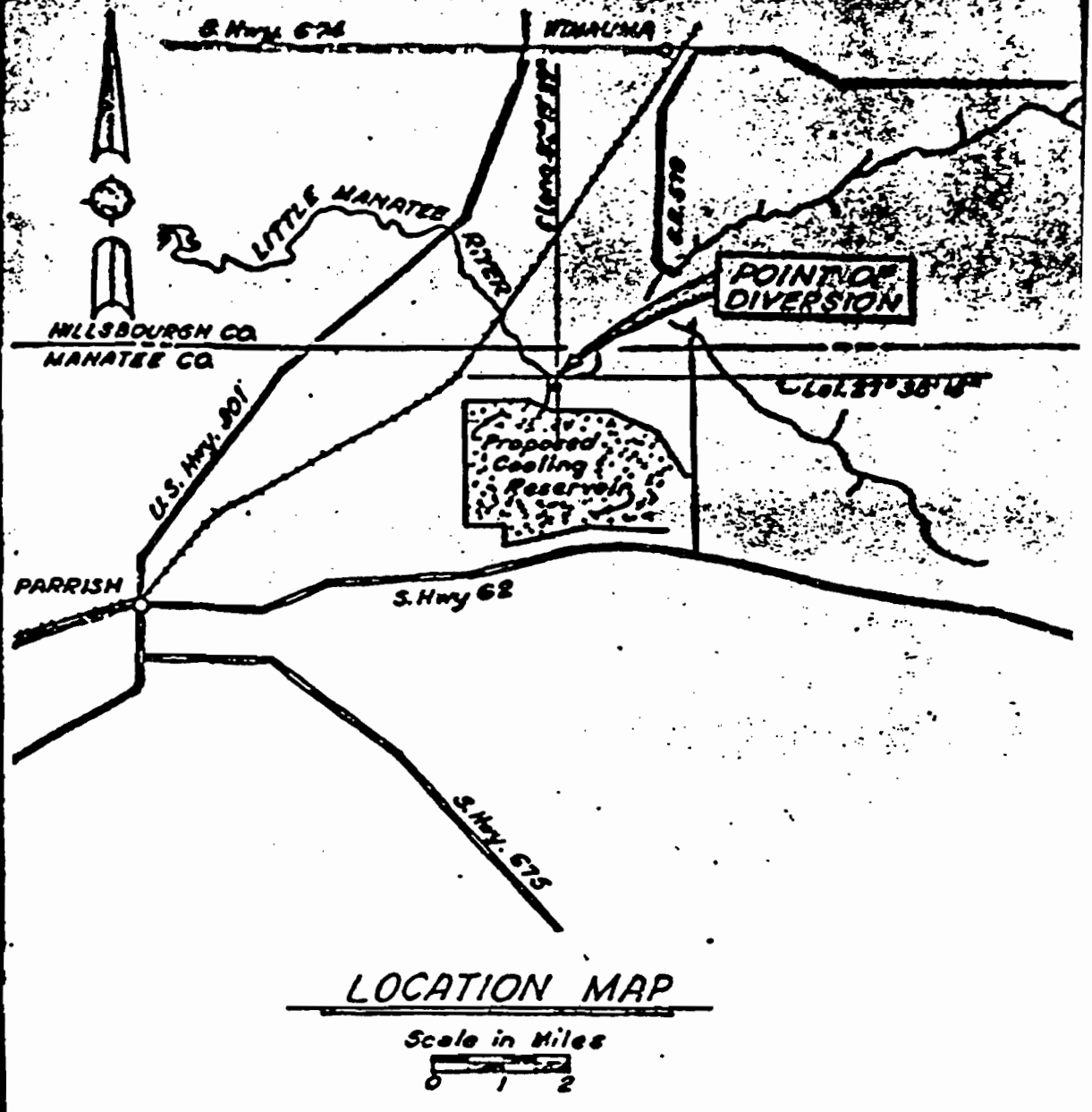


DIVERSION RESTRICTIONS

The plan for diversion restrictions as set forth on the above curve would employ a pumping station with a maximum capacity of 165 c.f.s. The Company is authorized to divert that amount of "flow available for diversion" which is indicated by the point on the appropriate curves corresponding to the "river flow" occurring in the Little Manatee River at the point of diversion at the time the diversion takes place. The allowable diversion rate will be determined by the solid curve labeled, "October through July" in all months except August and September. In no case shall the diversion reduce the river flow to less than 80 c.f.s. During August and September diversions would be restricted to 80 percent of the river flow in excess of the monthly average minimum flow (112 c.f.s. being the monthly average minimum flow for August and 97 c.f.s. being the monthly average minimum flow for September) or to the October through July curve, whichever is more severe.

EXHIBIT B

BEST AVAILABLE COPY



LOCATION MAP

Scale in Miles

0 1 2

EXHIBIT - A

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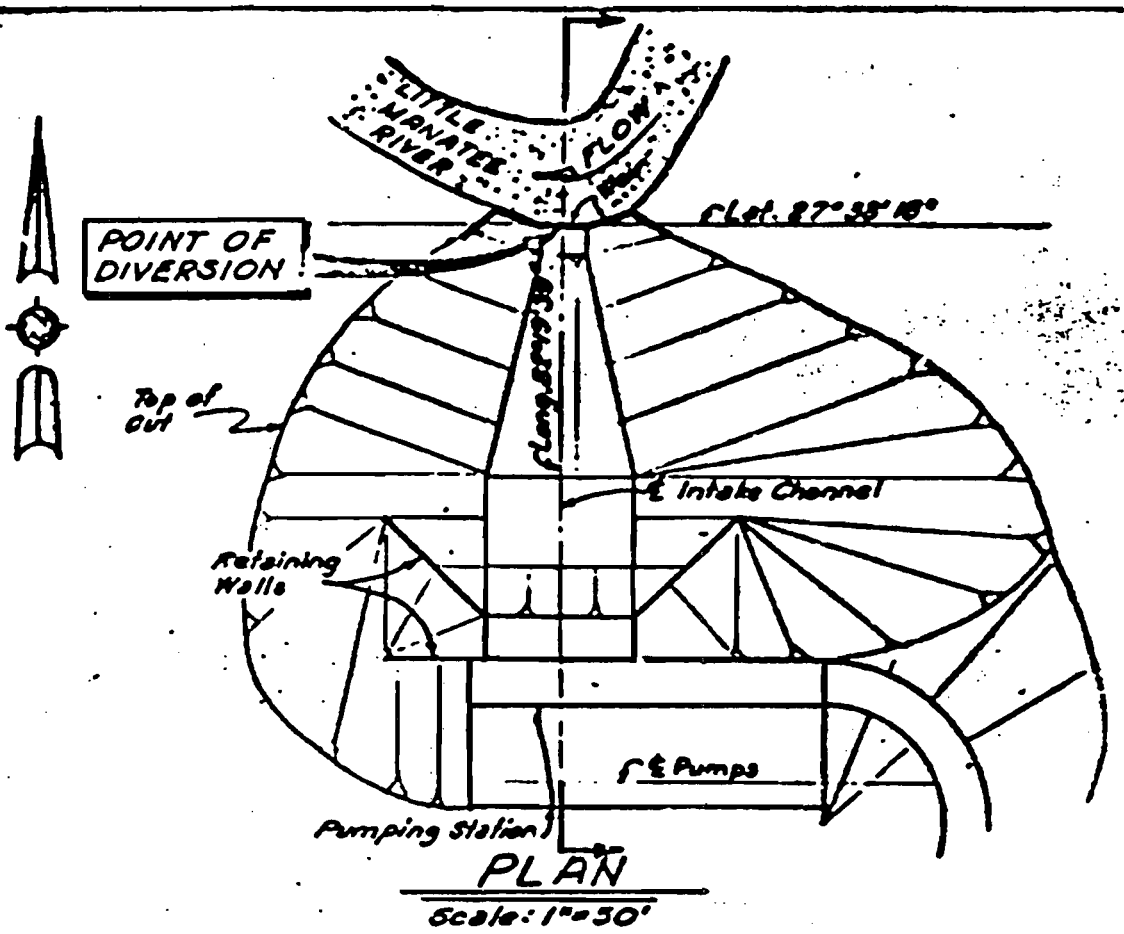
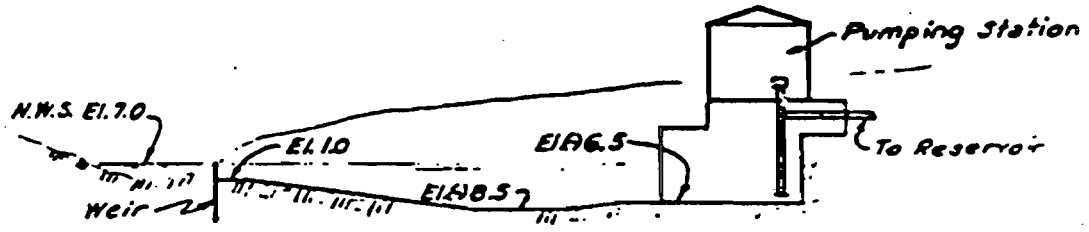


PLAN

Scale: 1"=50'



SECTION

Scale: 1"=50'

EXHIBIT-C

THIS FIRST AMENDMENT TO PERMIT AGREEMENT, made and entered into this 12th day of November, 1975, by and between ALAFIA RIVER BASIN BOARD, a subdivision of the Southwest Florida Water Management District, and the SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, a public corporation, and the SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (REGULATORY), a public corporation, hereinafter referred to collectively as "District," and FLORIDA POWER AND LIGHT COMPANY, a Florida corporation, hereinafter referred to as "Company."

W I T N E S S E T H:

WHEREAS, the parties hereto entered into a Permit Agreement dated the 17th day of April, 1973 for the purpose of authorizing Company to withdraw, capture, store and use water from the Little Manatee River, in Manatee County, Florida, for purposes set out herein for Company's operation of its 4,000 acre Manatee Plant closed system cooling reservoir which is an integral part of its 1700 megawatt steam electrical generating facilities, so long as such diversion is made pursuant to the plan of diversion set forth in Exhibit "B", attached to said Permit Agreement, and

WHEREAS, the parties hereto desire to amend said Permit to provide for a new plan of diversion which the parties agree is a reasonable and beneficial use of the water of the Little Manatee River.

NOW, THEREFORE, for and in consideration of the promises and mutual covenants herein contained, to be kept and performed by the parties hereto, and for other good and valuable considerations, it is hereby agreed as follows:

1. Exhibit "B" attached hereto is hereby substituted for Exhibit 'B" attached to the Permit Agreement dated the 17th day of April, 1973.

BEST AVAILABLE COPY

2. Said Permit Agreement dated the 17th day of April, 1973 is hereby ratified and confirmed as amended hereinabove and shall remain in full force and effect in all other respects.

IN WITNESS WHEREOF, the parties to this Amended Agreement have hereunto set their hands and seals the day and year first above written.

Signed, sealed and delivered in the presence of:

Debby Reesing
As to Alafia River Basin Board

ALAFIA RIVER BASIN BOARD

By _____
Chairman Ex Officio

Jay T Adams

_____
As to Southwest Florida Water Management District and Southwest Florida Water Management District (Regulatory)

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, BY ITS GOVERNING BOARD

By Dewitt S. McAteer
Chairman

Attest _____
~~Assistant~~ Secretary

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (REGULATORY), BY ITS GOVERNING BOARD

By Dewitt S. McAteer
Chairman

Attest _____
~~Assistant~~ Secretary

Martha A. Smith

W. S. Tucker
As to Company

FLORIDA POWER AND LIGHT CO.
a Florida Public Utility C.

By _____
Vice President

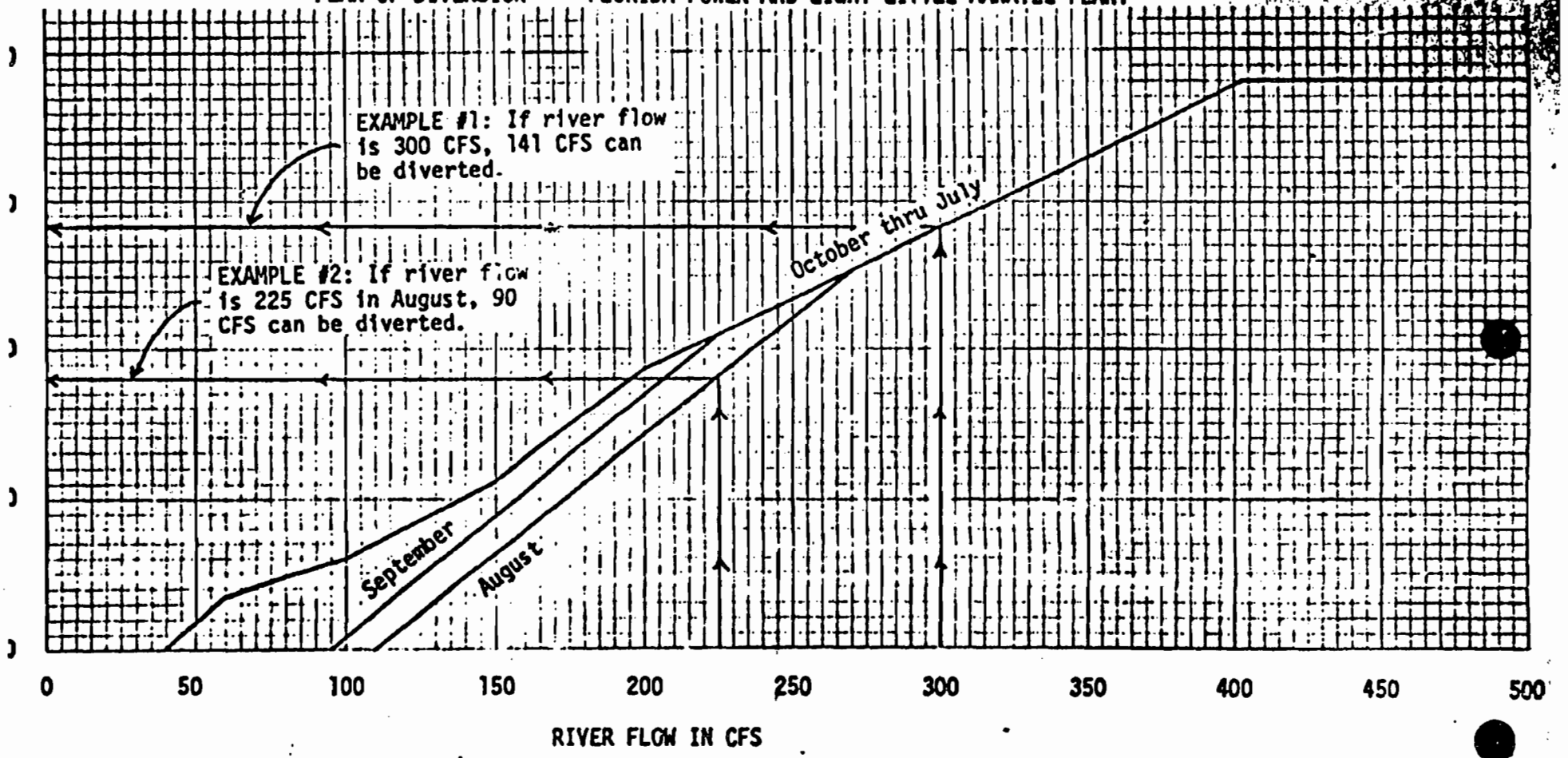
Attest _____
Secretary

BEST AVAILABLE COPY

EXHIBIT B (Revised November 12, 1975)

00264

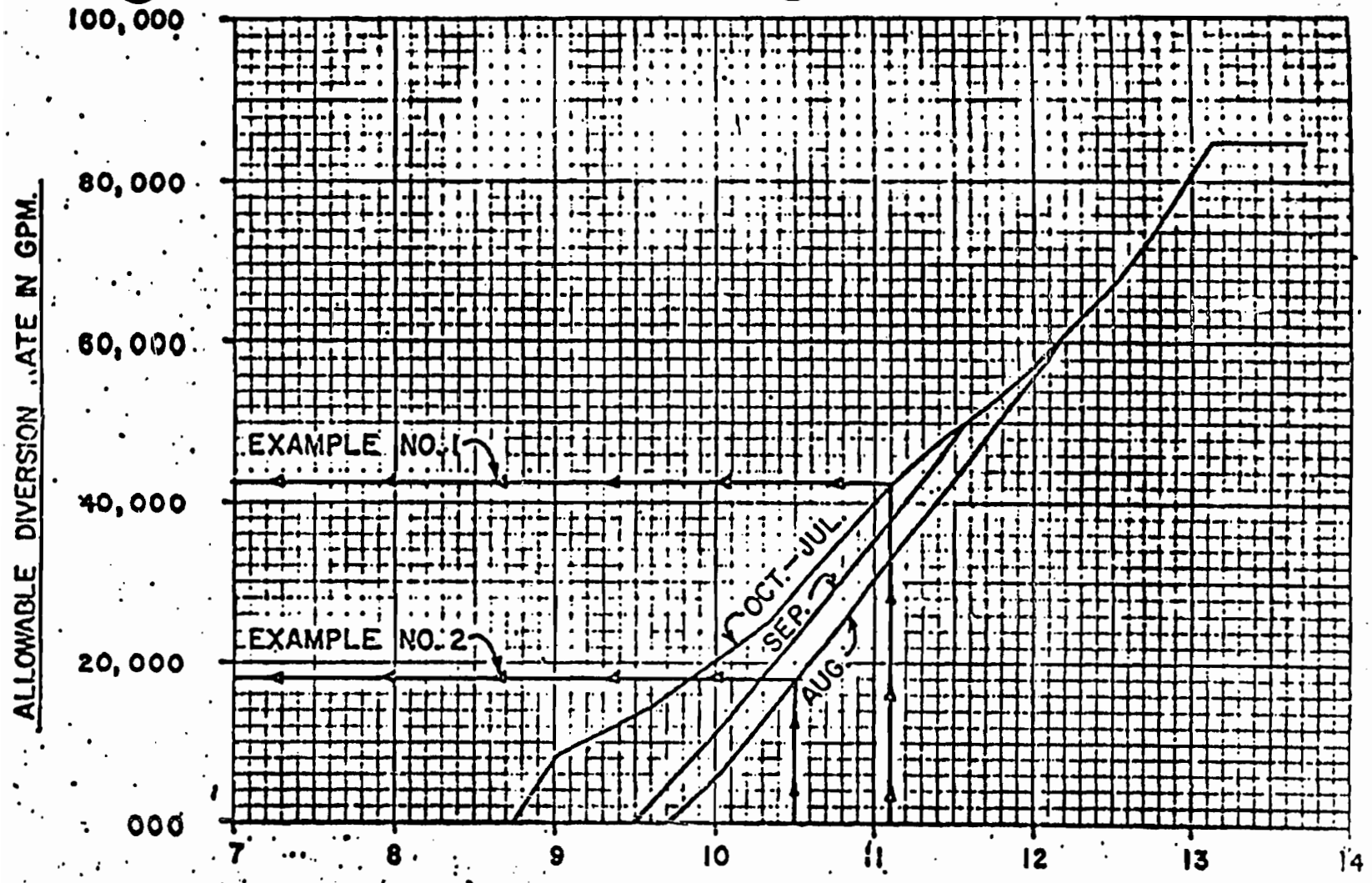
PLAN OF DIVERSION - FLORIDA POWER AND LIGHT LITTLE MANATEE PLANT



DIVERSION RESTRICTIONS

The plan for diversion restrictions as set forth on the above curve would employ a pumping station with a maximum capacity of 190 CFS. The company is authorized to divert that amount of "flow available for diversion" which is indicated by the point on the appropriate curves corresponding to the "river flow" occuring in the Little Manatee River at the point of diversion at the time the diversion takes place. The allowable diversion rate will be determined by the solid curve labeled, "October thru July" in all months except August and September. In no case shall the diversion reduce the river flow to less than 40 CFS. During August and September diversions would be restricted to 80 percent of the river flow in excess of the monthly average minimum flow (112 CFS being the monthly average minimum flow for August and 97 CFS being the monthly average minimum flow for September) or to the October thru July curve, whichever is

BEST AVAILABLE COPY



EXHIRIT B

EXAMPLE NO. 1

IF A RIVER LEVEL OF 11.1 IS REALIZED DURING THE MONTH OF JUNE, THE ALLOWABLE DIVERSION IS 42,800 GPM.

EXAMPLE NO. 2

IF A RIVER LEVEL OF 10.5 IS REALIZED DURING THE MONTH OF AUGUST, THE ALLOWABLE DIVERSION RATE IS 18,000 GPM.

MANATEE COOLING RESERVOIR
RIVER PUMPING STATION

OPERATING INSTRUCTIONS
LONG TERM ALLOWABLE DIVERSION
(WITH MAX. DIVERSION RATE OF 85,000 GPM)

APPENDIX 10.5

MONITORING PROGRAMS

APPENDIX 10.5.1

CULTURAL RESOURCES ASSESSMENT AND FDHR LETTER

FOUNDED 1979

JANUS RESEARCH ◊ PIPER ARCHAEOLOGY

Archaeology ◊ History ◊ Architectural History ◊ Public Interpretation

July 28, 1994

Ms. AnnaLee Moore
President
Moore-Bowers
3300 Henderson Boulevard, Suite 201
Tampa, FL 33609

Re: Cultural resource assessment survey, Manatee Orimulsion Conversion Project, Manatee County, Florida.

Dear Ms. Moore:

In satisfaction of state requirements, a cultural resource assessment survey was conducted by our firm in June and July, 1994 on the above referenced project. The purpose of this study was to determine whether any significant archaeological or historical sites will be impacted by future development of the property. The results of this study are summarized in the following brief report.

Project Location and Environment

The subject property is located in north-central Manatee County approximately 4.5 miles east of the town of Parrish. It includes portions of the east half of Section 13, T33S, R19E and the west half of Section 18, T33S, R20E, two small parcels of land in Section 1 of T33S, R19E, and a narrow strip of land in Section 19, T33S, R20E along SR 62 (see enclosed figure).

Current land use includes an existing Florida Power and Light electrical power plant facility on the east half of the property and active tomato fields on most of the west half. A small slough runs diagonally through Section 13 in the northwest corner of the project area separating the farm fields from improved pasture. A small portion of the pasture extends into the northwest corner of the project area. An existing railroad line connects the plant facility to the proposed spur lines in Section 1. Current land use in this area is agricultural.

Only a few areas of undeveloped upland remain on the property. These include a narrow strip of pine flatwoods located along the

boundary between Sections 13 and 18 between an existing Florida Power & Light plant facility and the tomato fields, and two small oak hammocks adjacent to the slough. Natural vegetation within the slough consists of cypress, bay, willow, and wax myrtle. Several small grass ponds are also present in the west half of the property.

Topographically, the property contains a linear sand ridge that is oriented north-south along the boundary between Sections 13 and 18. Elevation gradually slopes off towards the west and the terrain in Section 13 is relatively flat with the only relief provided by the slough and grass ponds. Soils on the ridge are excessively well drained while those in the lower western half range from poor to very poorly drained. Specific soil types on the property consist of: St. Lucie fine sand, Pomello fine sand, Immokalee-Leon fine sand, Leon-Immokalee fine sand, Leon fine sand, and Rutlege fine sand.

The undeveloped portions of the small northern parcels are vegetated in pine flatwoods. Two small bayheads are located nearby. Soils here are classified as Leon-Immokalee sand, nearly level phase which is poorly drained.

Cultural Resources

A search of the State of Florida's Site File indicated that no previously recorded archaeological or historical sites had been recorded within the subject property. However, several sites have been reported in the near vicinity of the property. The closest are 8MA98, an artifact scatter in the southwest quarter of Section 7, T33S, R20E, and 8MA316, a small lithic scatter located in the northwest quarter of Section 19 of the same township just south of SR62. These and other nearby sites are listed in the following table.

Table 1: Previously recorded archaeological sites in the near vicinity of the project area.

Site #	Site Type	T, R, Section
8MA 1	Burial Mound	33S, 20E, 12
8MA 3	Burial Mound	33S, 19E, 27
8MA 53	Burial Mound	33S, 19E, 22
8MA 90	Artifact Scatter	33S, 20E, 16
8MA 93	Artifact Scatter	33S, 20E, 11
8MA 98	Artifact Scatter	33S, 20E, 7
8MA136	Artifact Scatter	33S, 18E, 1
8MA316	Lithic Scatter	33S, 20E, 19

Sites 8MA1 and 8MA3, as well as a third mound 8MA2, are known collectively as the Parrish Mounds. Excavations were conducted at all three in the 1930s, however their present condition is unknown. The exact location of 8MA2 is not known although it is described as being located "5 miles north of the Parrish-Wauchula road at a point about one-half mile south of the south fork of the Little Ms. Manatee River" (G.W. Willey, *Archeology of the Florida Gulf Coast*, 1949:146). Site 8MA53 was recorded in 1954 and the FSF form indicates that it had been partly destroyed at that time. The remaining portion of the mound is still visible today and is in moderately good condition.

Although the archaeological significance of these mounds has not been evaluated using **National Register** criteria, the potential for encountering human remains requires that they be treated as sensitive resources, and that the stipulations of Chapter 872, F.S. (*Offenses Concerning Dead Bodies and Graves*) be followed. The remaining five sites in Table 1 have either been destroyed or evaluated as not significant.

Field Methods

Prior to the start of the field survey, aerial photographs, USGS topographic maps, and soil survey maps were used to identify potentially sensitive areas for archaeological sites within the project area. The sand ridge in Section 18 is the highest and best drained land on the property; however, the construction of the FP&L plant facility effectively limited investigation of this area. In the western half of the property, the upland/wetland margins, and in particular two small oak hammocks, were considered most likely to contain archaeological sites. In the northern area, attention was paid to undeveloped upland areas adjacent to bayheads. The locations of all these areas are shown on the enclosed figure.

The field work was conducted in two stages: a preliminary field reconnaissance to evaluate site potential and an intensive field investigation to locate buried archaeological sites. The field reconnaissance consisted of a walkover survey of the upland/wetland margin and selected portions of the tomato fields. All exposed areas were visually examined for artifacts or other cultural features. No subsurface testing was conducted at this stage.

The walkover reconnaissance survey verified the disturbed nature of much of the site resulting from previous land use. No surficial evidence of prehistoric or early historic occupation was observed in the areas examined. The only areas that appeared to retain some potential for containing buried archaeological sites were the

hammock areas adjacent to the slough and the strip of pine flatwoods between the FP&L plant and the tomato fields. The location of the former along a wetland margin, and the latter in an area of well drained soils, conform to environmental variables that tend to be associated with high archaeological site occurrence in this part of the state ("An Archaeological Resource Inventory and Archaeological Site Predictive Model for Manatee County, Florida").

The intensive field survey included the excavation of 50 cm in diameter shovel tests in the two hammock areas near the slough and in the undeveloped strip of pine flatwoods. All shovel tests were excavated to a depth of at least one meter and all soil was screened through 6.4 mm (1/4 inch) wire mesh. In addition, a pedestrian surface examination of all exposed areas in the tomato fields was conducted.

Subsequent to the completion of the survey, Janus Research was requested to investigate the parcels in Section 1 and Section 19. Both areas were investigated on foot for artifacts or features, and judgmentally located, subsurface shovel tests were excavated in undisturbed areas in Section 1.

Results and Recommendations

No prehistoric or historic archaeological sites were discovered during the survey. Based on the results of this study, it is concluded that no cultural resources eligible for nomination to the **National Register of Historic Places** will be impacted by any future development of the property.

If you have any questions, or need additional information, please let me know.

Sincerely,

Robert J. Austin
Executive Vice President

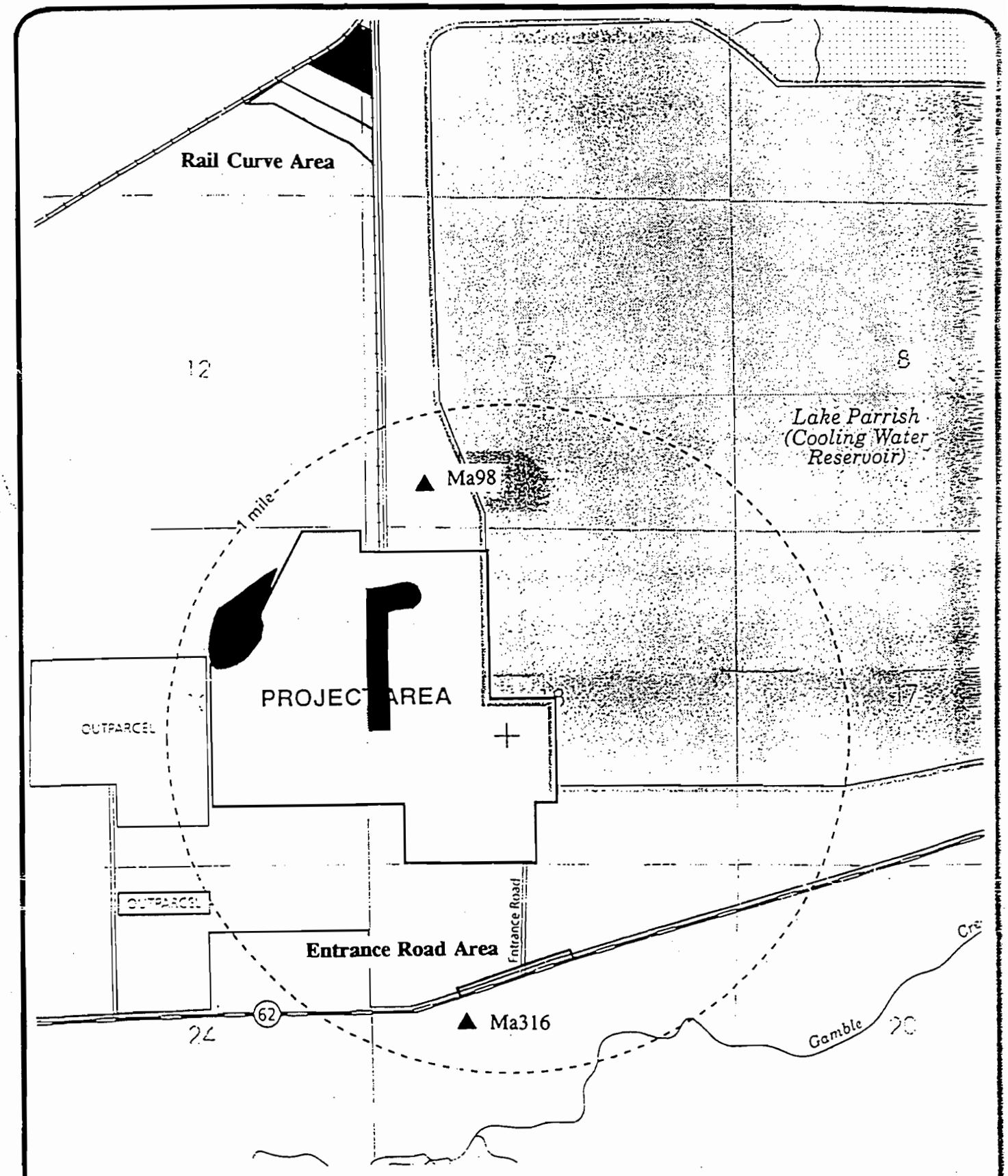


Figure 1: Project area showing areas tested and nearby archaeological sites.

JANUS RESEARCH · PIPER ARCHAEOLOGY
Archaeology · History · Architectural History · Public Interpretation
P.O. Box 919, St. Petersburg, Florida 33731

FLORIDA DEPARTMENT OF STATE
Jim Smith
Secretary of State
DIVISION OF HISTORICAL RESOURCES
R.A. Gray Building
500 South Bronough
Tallahassee, Florida 32399-0250
Director's Office (904) 488-1480
Telecopier Number (FAX) (904) 488-3353

August 31, 1994

Mr. Robert J. Austin
Janus Research/Piper Archaeology
P.O. Box 919
St. Petersburg, Florida 33731

In Reply Refer To:
Frank J. Keel
Historic Sites Specialist
(904) 487-2333
Project File No. 942991

RE: Cultural Resource Assessment Review Request
Cultural Resource Assessment Survey of the Manatee Orimulsion Conversion Project, Manatee, County, Florida. By Robert J. Austin. August 25, 1994.

Dear Mr. Austin:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the referenced project(s) for possible impact to historic properties listed, or eligible for listing, in the National Register of Historic Places. The authority for this procedure is the National Historic Preservation Act of 1966 (Public Law 89-665), as amended.

We have reviewed the above referenced survey report and find it to be complete and sufficient. Further, we note that no archaeological or historic sites were located during the course of the survey. Therefore, it is the opinion of this office that the proposed project will have no effect on any historic properties listed, or eligible for listing, in the National Register of Historic Places, or otherwise of historical or architectural value.

If you have any questions concerning our comments, please do not hesitate to contact us. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

for Laura A. Kammerer

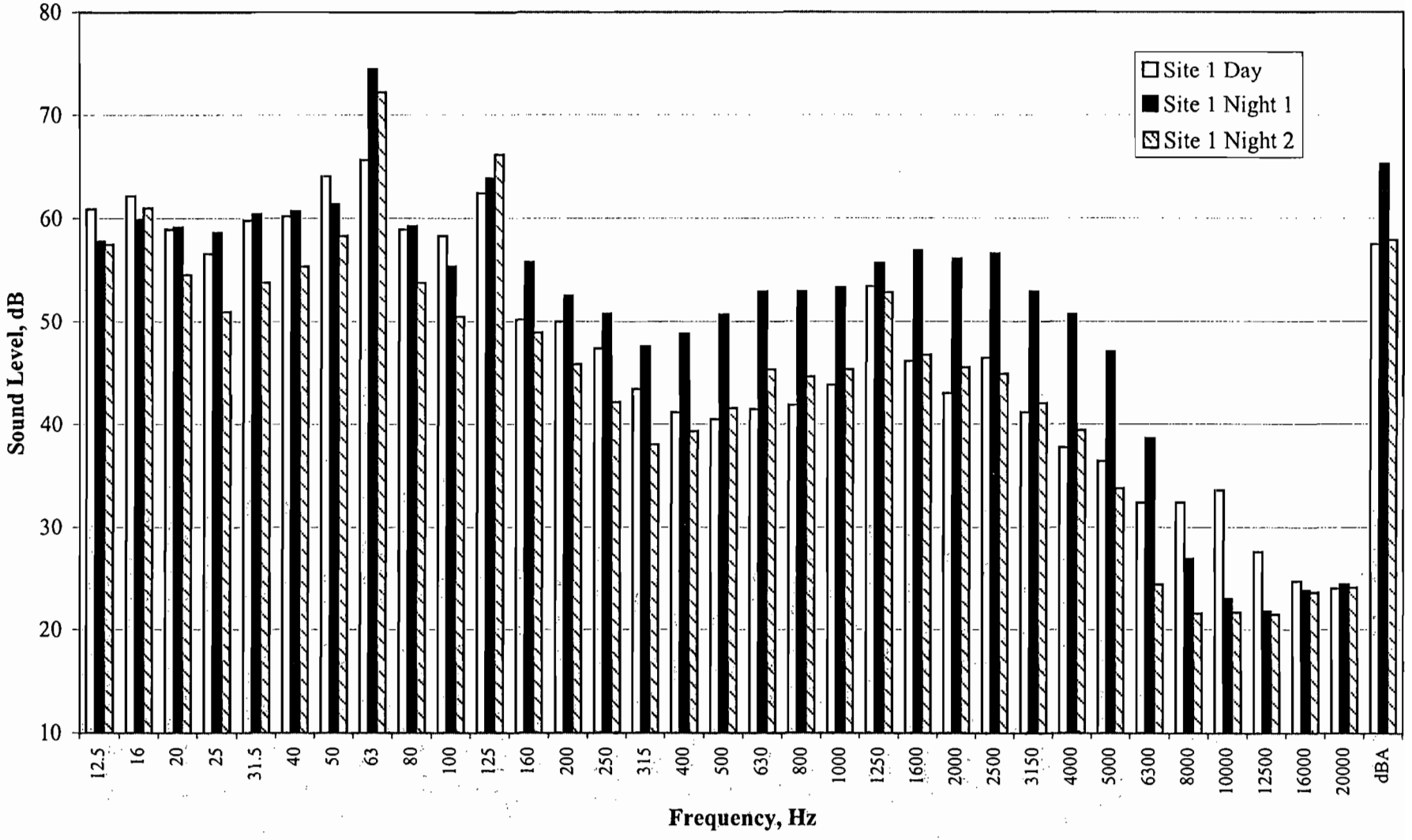
George W. Percy, Director
Division of Historical Resources
and
State Historic Preservation Officer

GWP/Kfk

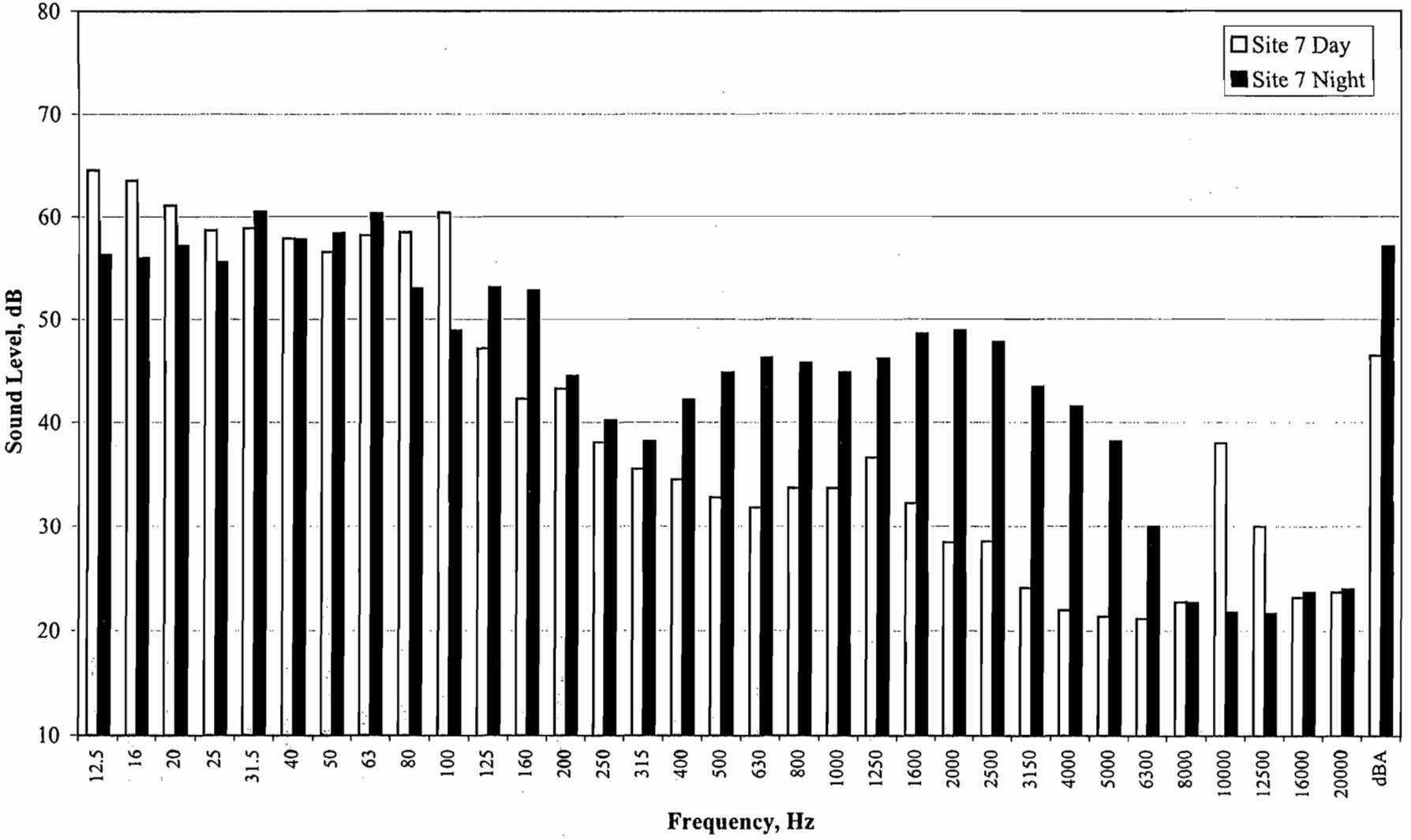
APPENDIX 10.5.2

NOISE

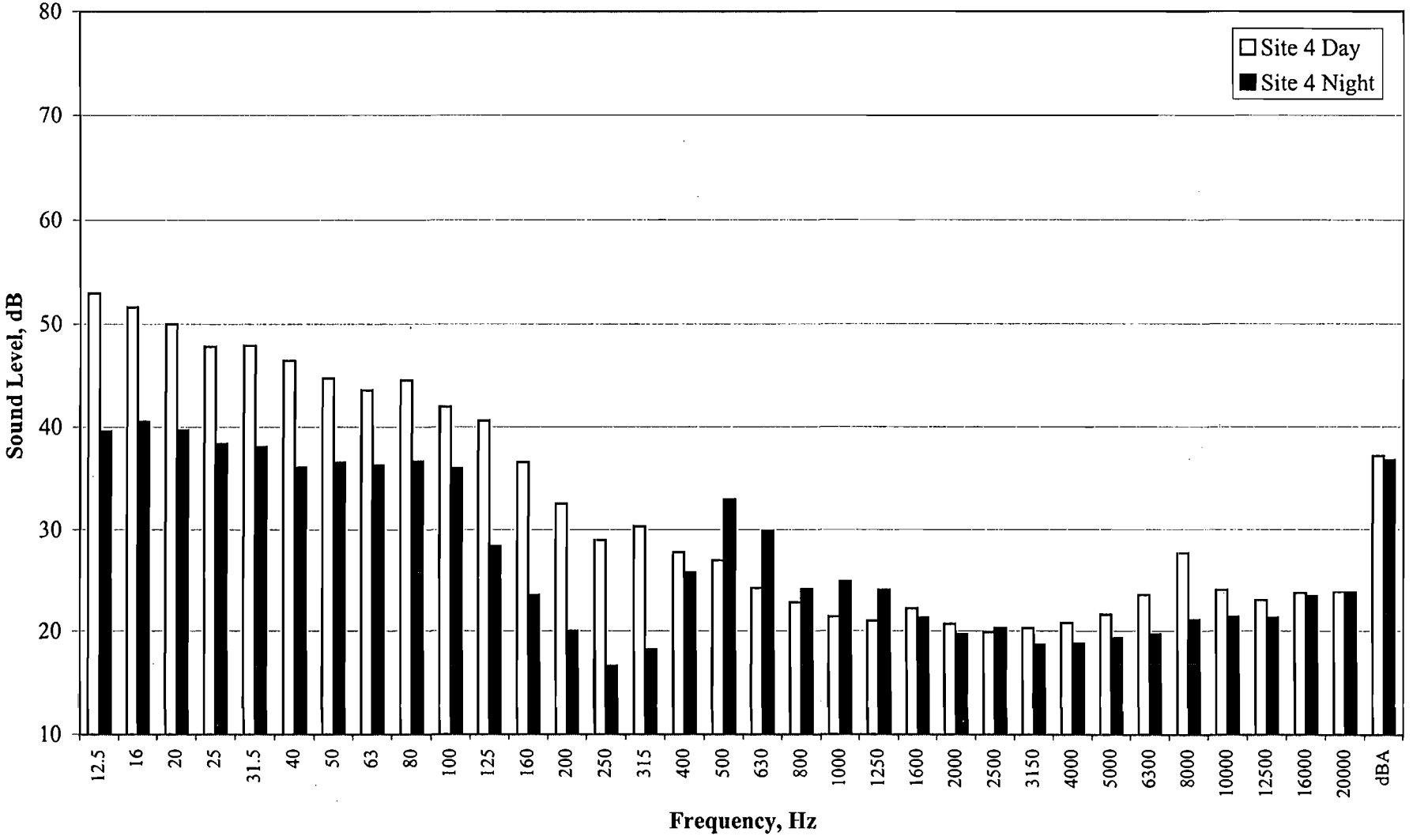
Site 1 Sound Pressure Level



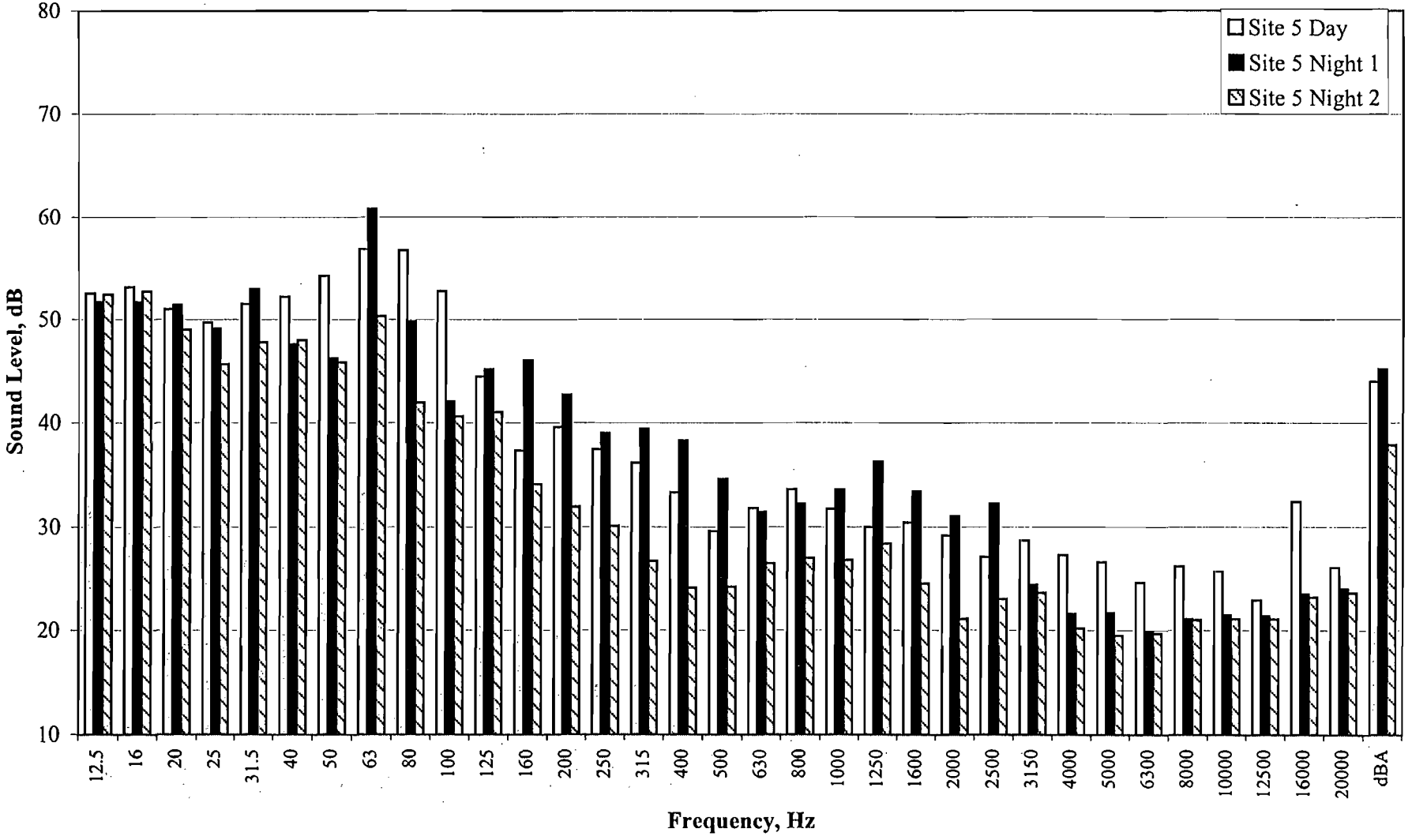
Site 2 Sound Pressure Level



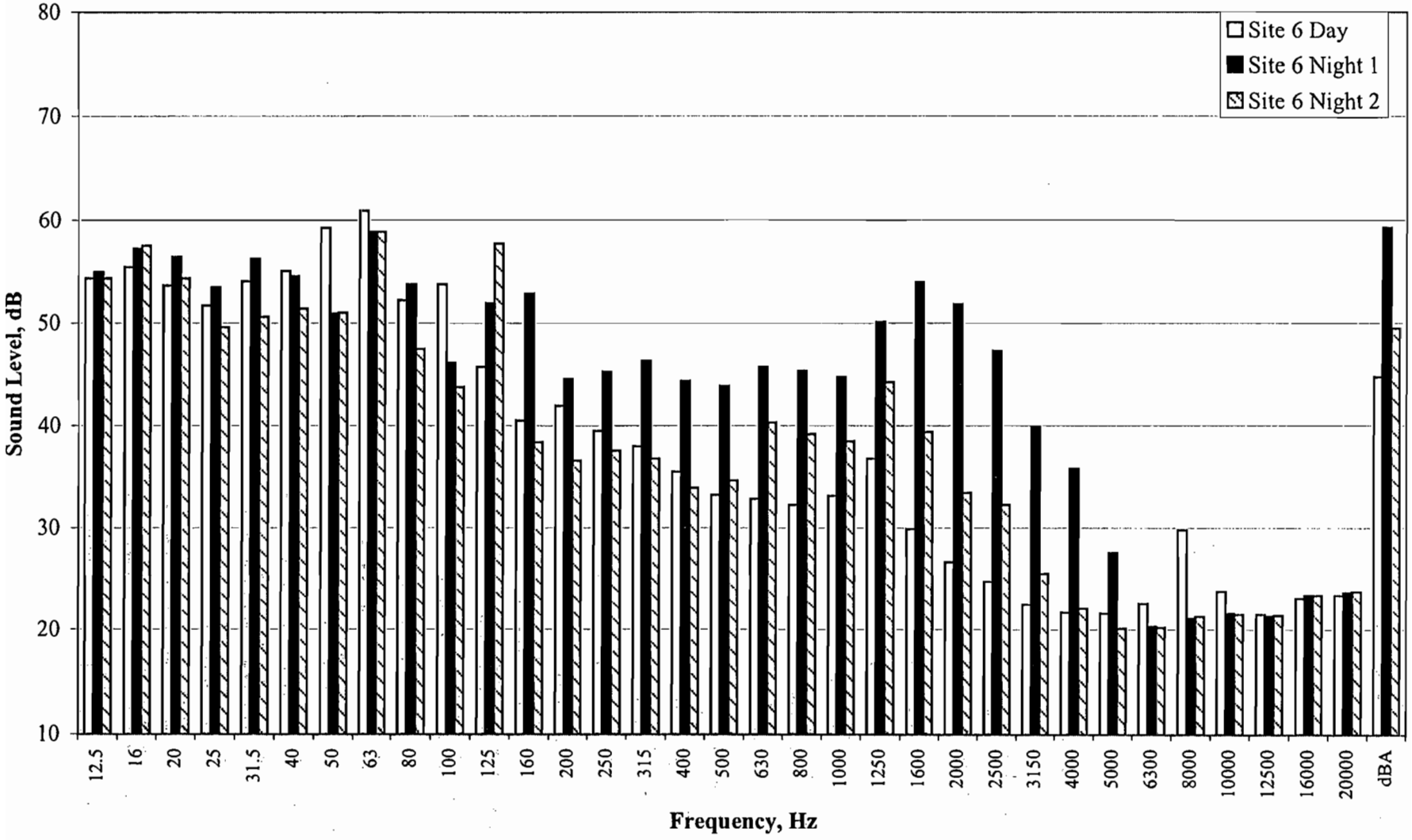
Site 4 Sound Pressure Level



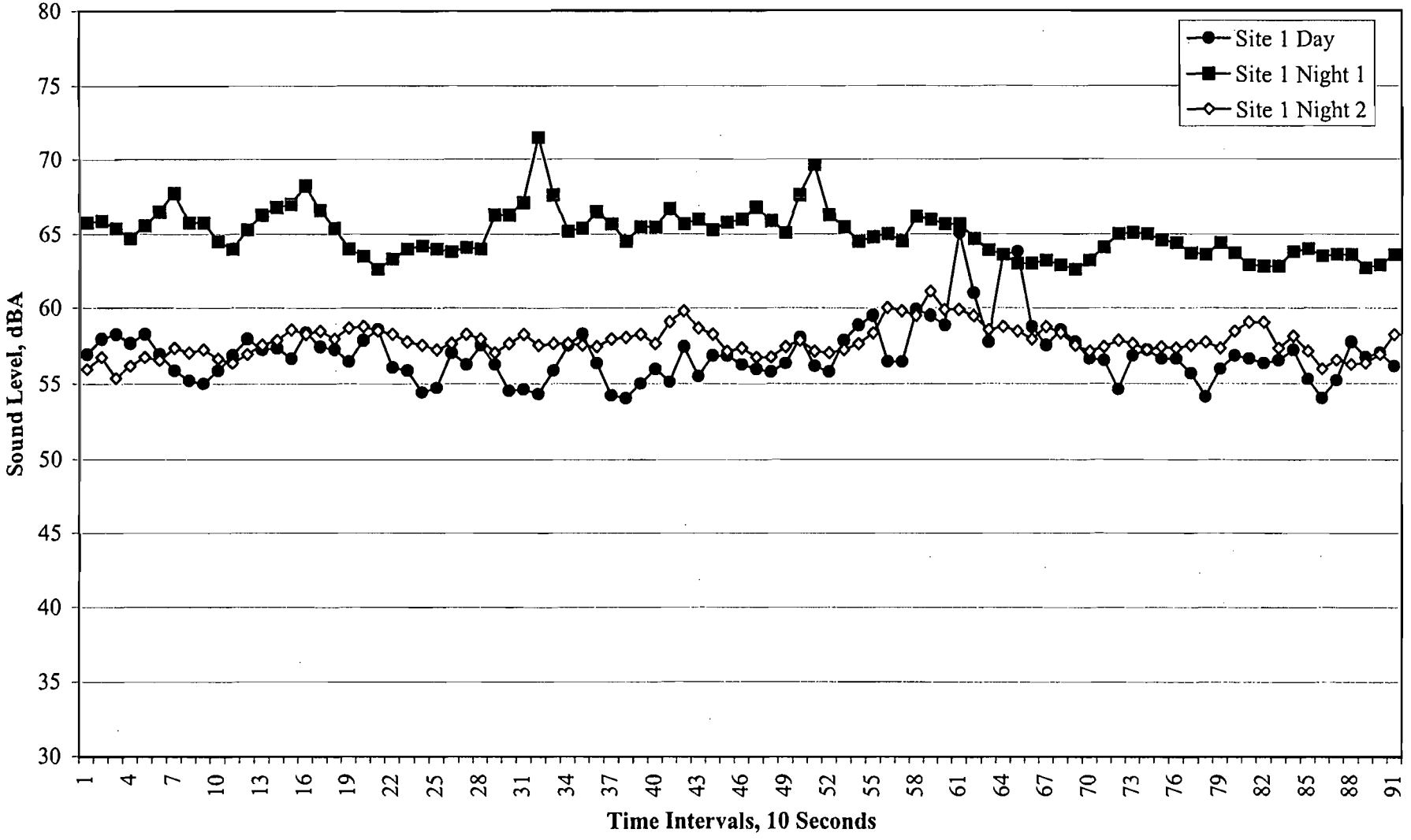
Site 5 Sound Pressure Level



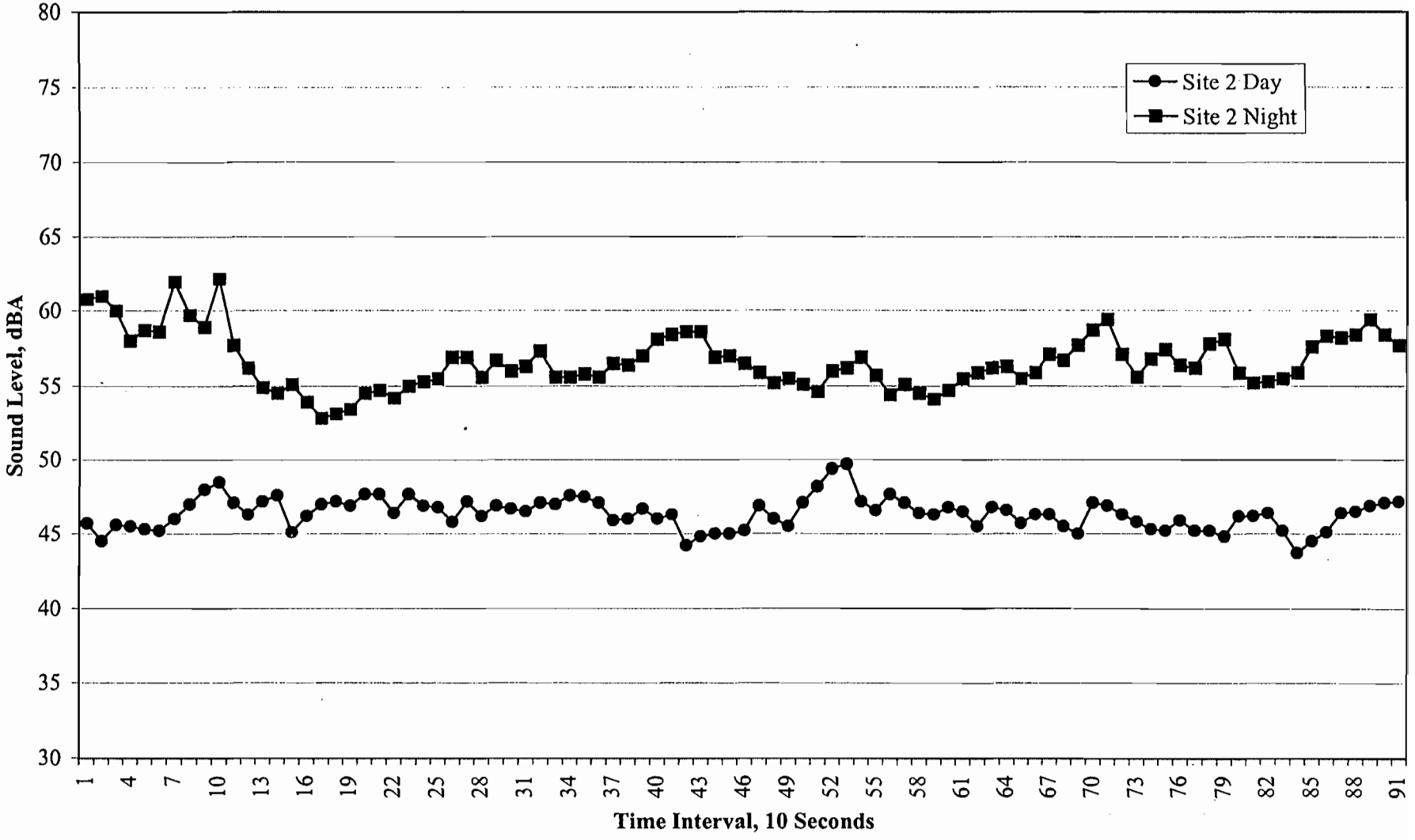
Site 6 Sound Pressure Level



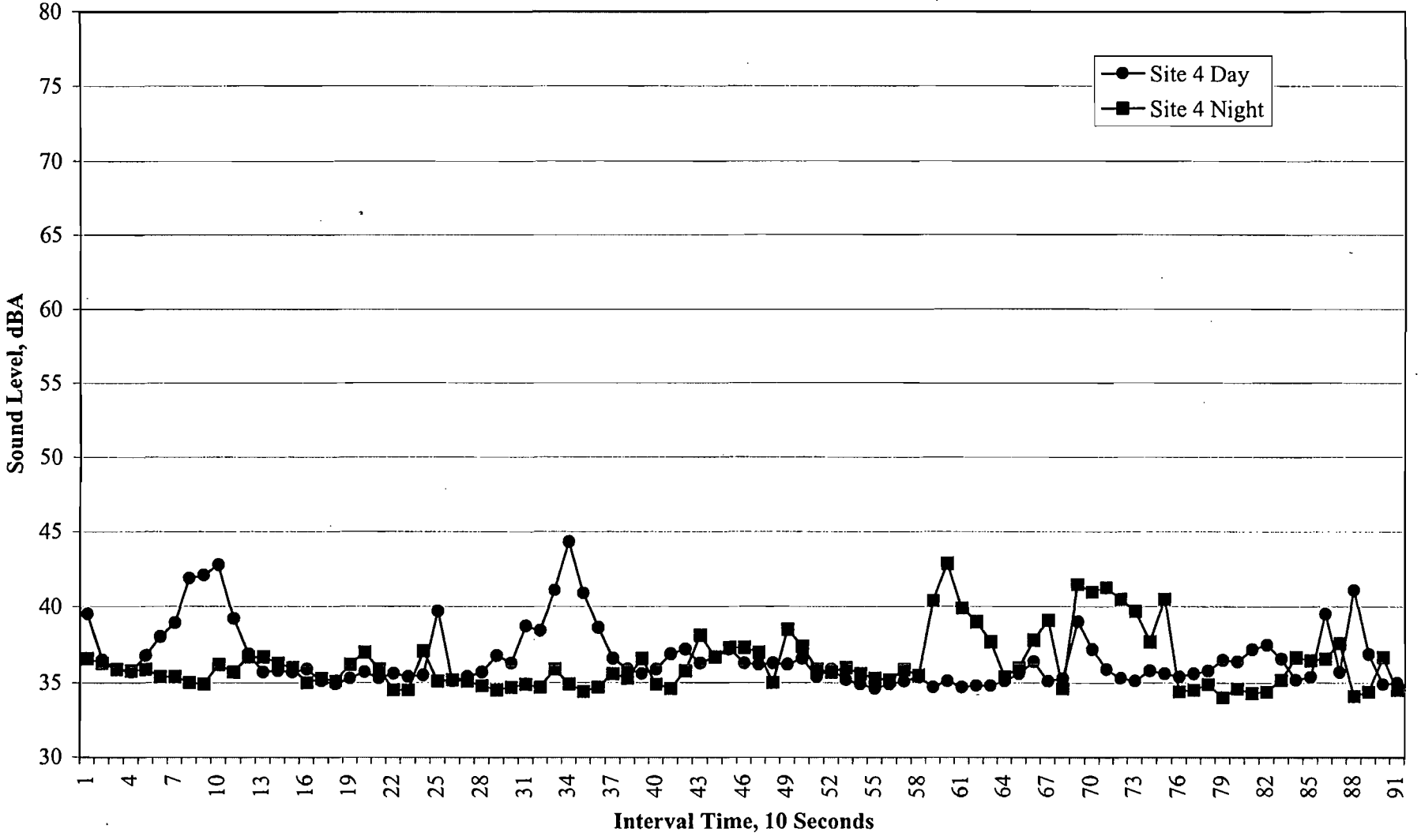
Site 1 Interval Sound Pressure Levels



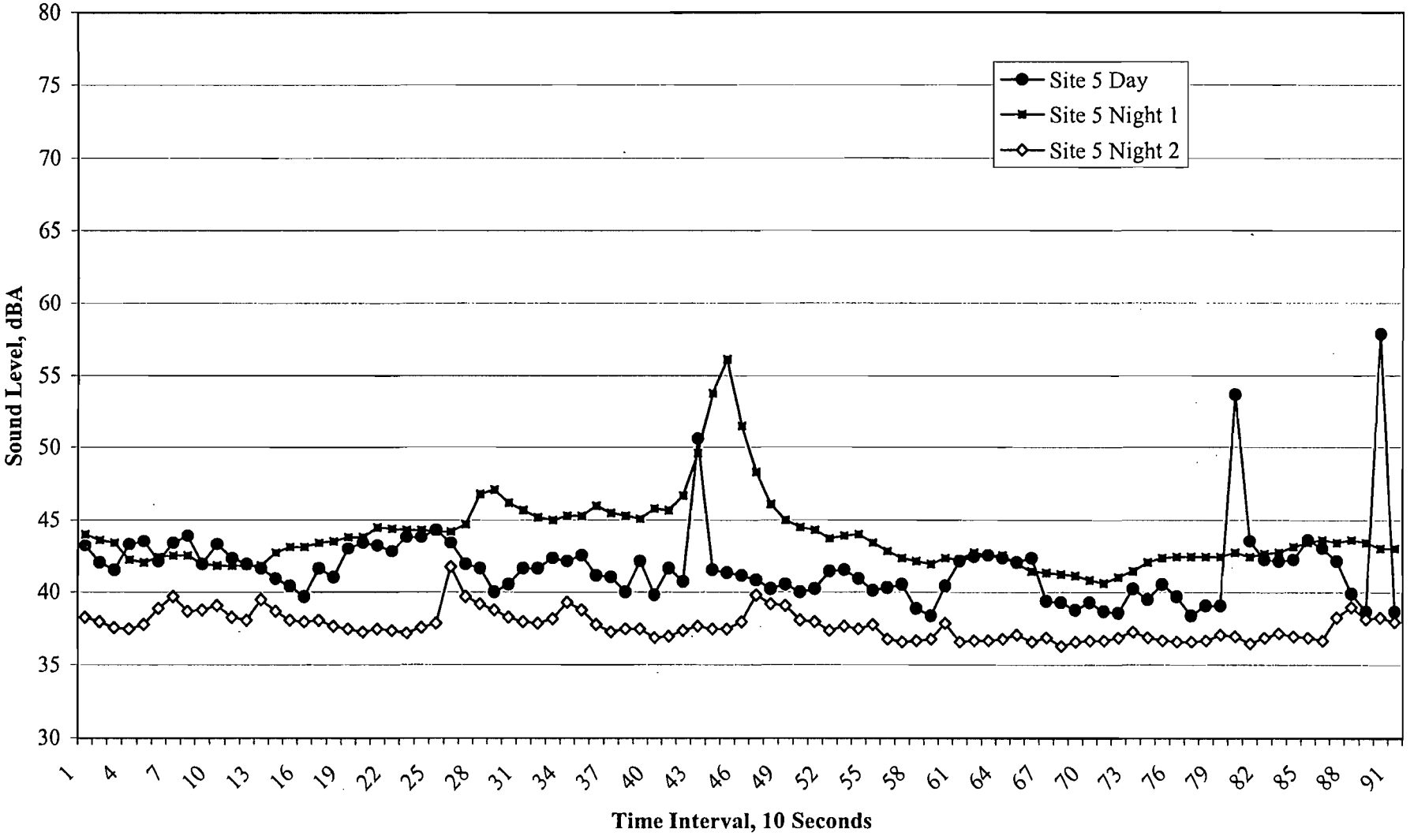
Site 2 Interval Sound Pressure Levels



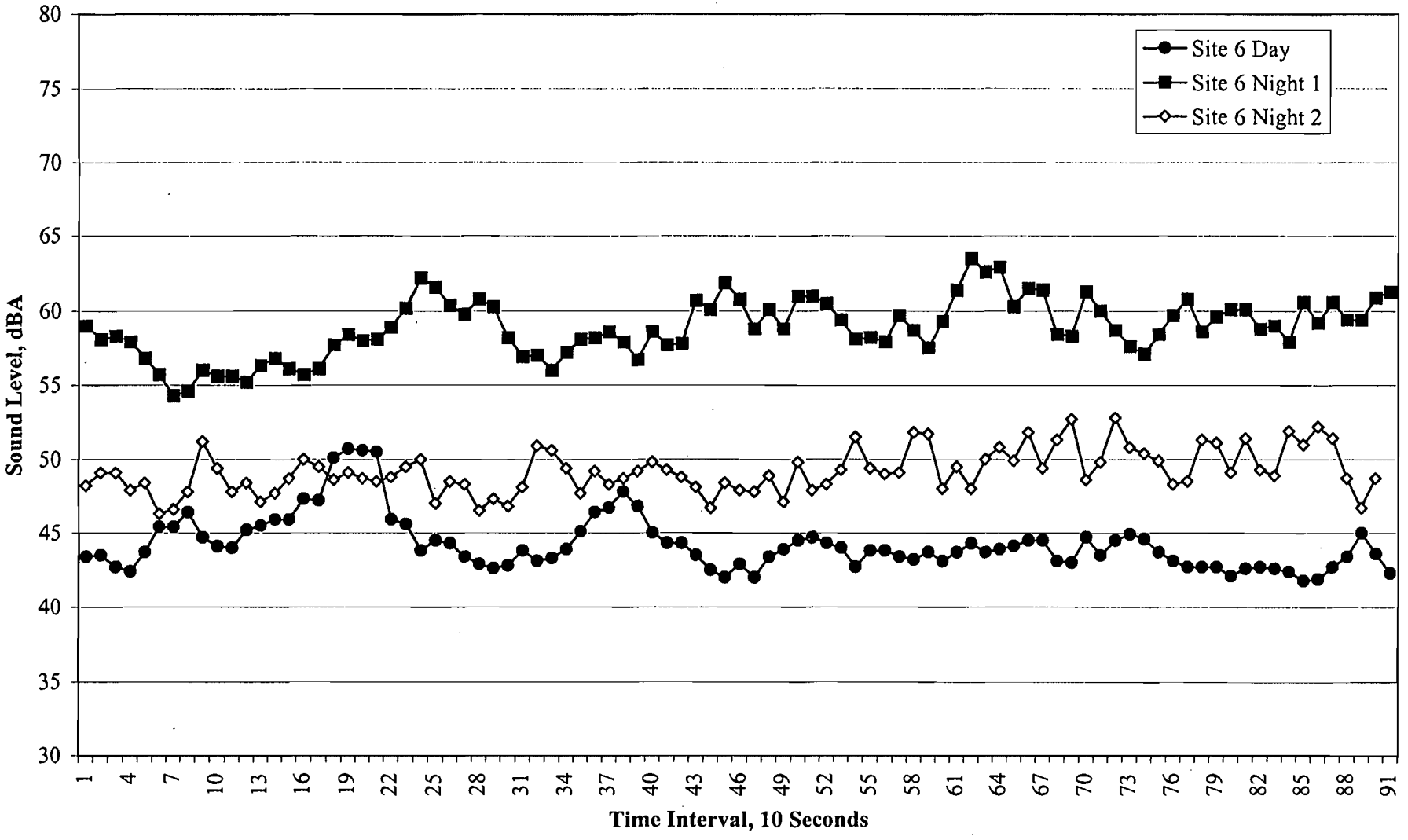
Site 4 Interval Sound Pressure Levels



Site 5 Interval Sound Pressure Levels



Site 6 Interval Sound Pressure Levels



APPENDIX 10.6

TRANSMISSION INTEGRATION

Table 1. Maximum Electric and Magnetic Fields Expected to be Produced by the Transmission Lines Associated with Manatee Unit 3 Integration

	Electric Field (kV/m)		Magnetic Field (mG)
	Maximum	Edge of ROW	Edge of ROW
Standards[a]	8.0	2.0	150
Transmission Line Section:			
Johnson – Manatee #2 230kV			
Cross Section 1 (East – West section from Manatee Plant)	5.7	. 06	13.5
Cross Section 2 (North – South section)	4.3	. 80	113.4
Cross Section 3 (East - West section to Johnson Sub)	5.3	1.88	129.2

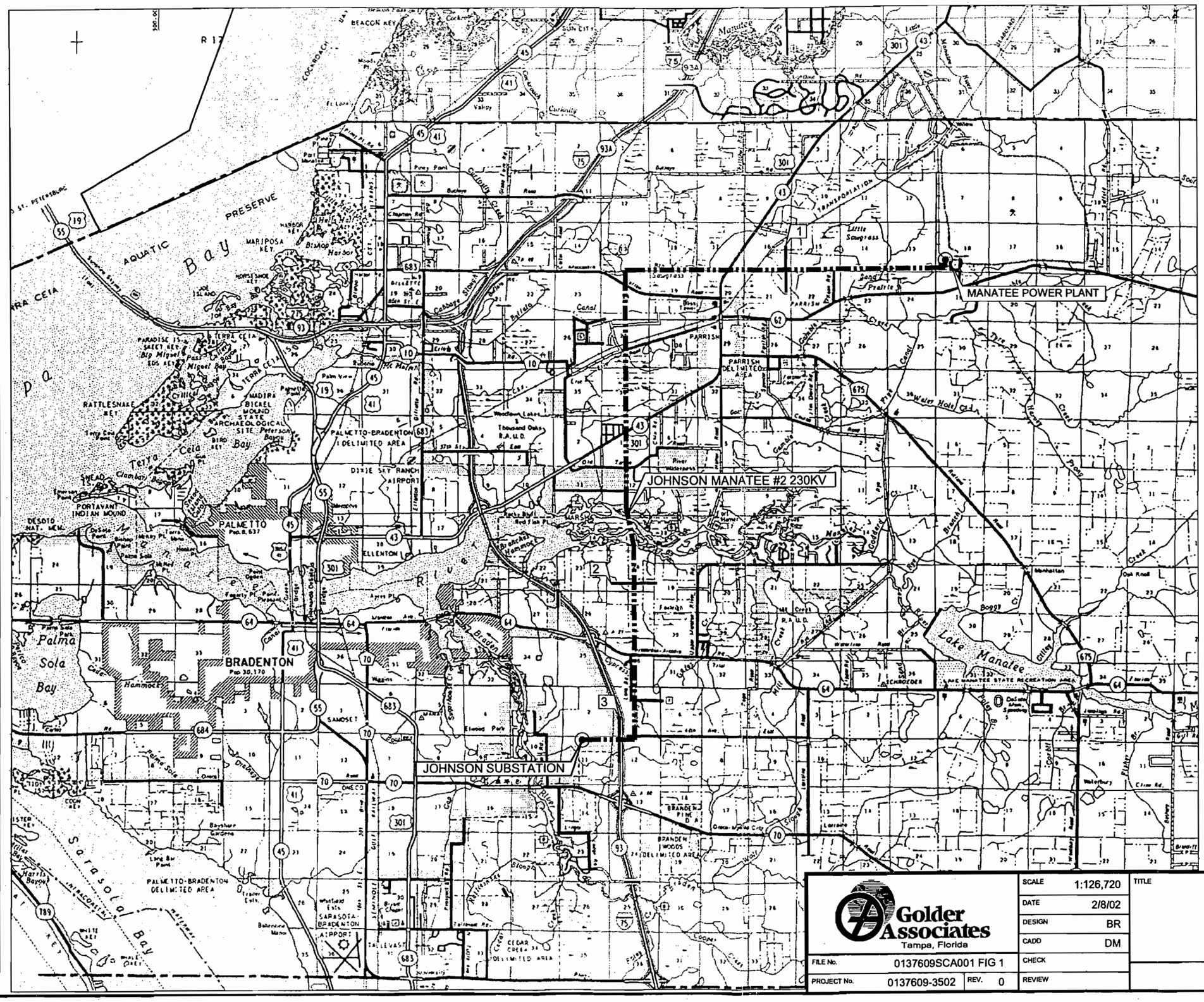
Note: kV/m = kilovolts per meter

mG = milligauss

[a] FDEP Rule 62-814.450 F.A.C

Source: EzEMF software program developed through Florida Coordinating Group (FCG) and accepted by the Florida Department of Environmental Protection (FDEP)

Best Available Copy



0 0.5 1 2 3 4 MILES
0 0.5 1 2 3 4 5 6 KILOMETERS
SCALE

LEGEND:

NEW 230 KV LINE COLLOCATED IN EXISTING FPL ROW.

CROSS SECTION #

RESOURCES:

GENERAL HIGHWAY MAP, MANATEE COUNTY, FLORIDA; U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, FEBRUARY 1989.

GENERAL HIGHWAY MAP, HILLSBOROUGH COUNTY FLORIDA, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, DECEMBER 1976.

TRANSMISSION MAP, FLORIDA POWER & LIGHT COMPANY, ND.

Golder Associates
Tampa, Florida

FILE No.	0137609SCA001 FIG 1		
PROJECT No.	0137609-3502	REV.	0

SCALE	1:126,720
DATE	2/8/02
DESIGN	BR
CADD	DM
CHECK	
REVIEW	

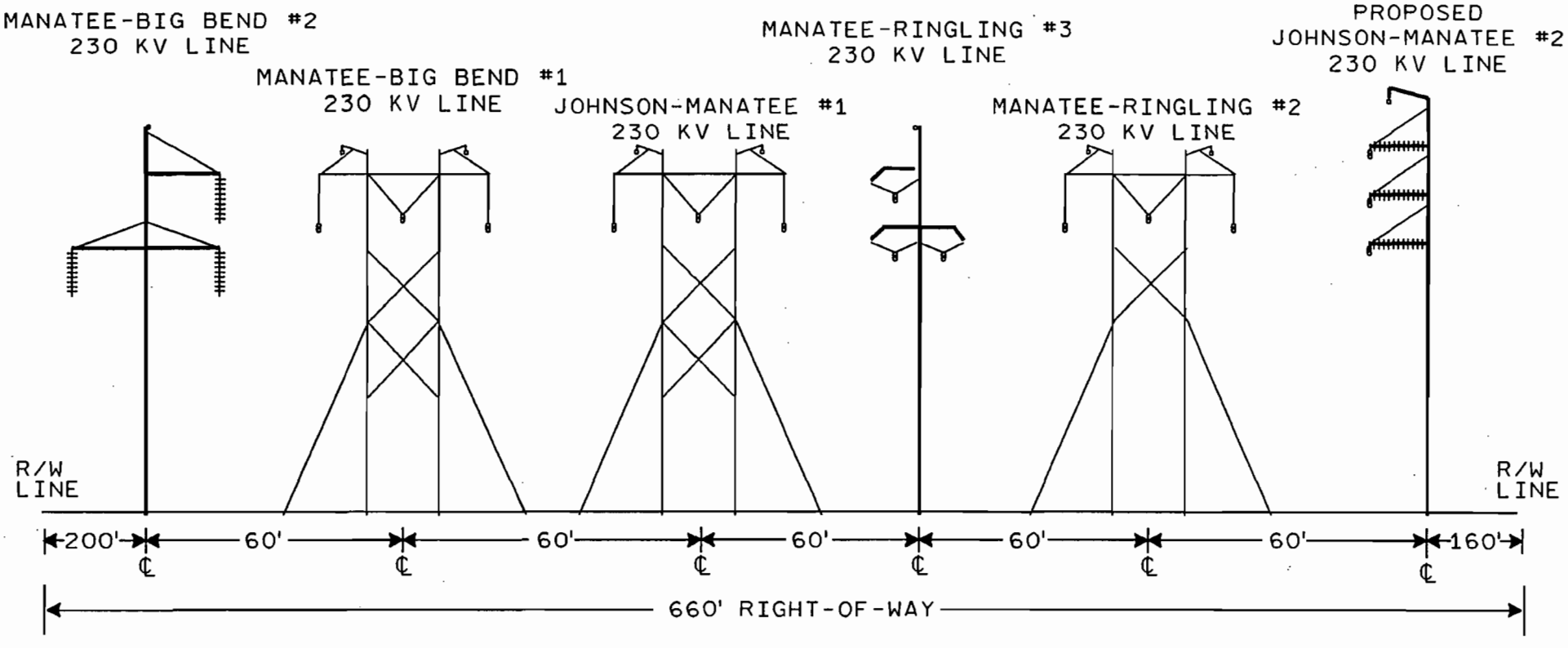
TITLE

PROJECT LOCATION MAP

MANATEE UNIT 3

FIGURE 1

Drawing file: 0137609SCA001 FIG 1.dwg Feb 08, 2002 - 11:11am



Golder Associates
Tampa, Florida

SCALE	NTS
DATE	2/8/02
DESIGN	BR
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CHECK	
REVIEW	

FILE No. 0137609SCA002 FIG 2
PROJECT No. 0137609-3502 REV. 0

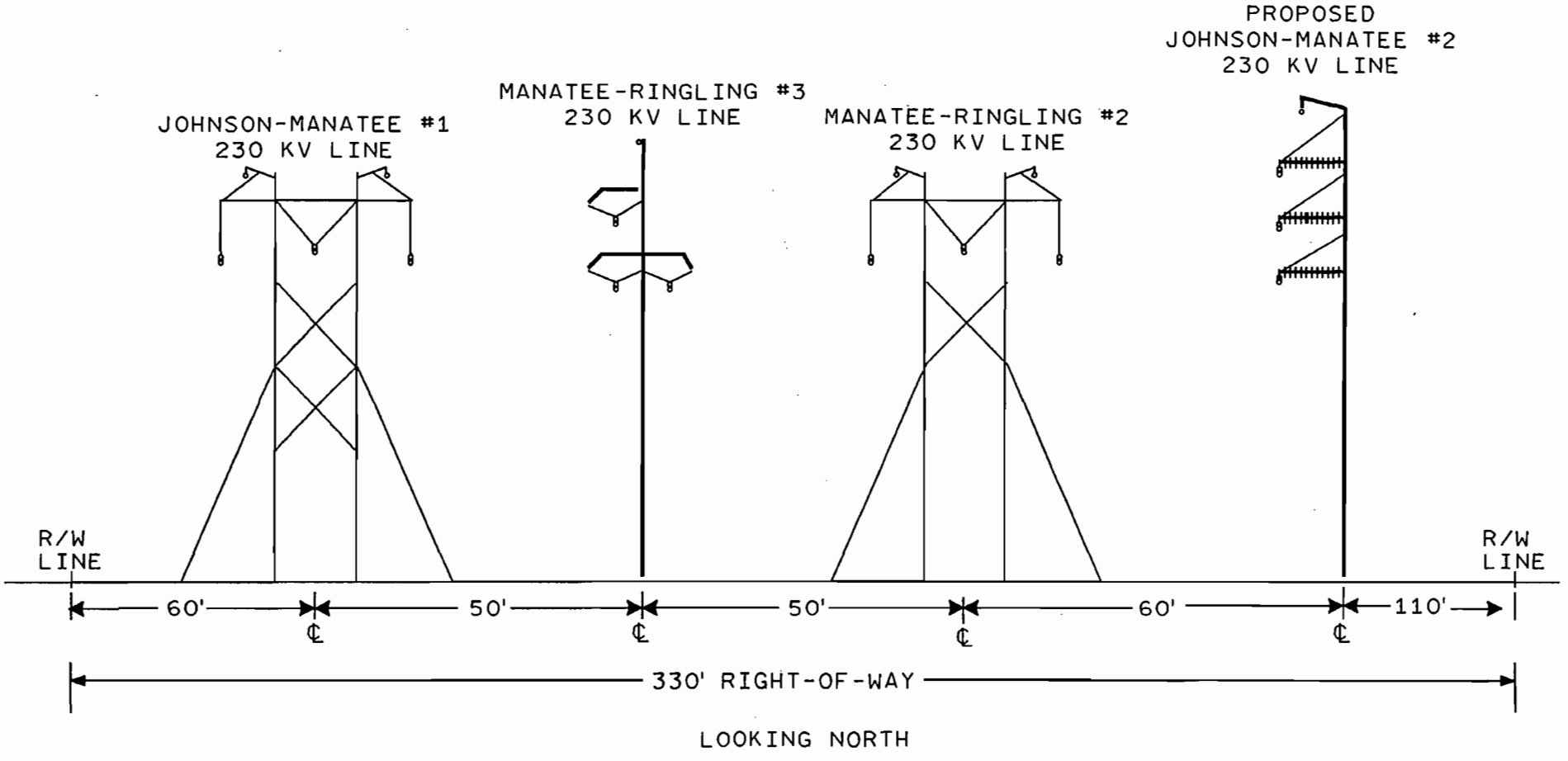
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY
JOHNSON-MANATEE #2 230 KV LINE
CROSS SECTION 1

MANATEE UNIT 3

FIGURE **2**

Drawing file: 0137609SCA002 FIG 2.dwg Feb 08, 2002 - 1:49pm



Golder Associates
Tampa, Florida

SCALE	NTS
DATE	2/8/02
DESIGN	BR
CADD	DM
CHECK	
REVIEW	

FILE No. O137609SCA003 FIG 3
PROJECT No. O137609-3502 REV. 0

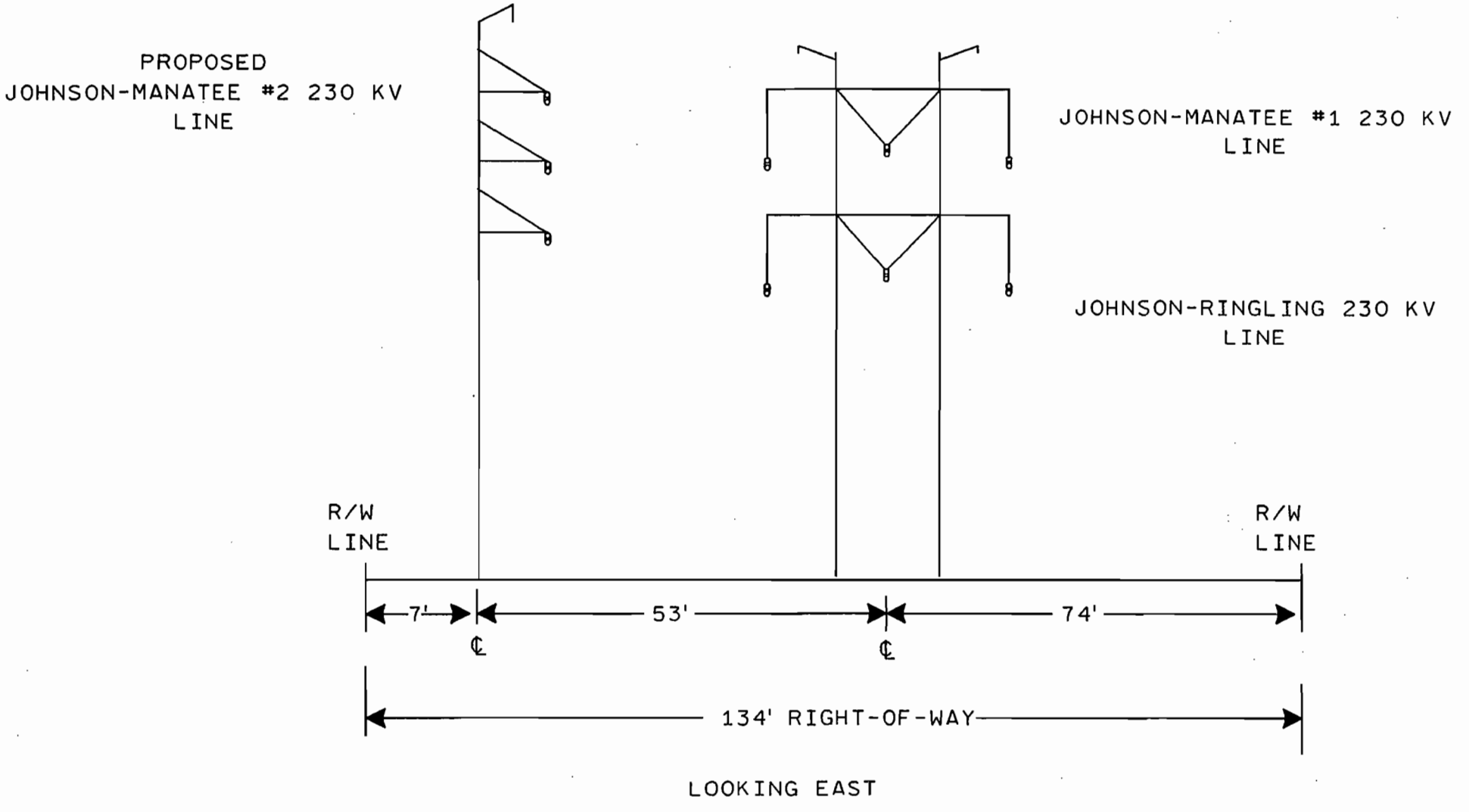
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY
JOHNSON-MANATEE #2 230 KV LINE
CROSS SECTION 2

MANATEE UNIT 3

FIGURE **3**

Drawing file: 0137609SCA003 FIG 3.dwg Feb 08, 2002 - 1:49pm



Golder Associates Tampa, Florida	SCALE	NTS	TITLE: PROPOSED TRANSMISSION RIGHT-OF-WAY JOHNSON-MANATEE #2 230 KV LINE CROSS SECTION 3
	DATE	2/8/02	
	DESIGN	BR	
	CADD	DM	
FILE No. 0137609SCA004 FIG 4	CHECK		
PROJECT No. O137609-3502 REV. 0	REVIEW		MANATEE UNIT 3 — FIGURE 4

Drawing file: 0137609SCA004 FIG 4.dwg Feb 08, 2002 - 1:49pm

APPENDIX 10.7

COOLING POND MODELING REPORT

FPL MANATEE PLANT

COOLING POND MODELING REPORT

SCA APPENDIX 10.7

February 6, 2002

BY:
FOSTER WHEELER ENVIRONMENTAL CORPORATION

2/12/02

Harold A Frediani Jr

Harold A. Frediani, Jr.
P.E. Number 36394
Foster Wheeler Environmental Corporation
210 Hollyridge Drive, Roswell, GA 30076-1208
Certificate of Authorization Number 7130

FPL MANATEE PLANT

COOLING POND MODELING REPORT

SCA APPENDIX 10.7

February 6, 2002

BY:
FOSTER WHEELER ENVIRONMENTAL CORPORATION

Harold A. Frediani, Jr.
P.E. Number 36394
Foster Wheeler Environmental Corporation
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FPL Manatee Plant - Cooling Pond Modeling Report

I. Introduction

Foster Wheeler Environmental Corporation (FWENC) has performed computerized mathematical modeling to predict cooling pond thermal performance and water consumption at the Manatee Plant. Thermal performance is represented by providing cooling pond cold water temperature (condenser inlet water temperatures) as a function of meteorological data, while water consumption is represented by predicting cooling pond water levels. The intent was to utilize a screening model (EQTP) that analyzes plant and meteorological data on a monthly basis, and to compare predicted results for condenser inlet water temperatures and pond water levels with actual data provided by the plant.

The Manatee plant configuration includes 2 units with the following design operating characteristics:

Type of Condenser Cooling	Closed-Cycle
Megawatts	1700 MW
Circulating Water Flow (gpm)	833,667
Delta T across Condenser (°F)	18
Heat Rejection Rate (Btu/Hr)	7.5×10^9

The units utilize a 3,825-acre closed-cycle cooling pond for condenser cooling. Under an existing permit agreement between FPL and the Southwest Florida Water Management District, the plant is permitted to divert water from the Little Manatee River to its cooling pond for makeup purposes. The amount of the allowable diversion varies, depending on river flows at the plant and month of the year, as shown in the curves in Figure 1.

II. Calibration Modeling

This modeling was performed utilizing the EQTP cooling pond model. This is a steady state energy balance computer model that was originally written in the 1970s, and documented in a paper presented at the 33rd Annual Meeting of the American Power Conference in April 1972. This model has since been used to analyze numerous cooling ponds, including several ponds in Florida.

A. Model Description

EQTP is a steady state energy balance computer model which simulates the expected thermal performance of a cooling pond with respect to both temperature and evaporation effects. The program assumes that heat transfer to and from a cooling pond is a function of the water's equilibrium temperature. This model was originally described by Patterson, Leporati and Scarpa ("The Capacity of Cooling Ponds to Dissipate Heat", Ebasco Services Incorporated, presented at the 33rd Annual Meeting of the American Power Conference, Chicago, Illinois, April 20-22, 1972.)

The problem of predicting the steady-state temperatures in a cooling pond reduces to a quantitative determination of the energy transfer through a boundary between the atmosphere and the water.

The processes involved in the heating and cooling of a water mass can be summarized as follows:

Heating Process

1. Absorption of short-wave radiation from the sun and the sky, Hs
2. Absorption of longwave radiation from the atmosphere, Ha
3. Heat rejected to the water by the plant, Hp
4. Convection of heat through the bottom of the water body from the interior of the earth
5. Transformation of kinetic energy to heat
6. Heating due to chemical processes
7. Condensation of water vapor

Cooling Process

1. Reflection of short-wave solar radiation by the water, Hsr
2. Reflection of longwave atmospheric radiation by the water, Har
3. Longwave radiation emitted by the water, Hbr
4. Conduction of sensible heat to the atmosphere, Hc
5. Heat carried away by evaporation, He

In the heating process terms 4 through 7 are small in comparison with terms I through 3 and, therefore, can be neglected. Thus the following equation is solved within the steady state model:

$$Hs+Ha+Hp-Hsr-Har-Hbr-Hc-He=0$$

Where:

$$Hs = Ho\ (0.61S+0.35)$$

Ho = the solar and sky short-wave radiation received on a horizontal surface of the earth during a cloudless day

S = percentage of possible sunshine

$$Ha = 4.15 \times 10^{-8}(Ta + 460)^4\ (C+0.03\ 1\ (e_a)^{1/2})\ \text{Btu} / \text{ft}^2 / \text{day}$$

Ta = the ambient air temperature, °F

C = Brunt coefficient determined from air temperature and the ratio of solar radiation and clear-sky solar radiation, dimensionless
e_a = air vapor pressure, mm Hg

$$Hbr = \gamma w \sigma (Ts + 460)^4 \quad Btu / ft^2 / day$$

γw = emissivity of water = 0.97, dimensionless
σ = Stephan-Boltzman constant = 4.15×10^{-8} Btu / ft^2 / day
Ts = water surface temperature, °F

$$He = (73 + 7.3W)(e_s - e_a) \; Btu \; / ft^2 / day$$

W = wind speed measured 25 feet above ground-level, mph
e_s = saturation vapor pressure determined from the water surface temperature, mm Hg
e_a = air-vapor pressure, mm Hg

$$Hc = 0.26(73 + 7.3W)(Ts - Ta)(P/760) \; Btu / ft^2 / day$$

Ta = ambient air temperature, °F
Ts = water surface temperature, °F
W = wind speed, mph
P = barometric pressure, mm Hg

To determine the distribution of temperature throughout the lake, a heat exchange coefficient which describes the rate of heat lost across the air-water interface per unit area per unit temperature increase is calculated as follows:

$$Kf = Hp/[At(Ef-En)]$$

Kf = the forced heat exchange coefficient, Btu/ft^2/day/°F
At = total effective area of the cooling pond, ft^2
Hp = plant heat rejection rate, Btu/day
Ef = forced equilibrium temperature, °F
En = natural equilibrium temperature, °F

For a closed-cycle pond, the temperature at the circulating water intake can be calculated as follows:

$$Ti-En = \Delta T / e^r - 1$$

Ti = inlet circulating water temperature, °F
ΔT = the condenser rise, °F

En = natural equilibrium temperature, °F
r = KfAt/ρCpQp
ρ = density of water, lb/ft^3
Cp = specific heat of water, Btu/lb/°F
Qp = plant condensing water flow, ft^3/day

Once the inlet temperature has been computed, the temperature at any point in the lake may be calculated as follows:

$$T\text{-}En = (Ti + \Delta T - En)/ e^{r1}$$

T = the temperature at any point in the pond, °F
r_1 = KfA/ρCpQp
A = effective area between the circulating water discharge point and the point in question, ft^2

The primary assumption of the model is that of the steady state energy balance. This assumption provides the limitation that the model time step has to be long enough for transient factors to be dampened out. For example, the diurnal variation in air temperature occurs too fast for a large body of water to follow; therefore, the minimum time step that is appropriate has been found to be 5 days.

The model derivation also assumes that the only mechanisms of heat transfer into the pond that need to be considered are the absorption of short-wave radiation from the sun and the sky, the absorption of longwave radiation from the atmosphere, and the heat rejected to the pond by the plant.

Model output includes the condenser inlet temperature and natural and forced equilibrium temperatures, heat exchange coefficients, and evaporation on a monthly basis.

B. Data Inputs

Data inputs for the EQTP model include meteorological data, pond configuration data, and plant operating data.

Meteorological data for October 1999-September 2001 were obtained from the National Climatic Data Center for Tampa International Airport. These data include ambient air dry-bulb temperature, dew point, wind speed, barometric pressure, and sky cover (which was utilized to estimate % sunshine). Precipitation data were available from the plant. Graphs of monthly averages of these data over the period of record are included in Figures 2-7.

Pond configuration data were determined based on historical records and a stage-capacity curve developed for the pond as shown in Figure 8. For modeling purposes, area and capacity were assumed to vary linearly with pond elevation as shown in Figure 9. The pond has a maximum

conservation pool surface area of 3722 acres at elevation 66.5 ft-MSL. A bottom elevation of 52.7 ft-MSL corresponds to zero depth in the cooling pond. However, the circulating water pumps can only operate down to an elevation of 53 ft-MSL, which corresponds to a pond area of 1,900 acres and volume of 5,000 acre-feet. The maximum depth allowed for the pond was 13.8 feet (from 66.5-52.7 ft-MSL). This depth provides a maximum pond capacity of 46,385 acre-feet.

Plant operating data input to the model included design values for megawatts and Delta T, load factors, cooling pond blowdown rates, and diversion amounts. The plant supplied 6-hourly operating data for each unit for October 1999 through October 2000. The data were used to calculate monthly average megawatts and load factors for Oct-99 to Oct-00 as shown in Table 1:

Table 1: Monthly Average Megawatts and Load Factors

Month	Unit 1 Gross MW	Unit 2 Gross MW	Total Average Gross MW	Total Average % of Design Capability	Unit 1 Average of Design Capability	Unit 2 Average of Design Capability
Oct-99	306	374	679	39.9%	35.9%	43.9%
Nov-99	24	151	176	10.3%	2.9%	17.8%
Dec-99	6	153	158	9.3%	0.7%	17.9%
Jan-00	85	121	207	12.2%	10.0%	14.3%
Feb-00	194	0	194	11.4%	22.8%	0.0%
Mar-00	369	0	369	21.7%	43.4%	0.0%
Apr-00	251	168	419	24.6%	29.5%	19.8%
May-00	416	429	845	49.7%	49.0%	50.5%
Jun-00	462	436	898	52.8%	54.4%	51.3%
Jul-00	383	443	826	48.6%	45.1%	52.1%
Aug-00	445	462	907	53.4%	52.3%	54.4%
Sep-00	404	403	807	47.5%	47.5%	47.4%
Oct-00	321	390	710	41.8%	37.7%	45.8%

FPL supplied capacity factors only for Nov-00 through Sep-01 as shown in Table 2:

Table 2: Monthly Average Load Factors

Nov-00	22.7%
Dec-00	31.5%
Jan-01	52.9%
Feb-01	44.0%
Mar-01	36.9%
Apr-01	48.3%
May-01	51.8%
Jun-01	57.4%
Jul-01	51.6%
Aug-01	60.0%
Sep-01	39.5%

Another source of plant operating data was Diversion Reports that included daily values for the river water level at the plant and actual diversion amounts (water withdrawn from the river and pumped to the cooling pond). Monthly diversion totals are shown in Table 3 along with pond service water withdrawals and return flows. Net blowdown was calculated as withdrawals minus returns. The average blowdown amount was used for each month in the calibration modeling

Table 3: Monthly Operating Data

	Total Actual Diversion (Acre-Ft)	Withdrawal from Cooling Pond (MGD)	Return to Cooling Pond (MGD)	Blowdown (MGD)
Oct-99	1276.79	0.904	0.641	0.263
Nov-99	0	0.69	0.587	0.103
Dec-99	0	0.717	0.57	0.147
Jan-00	16.05	0.743	0.52	0.223
Feb-00	0	0.5	0.39	0.11
Mar-00	16.51	0.506	0.354	0.152
Apr-00	0	0.773	0.607	0.166
May-00	0	0.862	0.662	0.2
Jun-00	0	1.026	0.665	0.361
Jul-00	0	0.691	0.588	0.103
Aug-00	255.5	0.792	0.653	0.139
Sep-00	2570.61	1.007	0.754	0.253
Oct-00	35.51	-	-	-
AVERAGE		0.834	0.618	0.216

FPL supplied diversions only for Nov-00 through Sep-01 as shown in Table 4:

Table 4: Total Actual Diversion (Acre-Ft)

Nov-00	40.57
Dec-00	0
Jan-01	0
Feb-01	0
Mar-01	337
Apr-01	608
May-01	4
Jun-01	531
Jul-01	4346
Aug-01	3653
Sep-01	4539

C. Model Calibration with Actual Plant Data

The EQTP model was run to simulate existing operation of the pond over the 24-month period from October 1999 to September 2001 for which actual data are available. Figure 10 compares

actual and predicted pond water levels for October 1999-September 2001. Agreement was quite good. Figure 10 also compares actual and predicted condenser inlet temperatures for October 1999-November 2000. Temperature correlation is very good for March to October 2000, somewhat good for October 1999 and January 2000, and poor for November and December 1999 and February 2000. The poor correlation months were associated with many problematic data points in the plant-supplied data. In general, the model performed very well at simulating actual pond performance.

D. Calibration Results

Figure 10 indicates that the model does a good job simulating the cooling pond operation. The water level predictions in the cooling pond are quite accurate,.as are the temperature predictions for periods with good data..

III. Predictive Modeling

Predictive modeling was performed to simulate the operation of the cooling pond after the addition of waste heat rejected from Unit 3. The unit 3 heat load was assumed to be constant at 2.276 Billion Btu per hour, representing a 100% capacity factor on the unit. Units 1 and 2 were assumed to operate at historic heat loads, which were provided by FPL (see Table 1). The period of record selected for the modeling was water years 1977 through 2001 (October 1, 1977 through September 30, 2001). This is the period during which Units 1 and 2 and the cooling pond have operated, and the associated makeup water pumping system has withdrawn (or diverted) water from the Little Manatee River.

Daily flows for the Little Manatee River at the USGS gauging station near Wimauma, from October 1, 1977, through September 30, 2001, were obtained from USGS. Historical daily diversions taken by FPL were added to these flows to estimate flows at Wimauma if the Manatee Plant had not operated. These adjusted daily river flows at Wimauma were then read into the model as input data. The model then estimated synoptic flow at the plant makeup water pumping station by taking 96% of the Wimauma flows (drainage area correction), and used that flow to determine the allowable pumping rate under the diversion schedule FPL is proposing to implement with the operation of Unit 3. The adjusted daily flows at Wimauma are presented in Figure 11.

The diversion schedule that FPL is proposing includes the following conditions:

- No diversion will reduce flow in the river below 40 cfs, as measured at the USGS gauging station at Wimauma;
- Under ordinary (non-emergency) conditions, diversions will not exceed 10% of the river flow, as measured at the plant; and
- During what are designated as "emergency" conditions, diversions could be up to the limits designated October-July within the existing water use agreement between FPL and SWFWMD. These withdrawal rates were identified as the "Emergency Diversion Curve." Emergency conditions were defined as beginning whenever the water level in

the cooling pond dropped below elevation 62 feet MSL. Emergency conditions would end whenever the pond water level recovered back to elevation 63 feet MSL.

Meteorological data (except precipitation) were obtained from the National Oceanic and Atmospheric Administration (NOAA) in the form of Local Climatological Data Annual and Monthly Summary sheets (LCDs). Earlier LCDs (pre-1994) reported per cent possible sunshine directly. LCDs for later years reported sky cover using various methods such as description, tenths, and effective cloud amount. Per cent possible sunshine was estimated from these data (see Figure 12). Monthly values of air dry bulb and dew point temperature, barometric pressure, and wind speed were taken directly from the LCDs (see Figures 13 and 14). Monthly precipitation data used for water years 1977 through 1993 were provided by SWFWMD personnel. Based on their recommendation during previous modeling efforts, data from stations at Fort Green and Ruskin were averaged for this time period. Precipitation data recorded at the plant were used for the remainder of the period of record (see Figure 15).

Operation of the model proceeded in a step-wise fashion month to month over the 24-year period simulating 2005 to 2028. The combination of expected plant operating loads, pond area, and meteorological conditions was used to estimate the evaporation rate from the pond and its monthly inlet and outlet temperatures. The model also predicted the number of cycles of concentration at which the pond would operate, relative to the makeup water (Little Manatee River). This information can be used to estimate the dissolved solids level in the cooling pond so that performance of the condenser cooling system can be evaluated with respect to water chemistry, and so that water quality within the pond can be predicted.

IV. Results and Conclusions

Estimated diversions, based on the modeling performed, are shown in Table 2. The overall average monthly diversion (withdrawal) is estimated to be about 8.9 MGD. The ratio of the withdrawal to the total river flow at Wimauma, and its associated cumulative frequency of occurrence, are shown on Figure 16 for the spring, summer, fall, and annual cases. Figure 16 can be used to assess the frequency of operation of ordinary and emergency diversion pumping. For example, the annual curve shows that about 30 % of the time there is no pumping; about 67 % of the time pumping is less 10 % of the river flow; and only about 3 % of the time does the pumping exceed 10 % of the river flow. That 3 % represents time during which emergency diversions were made. Estimated pond water levels associated with operation at these diversion rates are shown on Figure 17. The modeling indicates that there are only 3 events that would qualify as 'emergencies" in which the EDC would be invoked.

Estimated monthly condenser inlet temperatures (the "cold" side of the cooling pond) are presented in Figure 18. Condenser outlet temperatures (the "warm" side of the pond) will be about 18 degrees F. higher. Temperatures within the pond will decay logarithmically from condenser outlet to inlet.

Estimated cycles of chemical concentration within the pond are presented in Figure 19. The cycles of concentration peaked at about 10.6, but then recovered to about 5.4.

Finally, simultaneous estimated water levels, condenser inlet temperatures, and cycles of concentration are shown on Figure 20, which demonstrates that peak cycles of concentration coincide with minimum cooling pond water level.

Table 1 Plant Manatee Historical Capacity Factors

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Average
1980												31.28	
1981	35.70	20.54	33.69	46.75	49.44	68.50	65.60	57.06	57.71	56.26	28.35	33.56	46.10
1982	24.27	21.63	46.17	30.47	20.95	41.63	50.84	46.22	38.25	20.23	21.97	19.68	31.86
1983	27.12	23.58	30.14	34.09	29.18	36.45	55.04	51.91	40.59	45.94	19.90	32.77	35.56
1984	30.42	29.00	28.92	13.72	22.65	17.16	24.20	28.01	21.02	26.34	13.37	10.07	22.07
1985	13.20	5.18	0.00	0.00	10.27	23.90	18.76	38.52	26.06	13.33	12.56	6.29	14.01
1986	8.94	29.68	37.93	55.03	67.92	66.30	75.80	66.08	63.50	54.30	32.01	10.75	47.35
1987	10.56	13.85	18.13	20.97	29.29	42.55	49.06	50.03	39.51	30.52	37.41	9.00	29.24
1988	17.91	27.24	14.75	28.95	24.30	29.72	48.29	60.32	53.98	28.89	35.38	43.06	34.40
1989	17.19	30.68	43.81	50.66	52.42	50.62	44.24	39.01	41.98	25.74	0.14	5.42	33.49
1990	2.84	5.53	19.02	23.94	33.31	61.41	58.34	55.63	45.41	27.90	7.97	13.18	29.54
1991	0.00	18.39	22.80	29.11	23.62	53.49	58.19	61.69	58.96	44.20	26.43	20.51	34.78
1992	14.26	11.40	27.29	23.14	29.69	50.95	60.17	55.15	63.48	26.92	20.52	5.34	32.36
1993	9.54	2.78	37.12	29.58	36.10	48.25	47.99	58.73	60.73	47.40	23.67	10.39	34.36
1994	11.35	18.09	43.35	61.00	49.52	50.56	35.51	36.02	29.75	34.64	36.03	21.58	35.62
1995	6.80	14.43	11.34	13.99	45.06	29.37	35.44	43.92	47.87	36.94	9.74	8.36	25.27
1996	17.66	19.78	12.17	9.08	40.42	41.09	35.86	19.18	34.57	11.99	7.43	15.55	22.07
1997	9.64	2.17	16.97	8.83	31.80	38.51	48.83	44.81	50.14	35.03	21.45	9.22	26.45
1998	2.45	18.10	28.05	26.63	47.24	66.32	57.61	54.71	54.47	44.05	34.06	29.09	38.57
1999	12.18	12.30	37.84	46.36	40.96	44.44	53.37	53.62	43.58	42.28	10.66	10.75	34.03
2000	10.60	11.62	23.89	26.60	51.76	52.12	52.40	55.47	50.47	44.79	22.69	31.51	36.16
2001	52.93	43.97	36.90	48.31	51.75	57.42	51.62	60.04	39.53	49.24	24.86	32.07	45.72
Monthly Minimum	0.00	2.17	0.00	0.00	10.27	17.16	18.76	19.18	21.02	11.99	0.14	5.34	14.01
Monthly Average	15.98	18.09	27.16	29.87	37.51	46.23	48.91	49.34	45.79	35.57	21.27	18.01	32.81
Max Monthly	52.93	43.97	46.17	61.00	67.92	68.50	75.80	66.08	63.50	56.26	37.41	43.06	56.88

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EXHIBIT B (Revised November 12, 1975)

00264

PLAN OF DIVERSION - FLORIDA POWER AND LIGHT LITTLE MANATEE PLANT

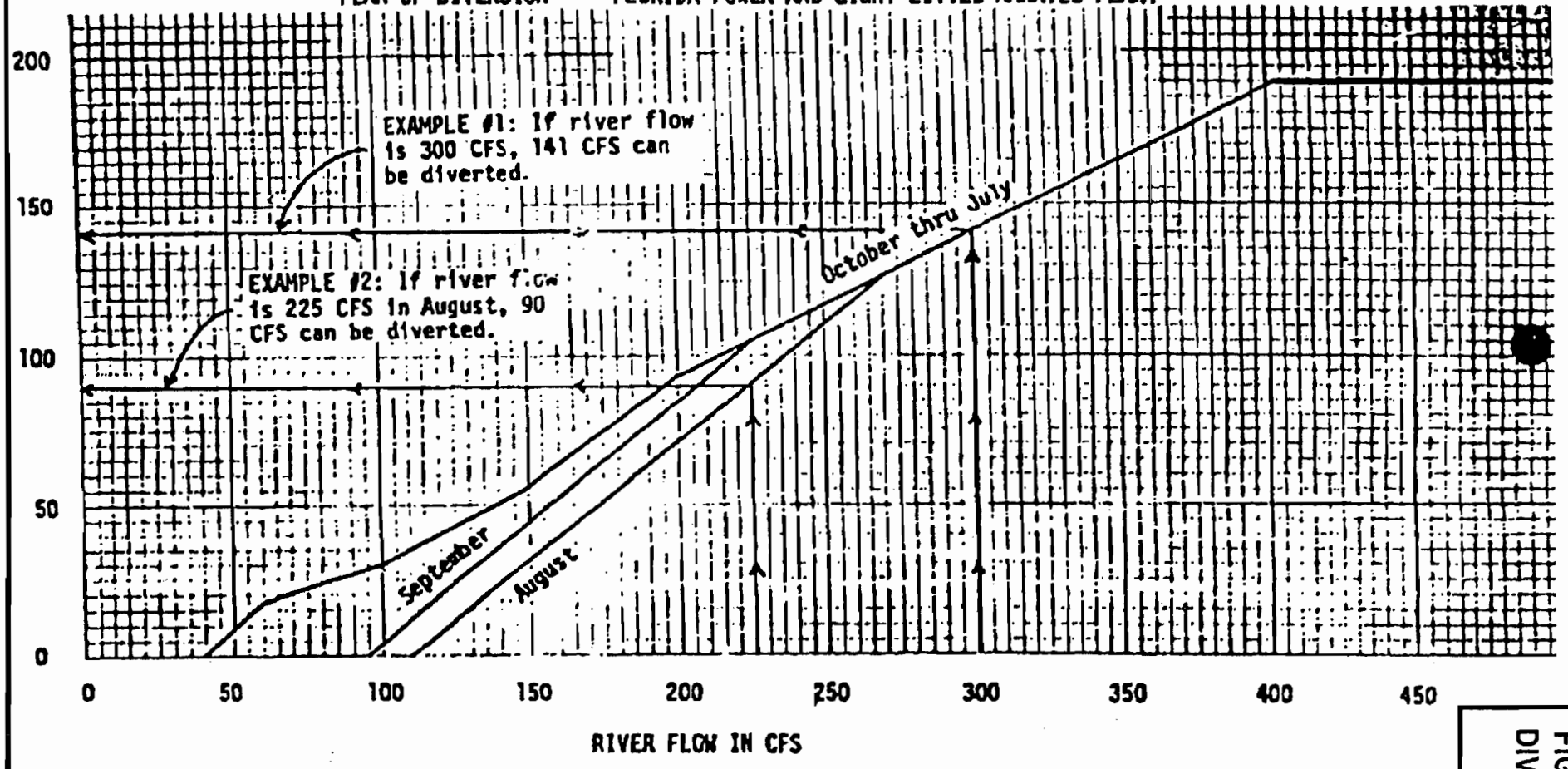


FIGURE 1. ALLOWABLE DIVERSION AS FUNCTION OF RIVER FLOW

DIVERSION RESTRICTIONS

The plan for diversion restrictions as set forth on the above curve would employ a pumping station with a maximum capacity of 190 CFS. The company is authorized to divert that amount of "flow available for diversion" which is indicated by the point on the apprppriate curves corrosponding to the "river flow" occuring in the Little Manatee River at the point of diversion at the time the diversion takes place. The allowable diversion rate will be determined by the solid curve labeled, "October thru July" in all months except August and September. In no case shall the diversion reduce the river flow to less than 40 CFS.

( ) August and September diversions would be rest ed to 80 percent of the river flow in excess of ( )nthly average minimum flow (112 CFS being the ( )ly average minimum flow for August and 97 CFS ( )

Figure 2 - Monthly Meteorological Data for Tampa International Airport
Dry Bulb Temperature

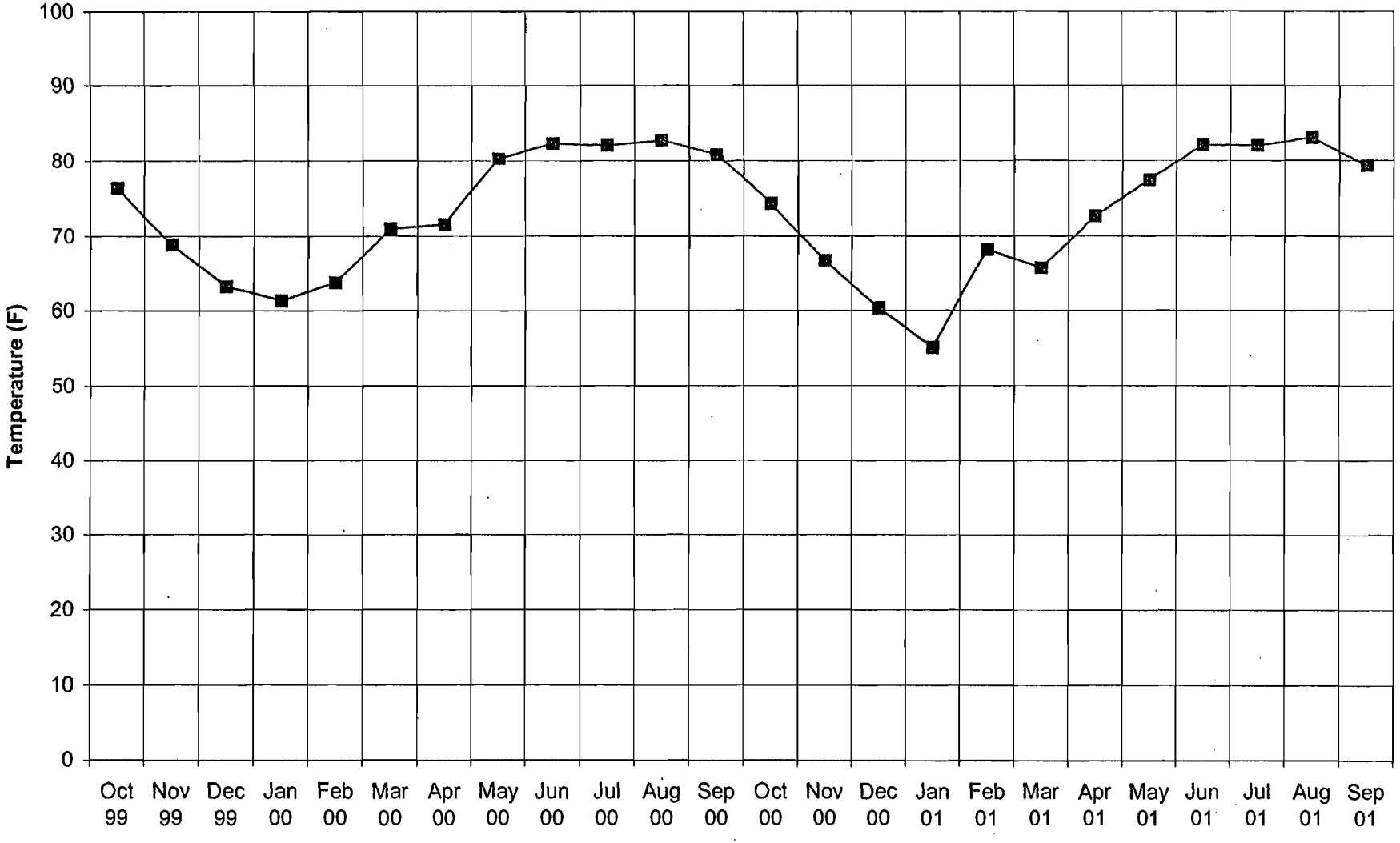


Figure 3 - Monthly Meteorological Data for Tampa International Airport
Dew Point Temperature

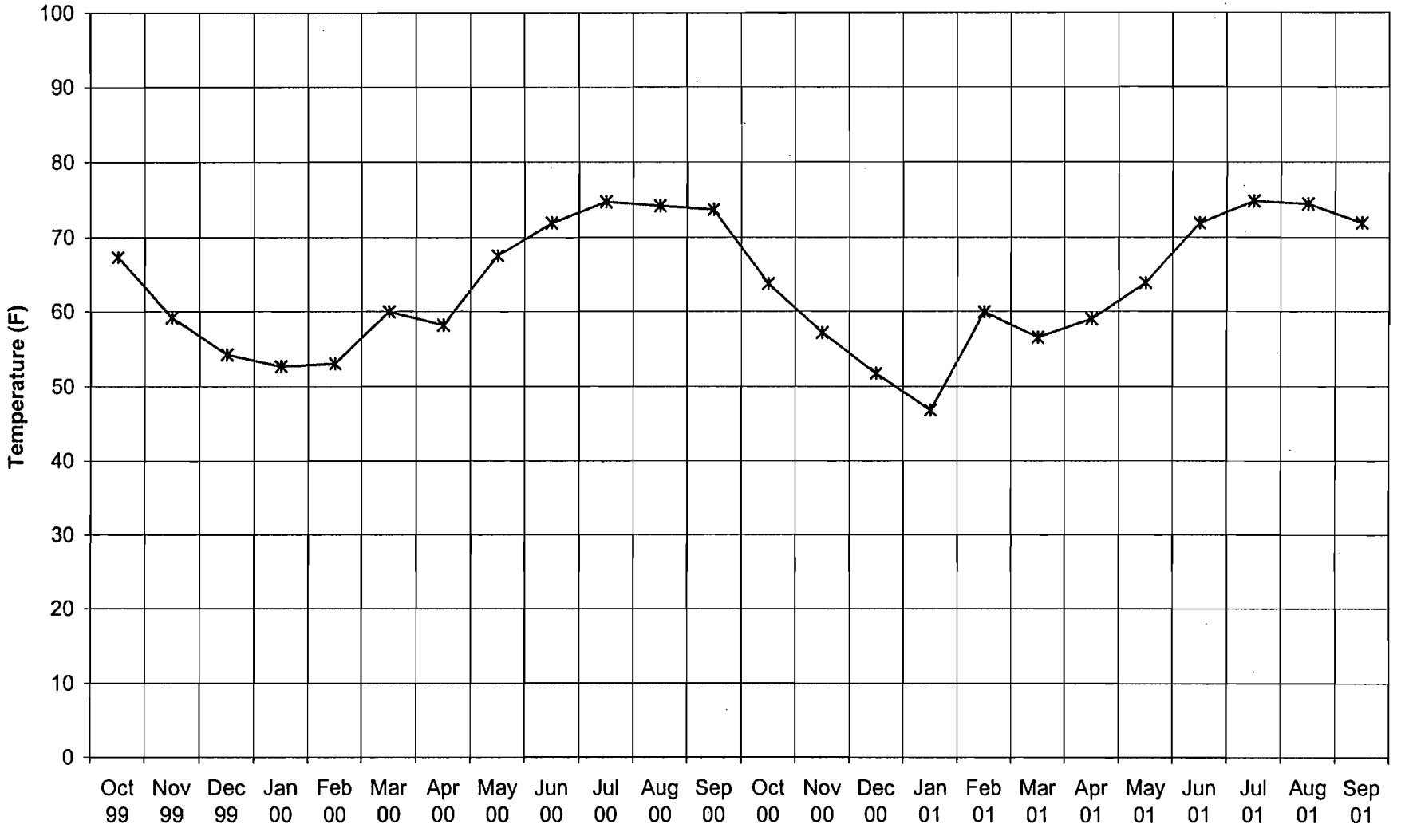


Figure 4 - Monthly Meteorological Data for Tampa International Airport
Wind Speed

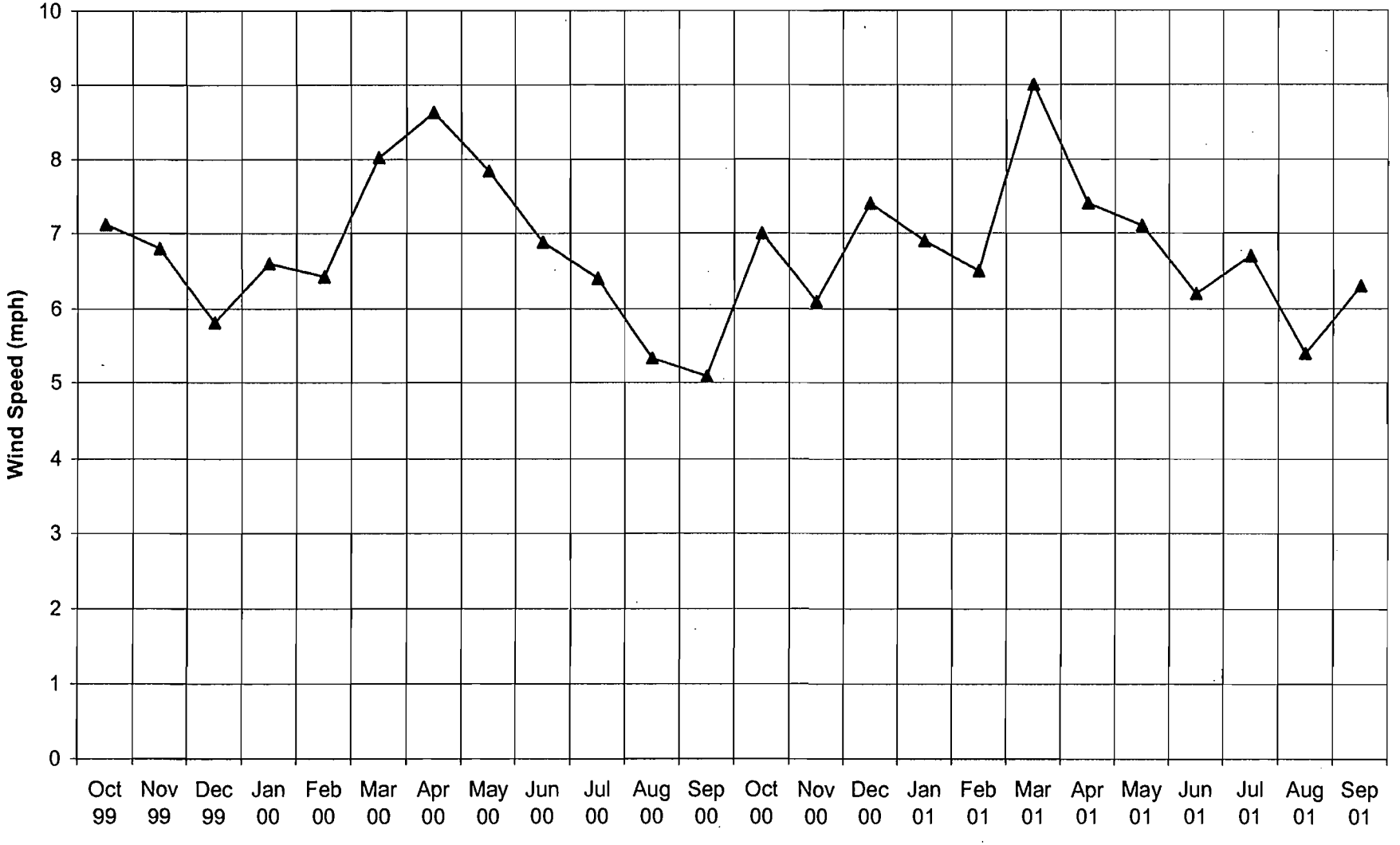


Figure 5 - Monthly Meteorological Data for Tampa International Airport
Barometric Pressure

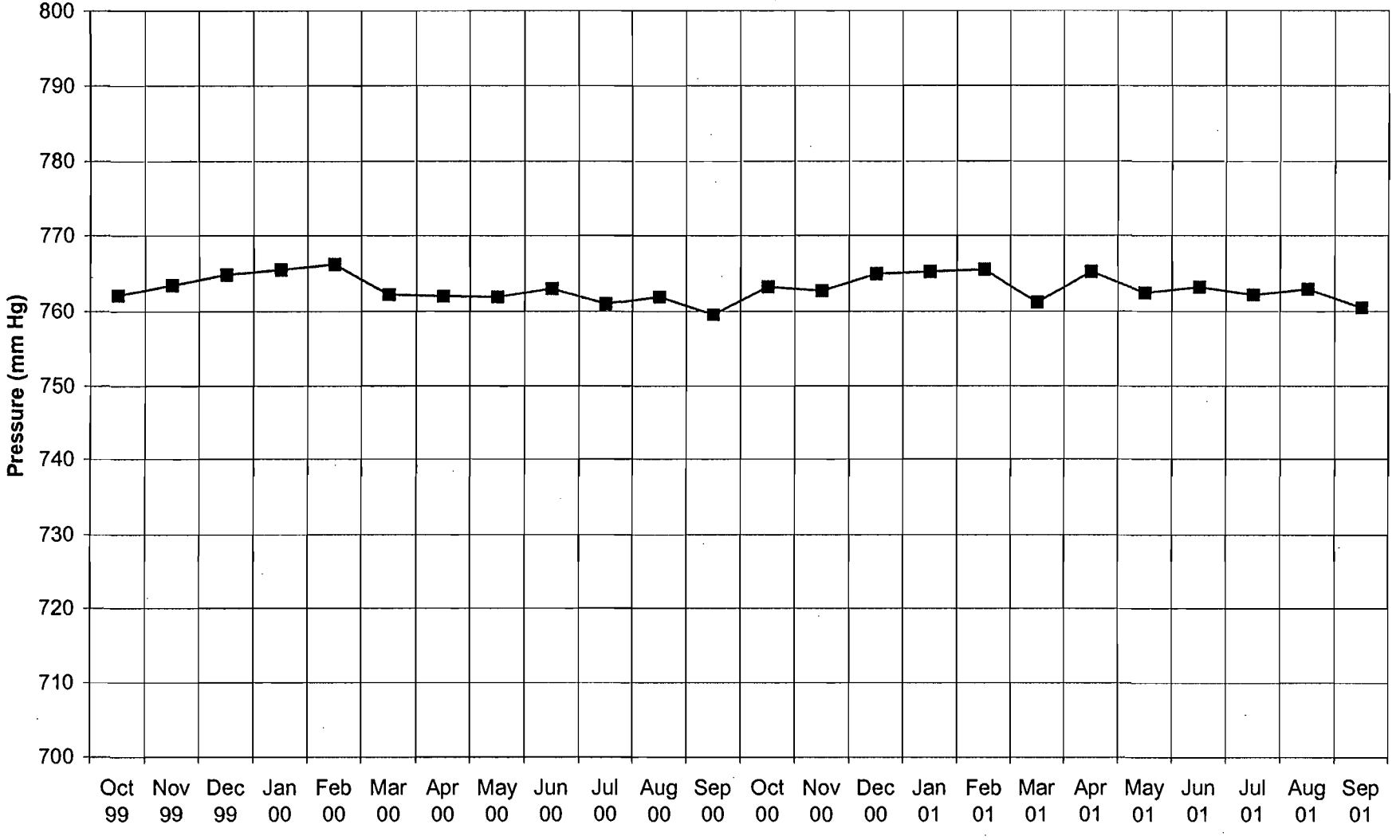


Figure 6 - Monthly Meteorological Data for Tampa International Airport
Percent Sunshine

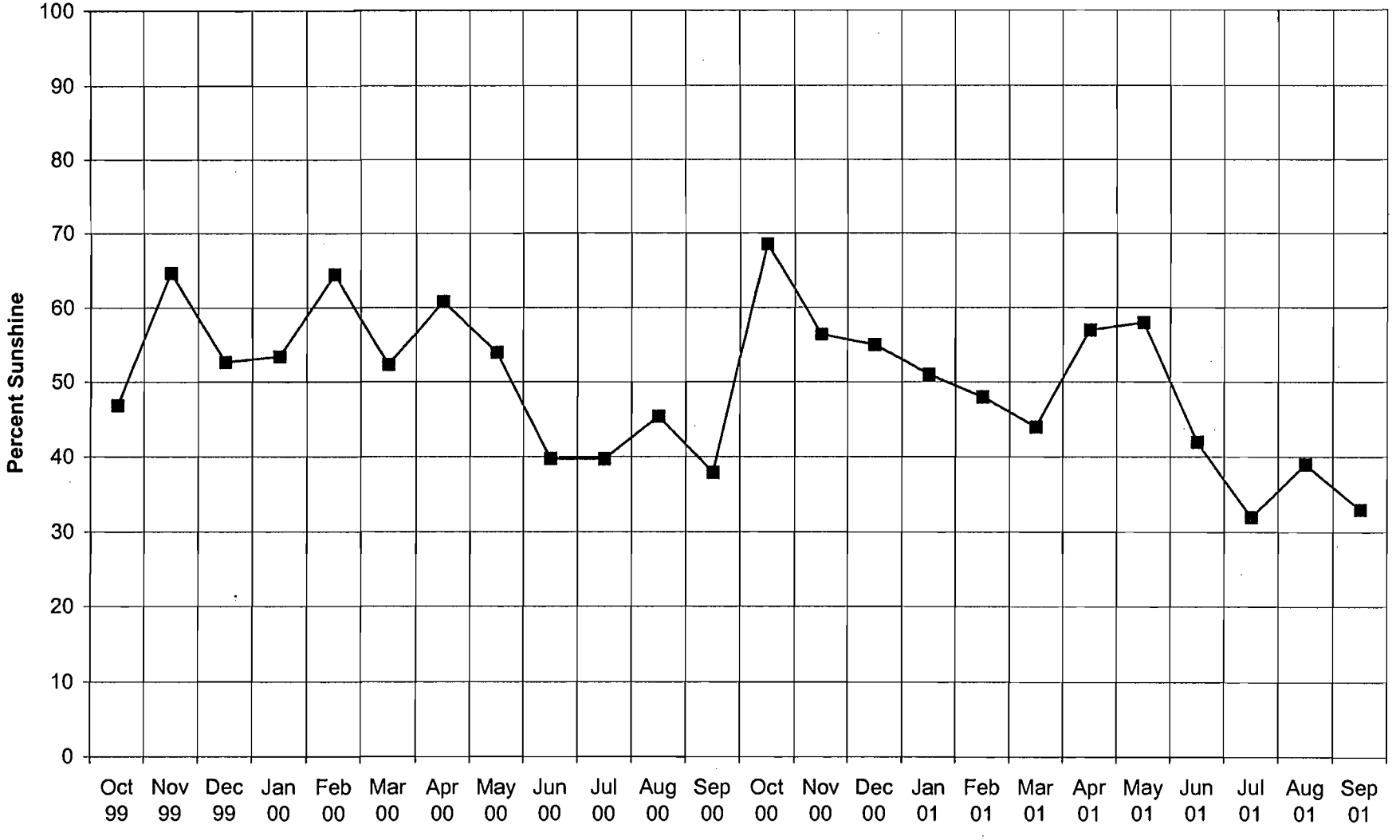
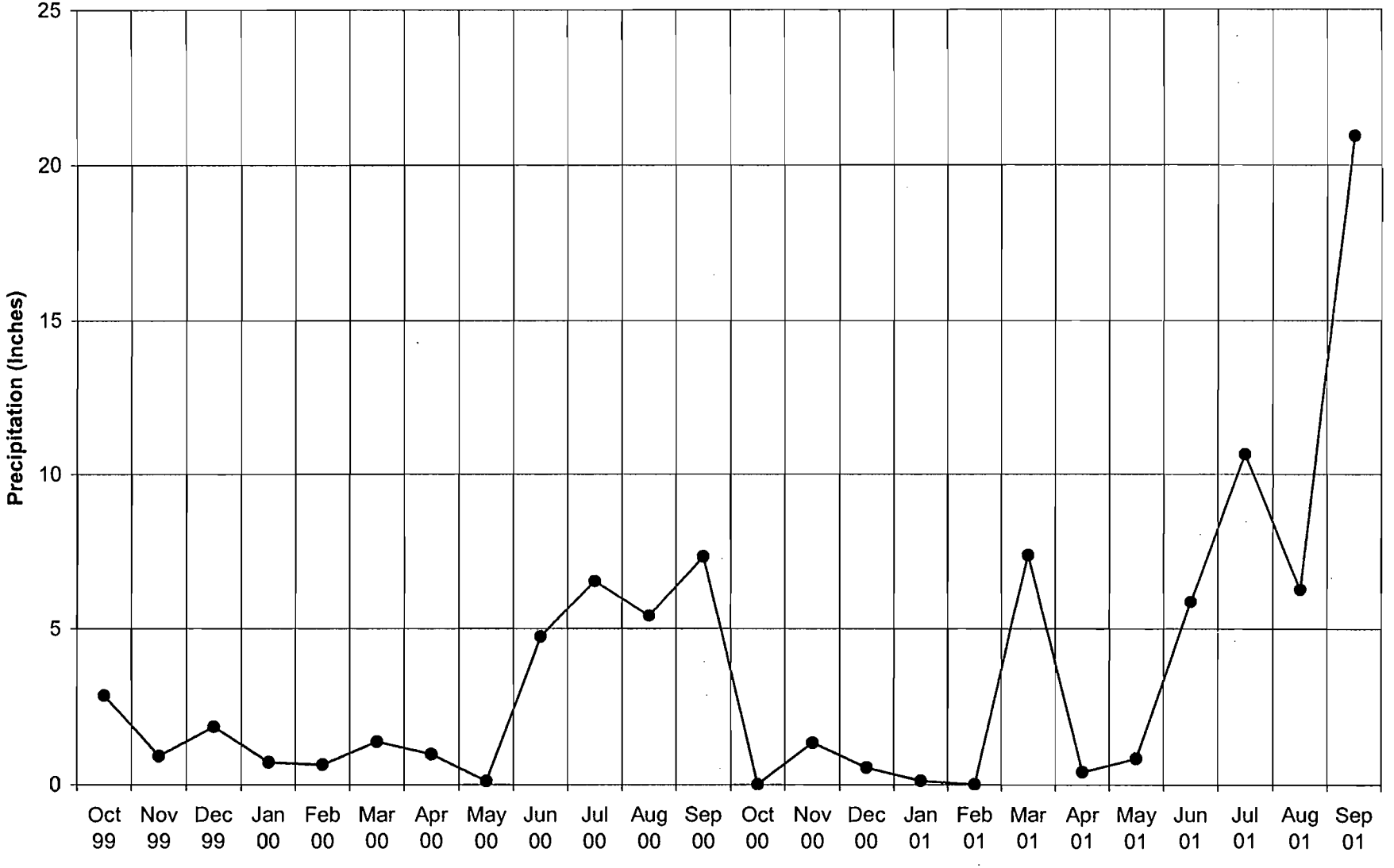


Figure 7 - Monthly Total Precipitation at Manatee Plant



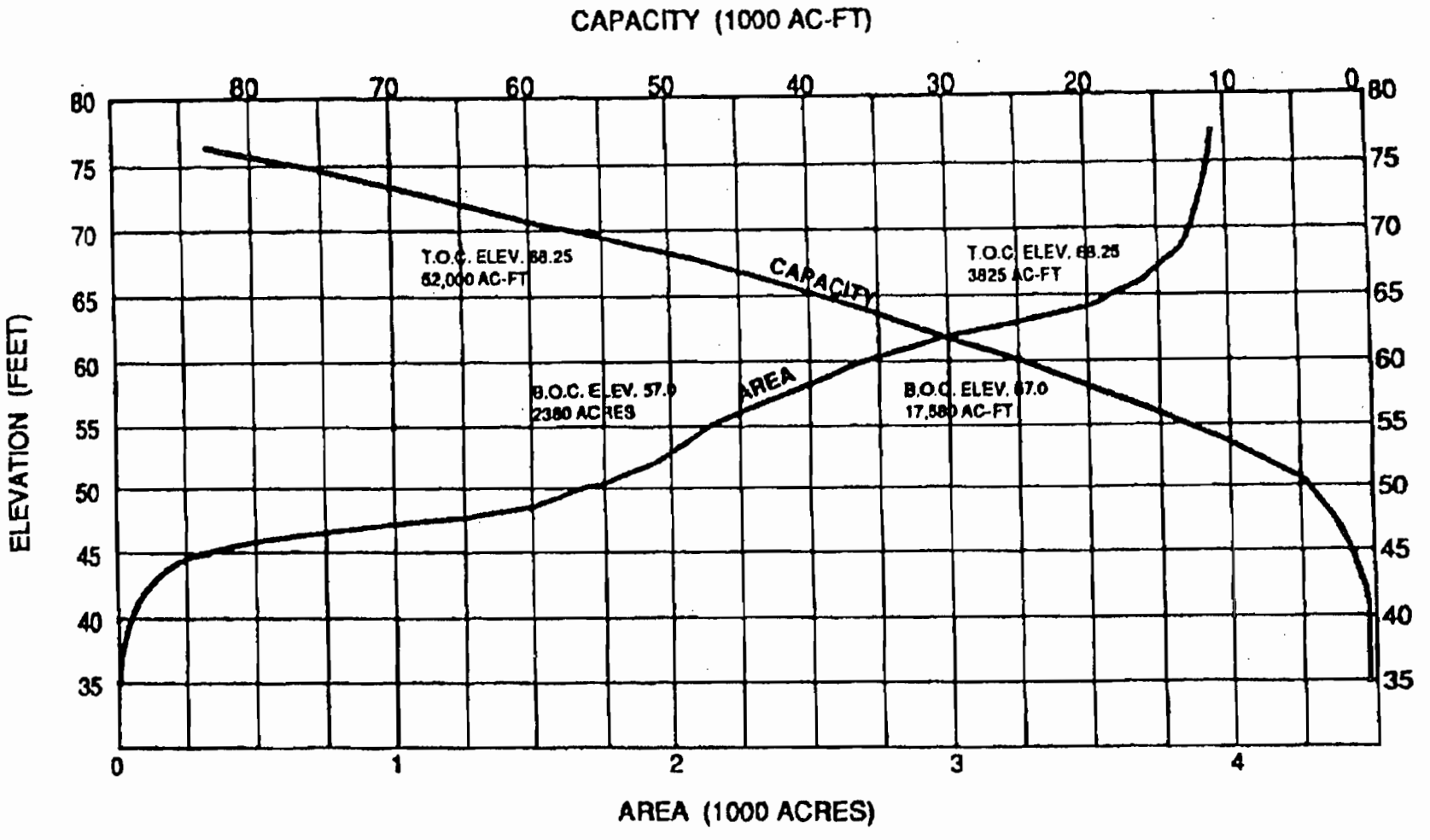


FIGURE 8
RESERVOIR AREA & CAPACITY CURVE - JUNE 1974

Figure 9 - Stage-Capacity Curve Used in Modeling

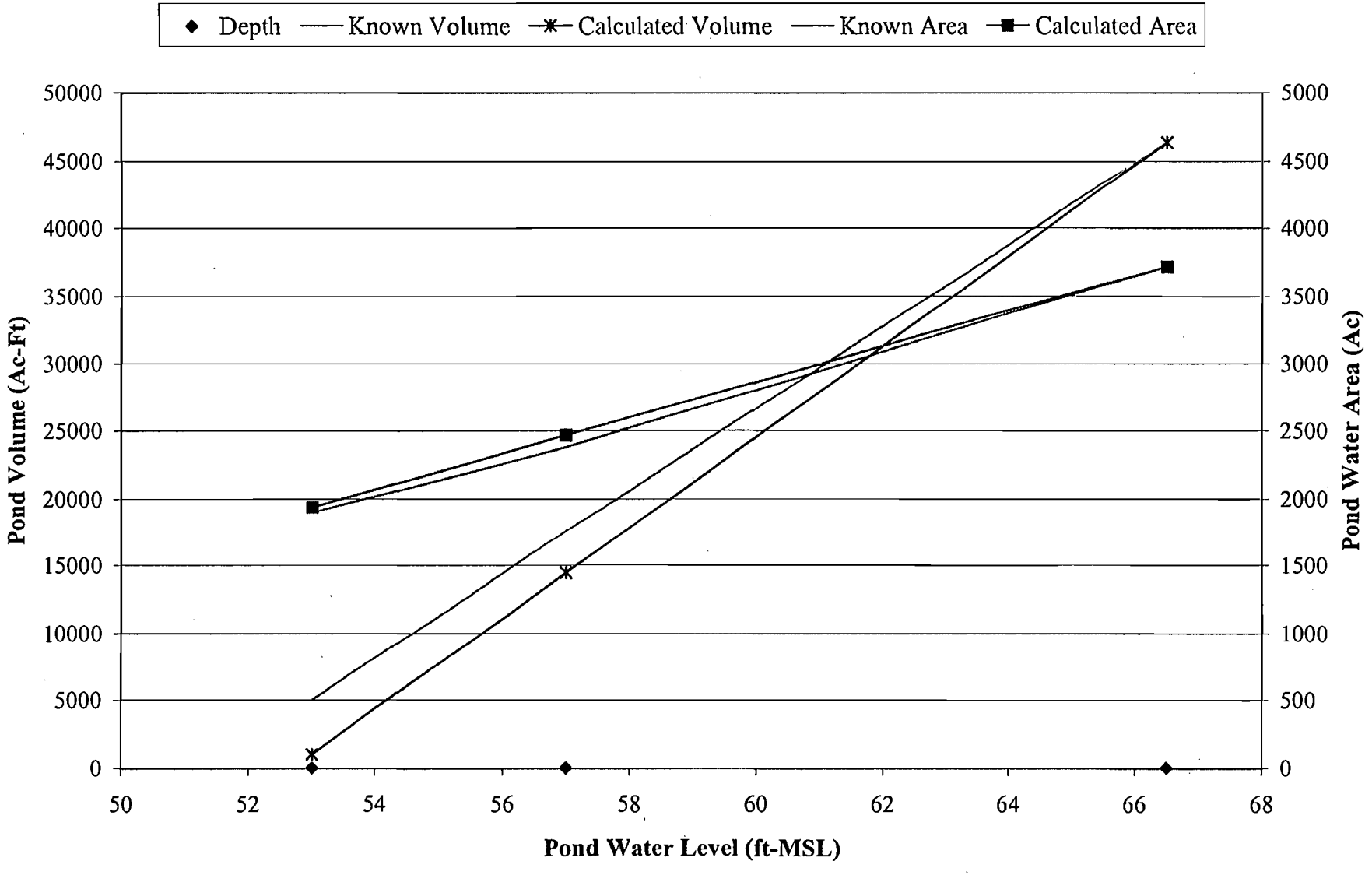


Figure 10 - Calibration Model Results

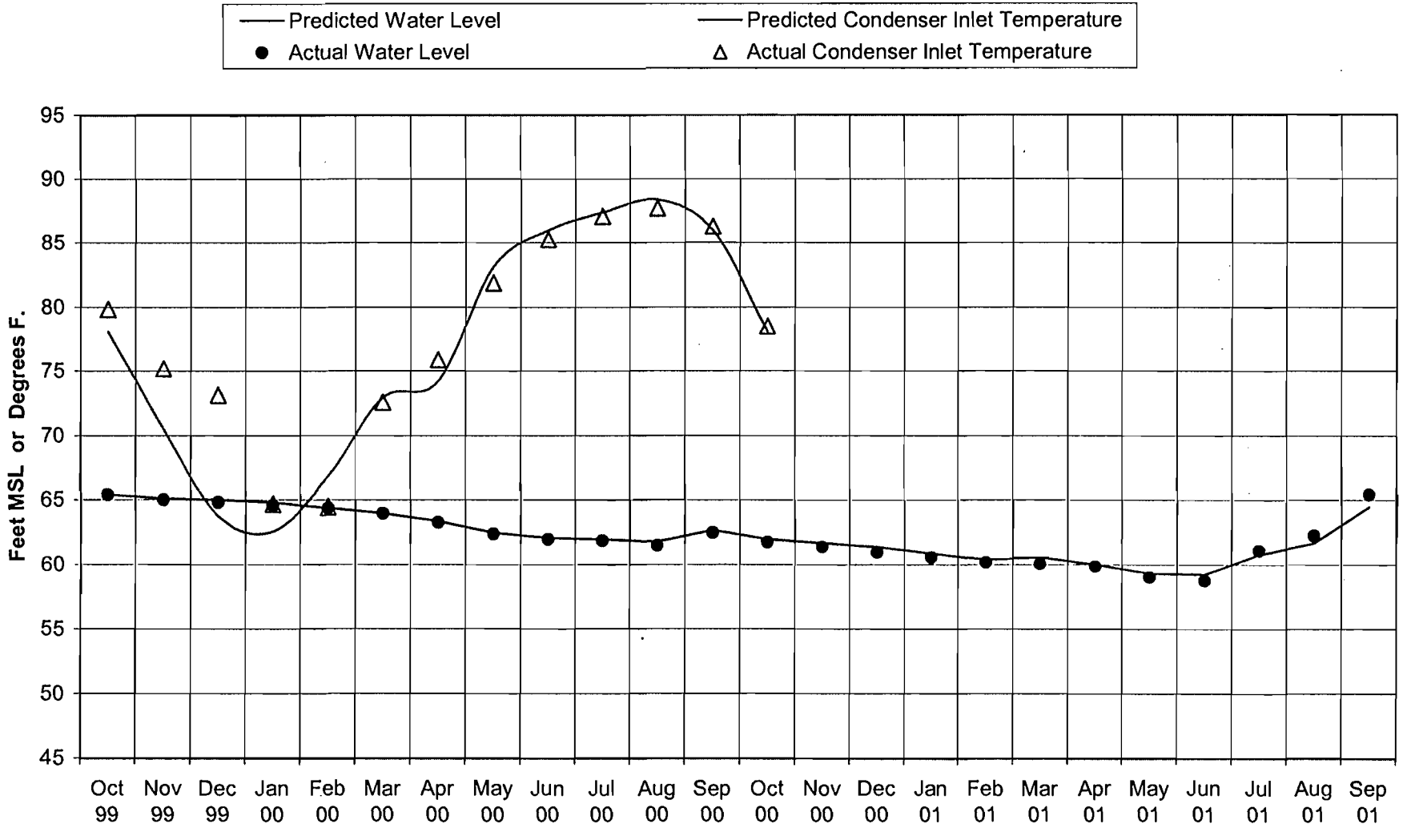


Figure 11 Adjusted Daily Flows Little Manatee River at Wimauma

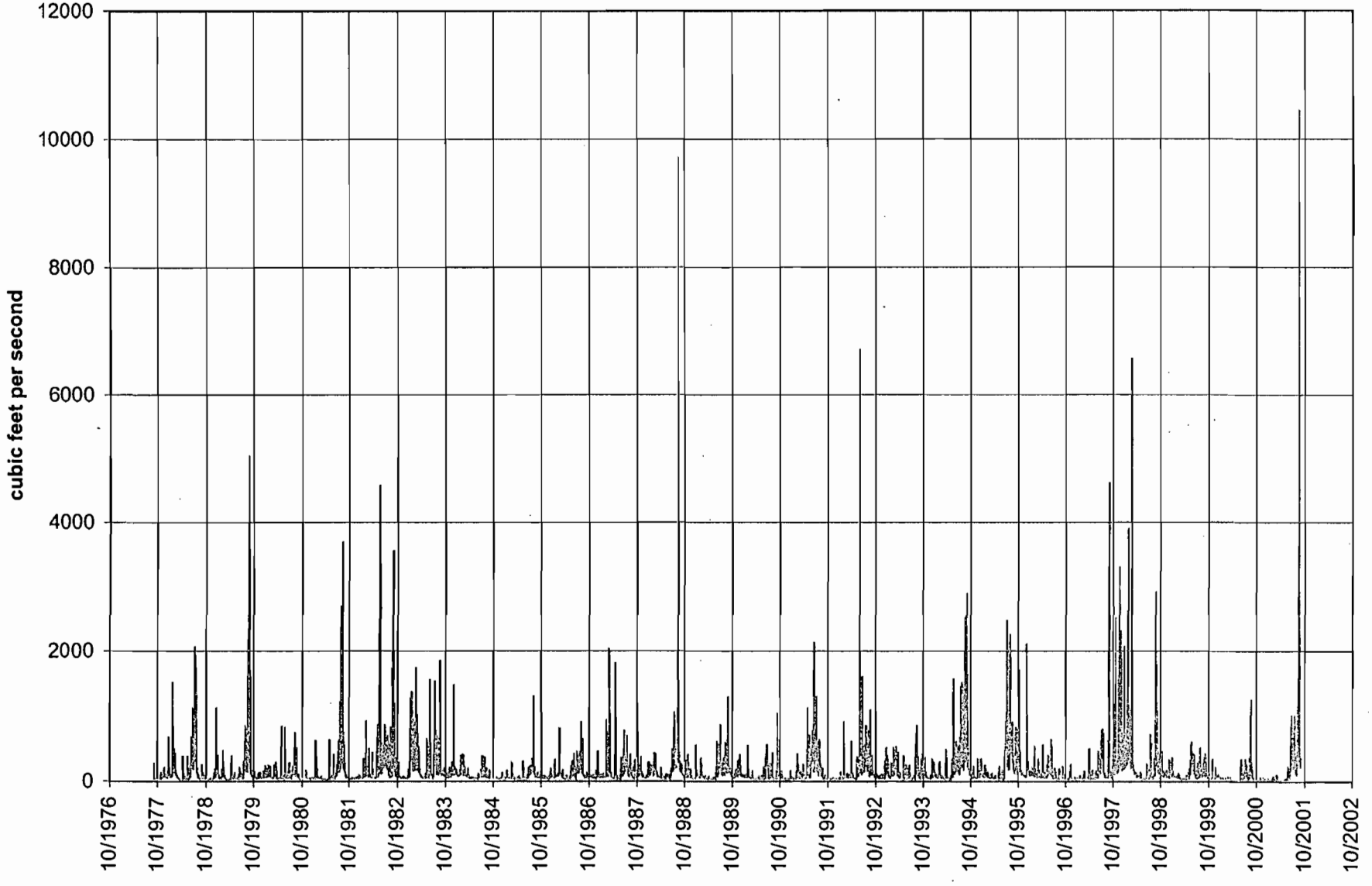


Figure 12 Per Cent Possible Sunshine
Tampa International Airport

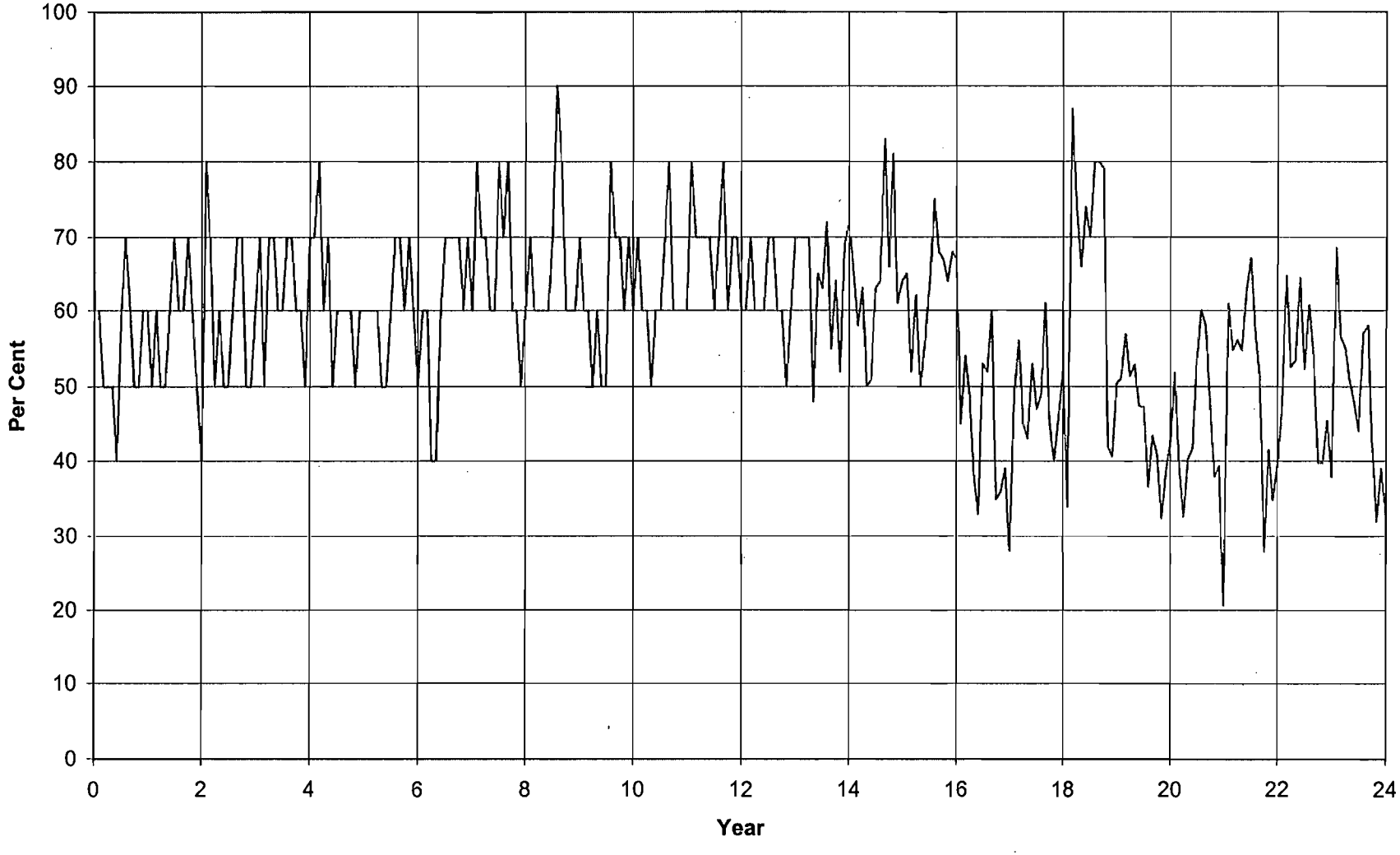


Figure 13 Air Dry Bulb and Dew Point Temperatures
Tampa International Airport

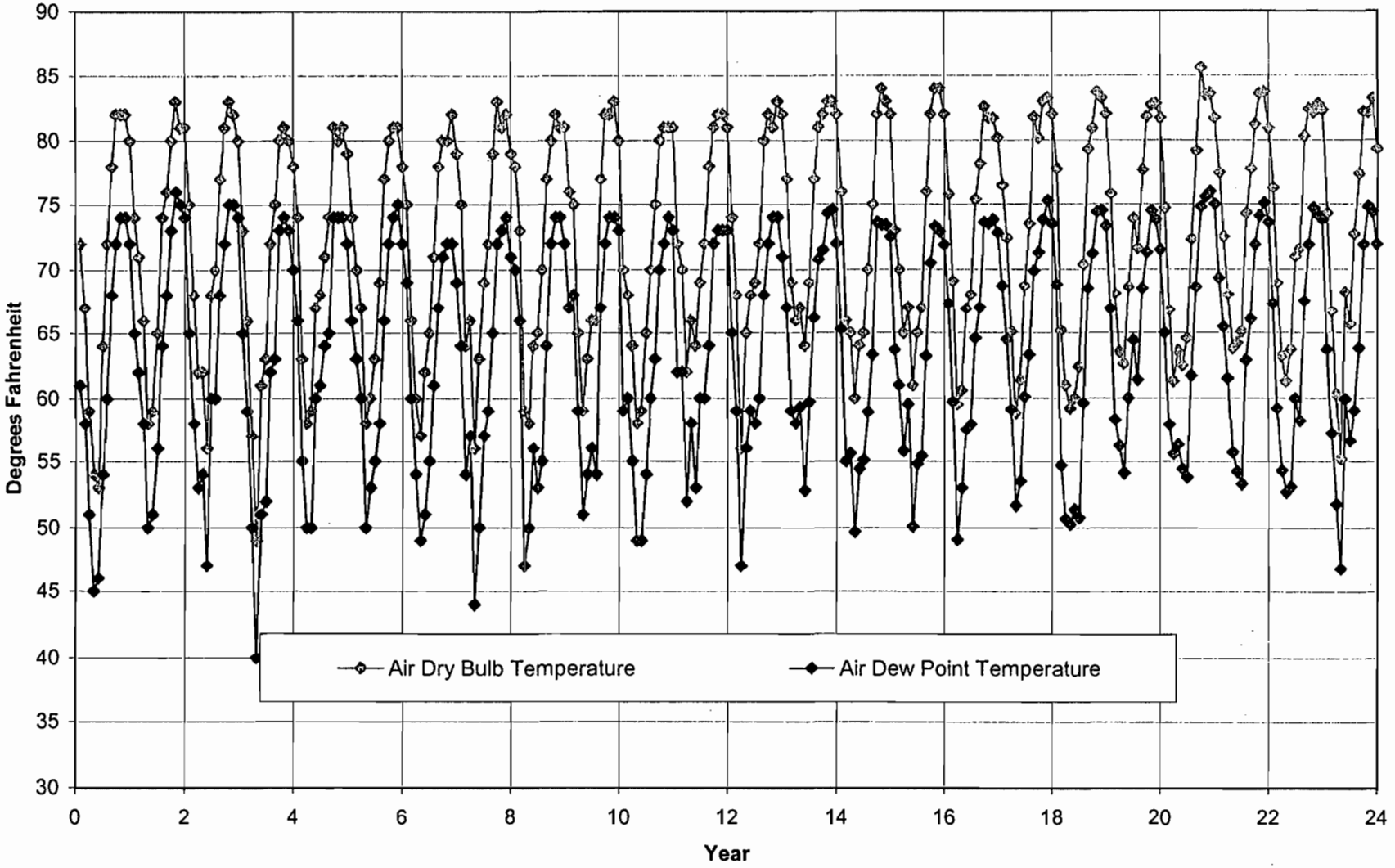


Figure 14 Wind Speed Tampa International Airport

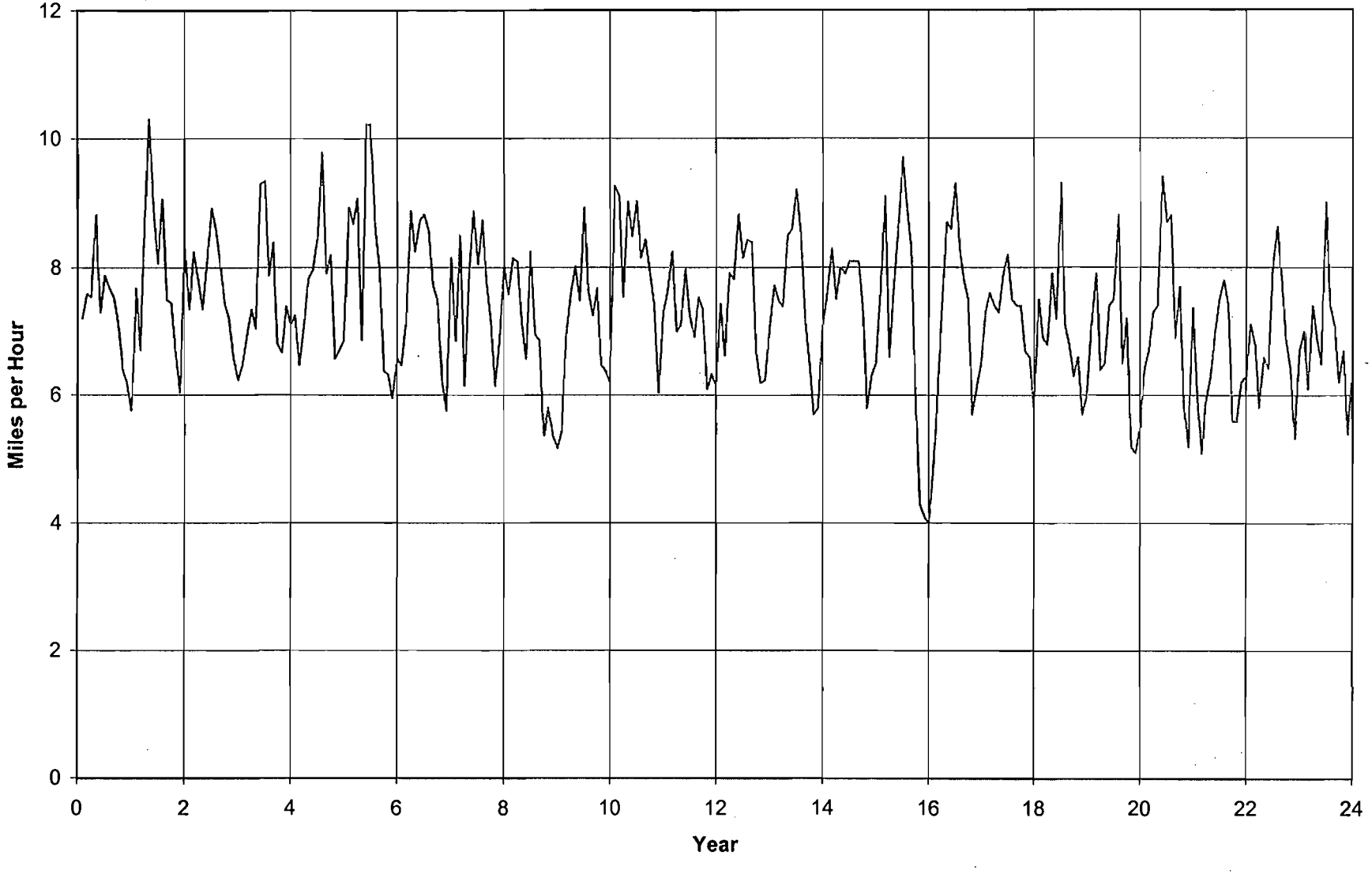


Figure 15 Precipitation from Various Sources

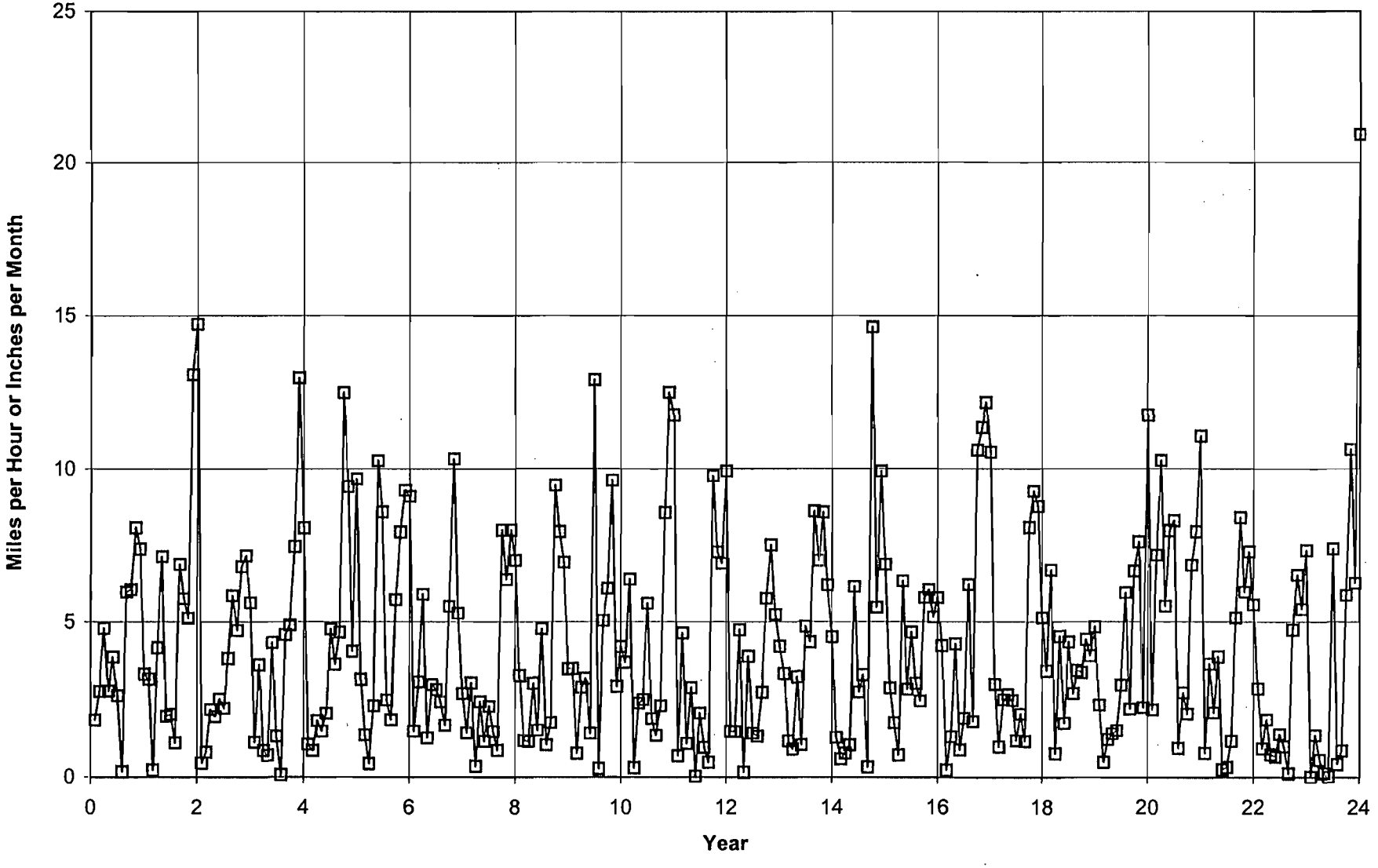


Figure 16. Ratio of the Withdrawal to the Total River Flow, and Associated Cumulative Frequency of Occurrence

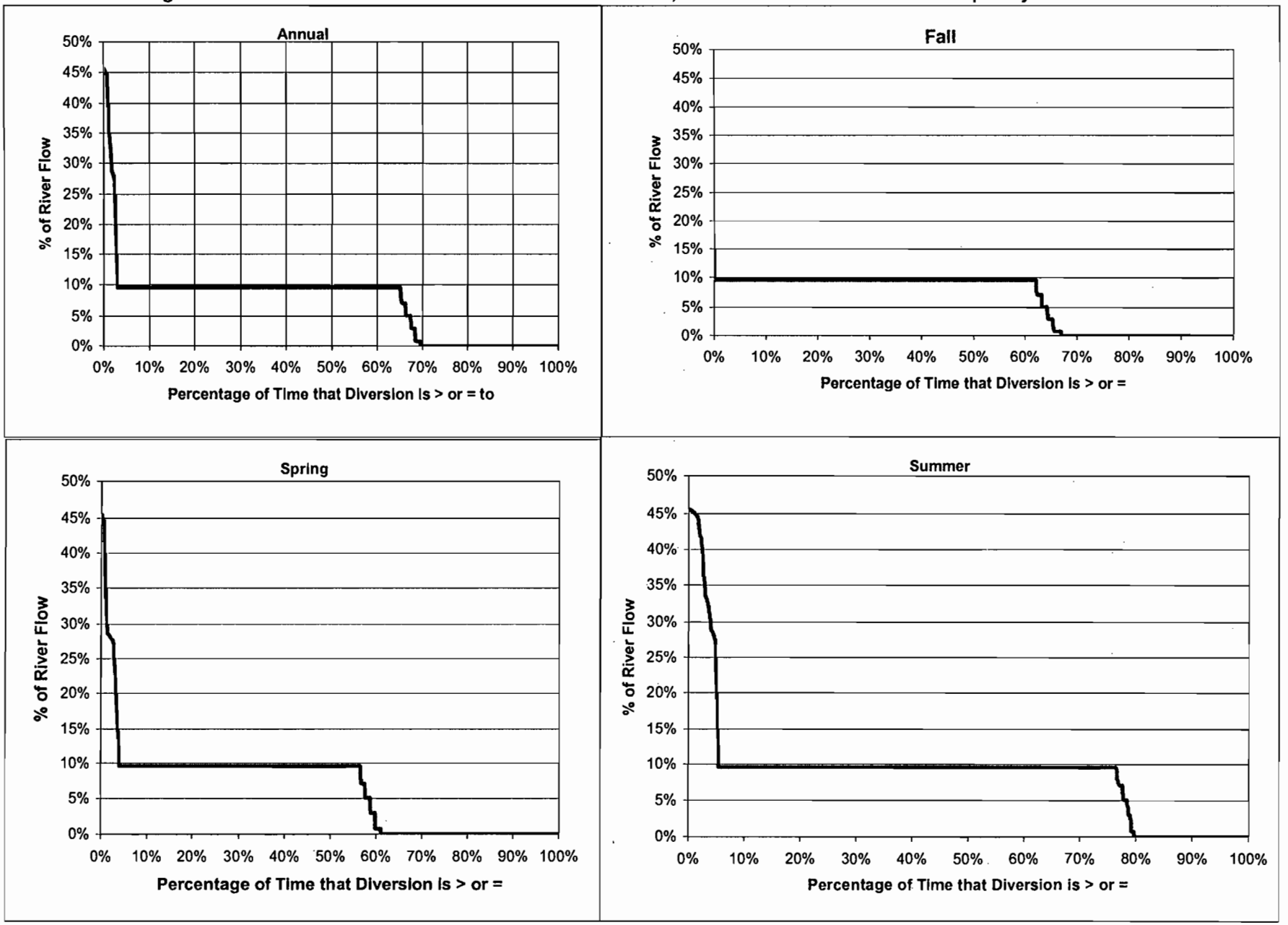


Figure 17 Estimated Operating Monthly Cooling Pond Water Levels

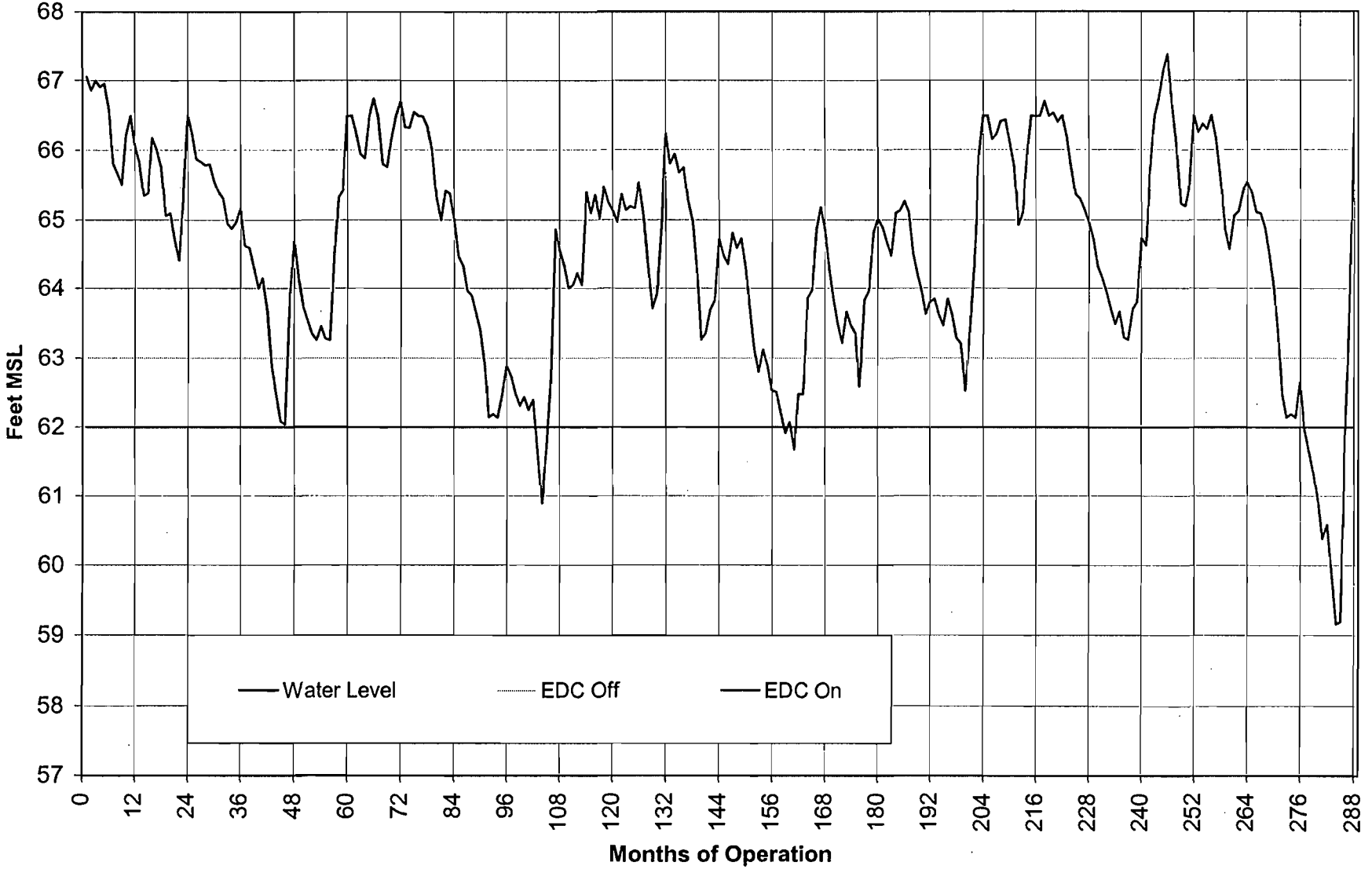


Figure 18 Estimated Monthly Condenser Inlet Temperature

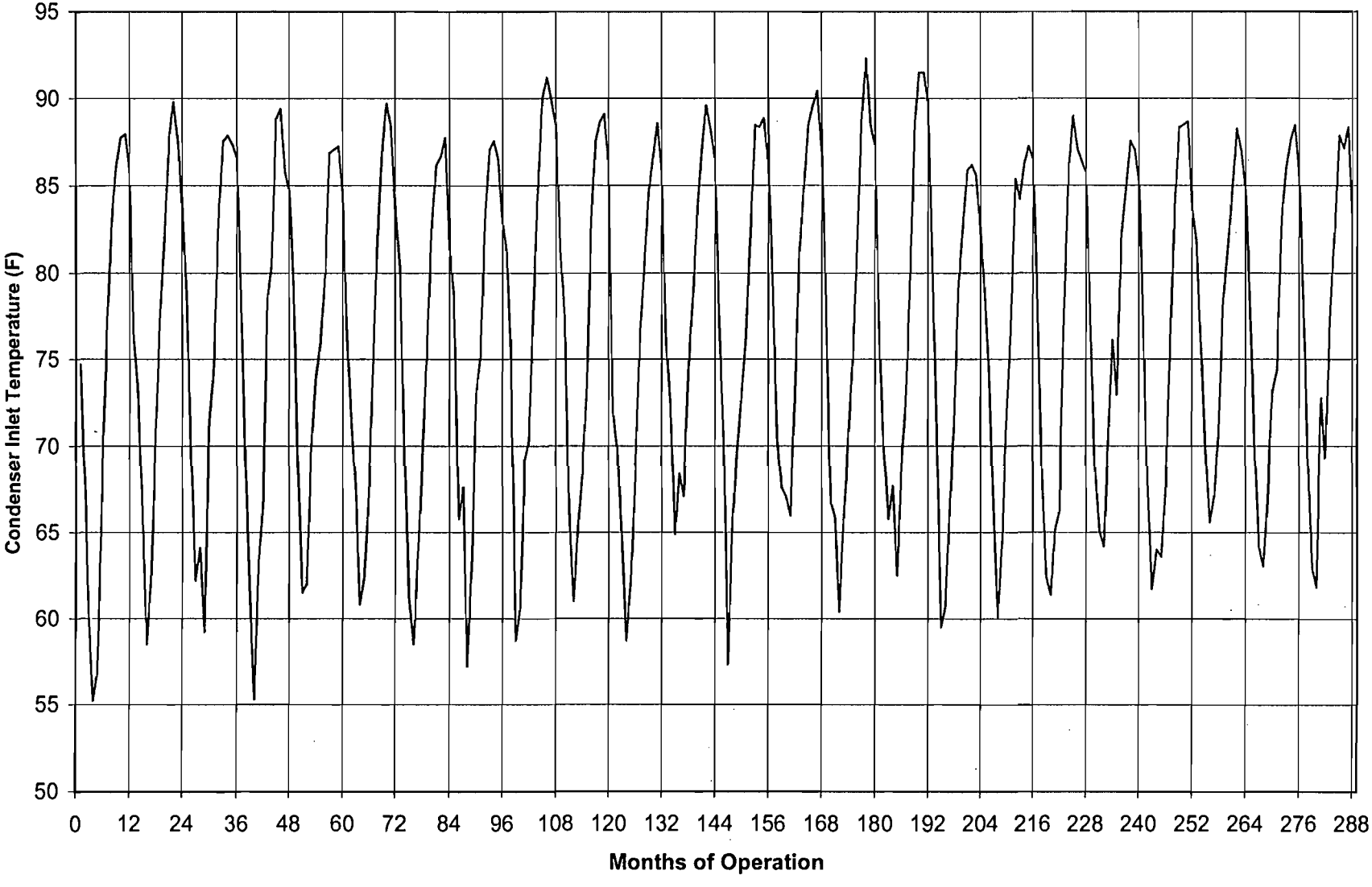


Figure 19 - Estimated Cycles of Concentration

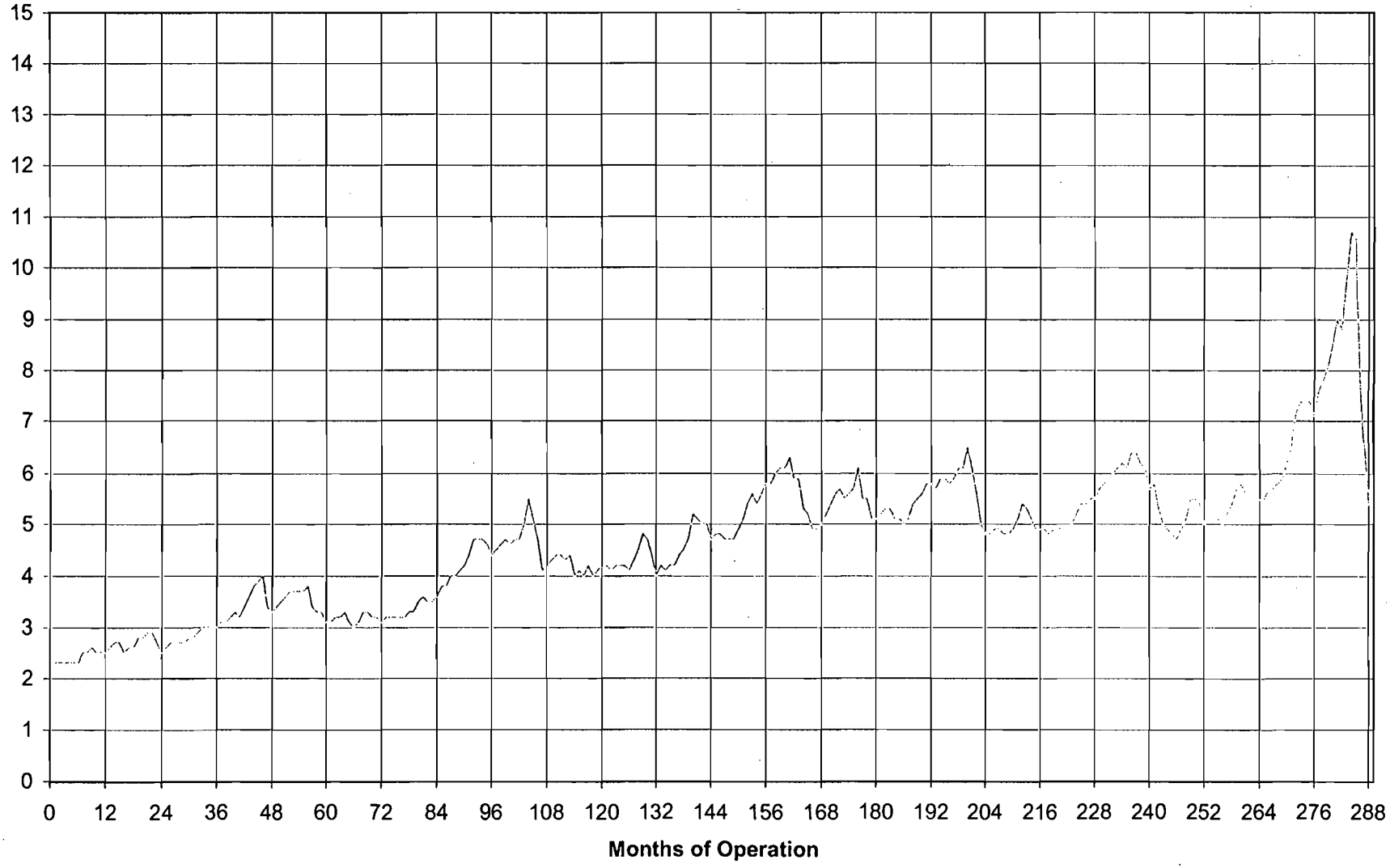
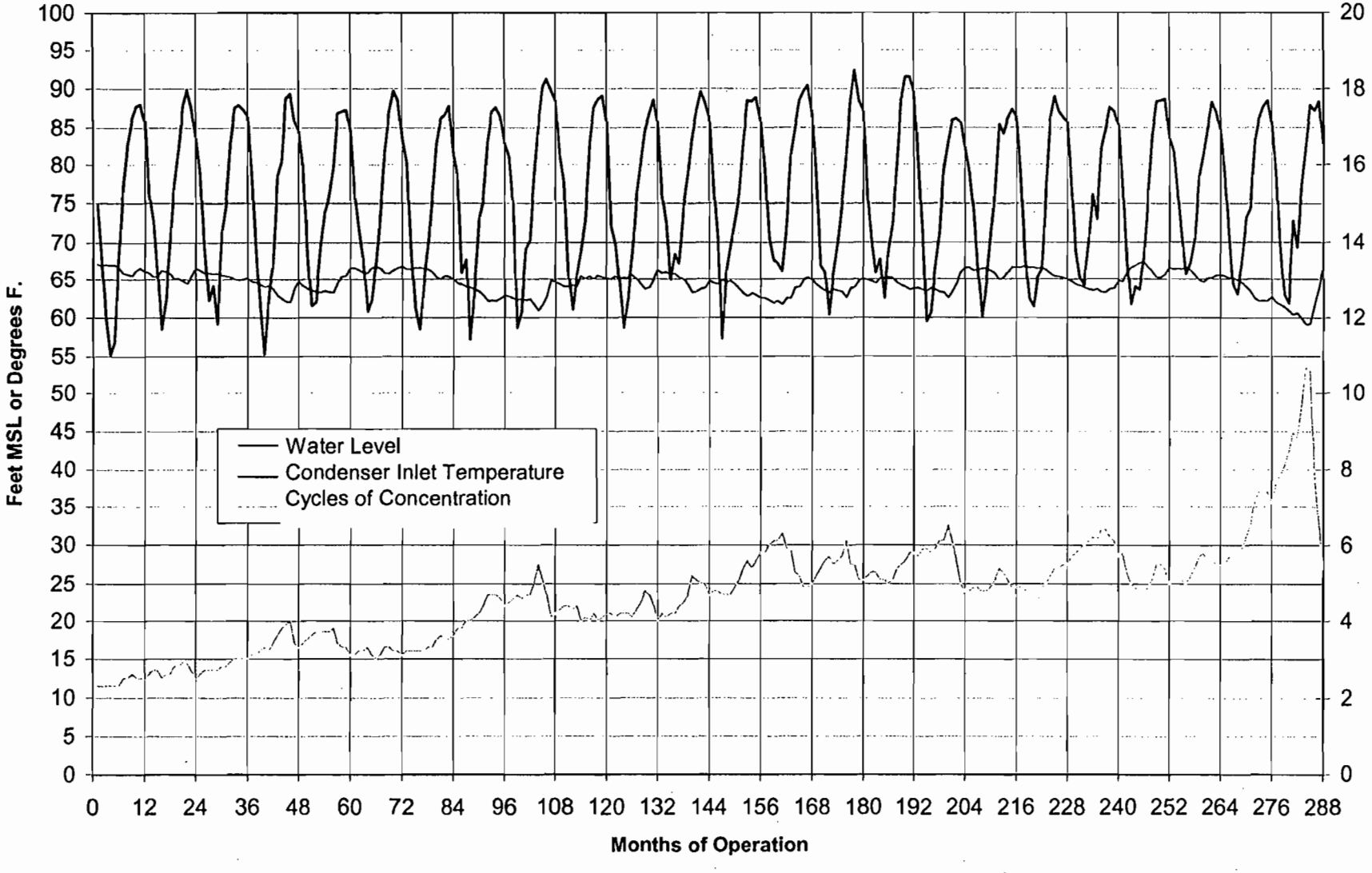


Figure 20 - Simultaneous Expected Water Levels, Condenser Inlet Temperatures, and Cycles of Concentration



APPENDIX 10.8

STORMWATER CALCULATIONS

Manatee Unit 3
Stormwater Calculations

The attached calculations contained under this cover were prepared through a joint effort between Florida Power and Light, Black & Veatch Engineers and Williams, Hatfield and Stoner.

The calculations are signed and sealed per Florida Department of Professional Regulations and include scope of project, assumptions body of calculations and summary of results.

Manatee Unit 3
Stormwater Calculations

The purpose of this document is to describe the Storm Water Management plan for the Manatee Power Plant project.

1.0 SCOPE

The addition of the Manatee Unit 3 Combined Cycle project will include the construction of additional paved areas, buildings, basins, and other miscellaneous industrial-related facilities. Storm water systems will be added to manage the runoff from the new development. This will include the addition of new retention/detention basins, treatment basins and equipment, piping, and weirs, were designed to comply with all applicable federal, state, and local laws

2.0 ENVIRONMENTAL REGULATIONS

Federal, State, Water Management District, and County regulations regulate the on-site drainage system. Following are the key regulations affecting this project:

3.1 Federal Regulations

Title 40 Part 423 of the Code of Federal Regulations (Steam Electric Power Generating Point Source Category) establishes effluent guidelines for power plant discharges to navigable waters. In particular, certain drainage discharges from the plant (i.e. equipment area runoff) are considered low volume wastes, and are subject to these guidelines.

Title 40, parts 122, 123, 124 Code of Federal Regulations (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges) regulates stormwater discharge associated with industrial activity. The regulations currently do not establish discharge limits for these stormwater discharges, but rather require information including water quality data for the discharge.

In addition, Title 40 Part 122 regulates construction activities including clearing, grading and excavation activities except operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development. The regulations require that the applicant identify proposed measures, including best management practices (BMP's) to control pollutants in stormwater discharges, both during and after construction.

Title 40 Part 125F establishes that BMP's be incorporated into National Pollutant Discharge Elimination System (NPDES) permits.

3.2 State Regulations

Stormwater from equipment areas is considered industrial wastewater and will satisfy applicable requirements of Chapter 62-660 F.A.C.

Chapter 62-25 F.A.C. provides regulations for stormwater discharges. Chapter 62-25.050 F.A.C. allows the water management districts, which have been delegated stormwater regulation (in this case the SWFWMD), to establish alternative requirements

which apply in lieu of 62-25 in the area of delegation. Thus, in the case of this project, SWFWMD regulations are applicable in lieu of Chapter 62-25, F.A.C.

3.3 Southwest Florida Water Management District Regulations

The SWFWMD rules and regulations concerning the construction, alteration, or generation of surface water management systems are outlined in Chapter 40D-4, F.A.C., and the document entitled Permit Information Manual, Management and Storage of Surface Waters.

Key SWFWMD drainage design criteria can be summarized as follows:

3.3.1 Water Quantity Requirements

Offsite discharge requirements vary depending on whether the project is located in an open or closed drainage basin. SWFWMD's definition of a closed drainage basin is a watershed in which the runoff does not have surface outfall up to and including the 100-year flood level. An open basin is any basin that does not meet the definition of a closed basin.

The post development peak discharge for an open basin shall not exceed the existing peak discharge for the 25-year/24-hour design storm.

For a closed basin the total post development volume leaving the site shall not be more than the total pre-development volume leaving the site for the design 100-year storm. Additionally, the rate of runoff leaving the site shall not have adverse offsite impacts.

3.0 PROJECT SITE DRAINAGE AREA DESCRIPTIONS

The perimeter road elevation has been set to contain the 100 year – 24 hour storm event from the main plant area without discharging from the plant site. Storm water is directed to two new storm water ponds and to the existing cooling pond. One pond is located in the Northwest region and the other is located in the southwest region of the property. The power block area, Area 4, contains a storm drain system. Refer to drawings 130770-3STA-S0007 and 130770-3STA-S0008 for the pre-development and post-development drainage areas.

4.1 NORTH POND

Channel 1 was designed, along the railroad tracks, to collect the runoff from Area 1. The runoff is discharged into the North Pond at a peak rate of 117 cfs (see attached calculations). The collected runoff flows lengthwise through the pond and discharges on the West Side, northern most area. The discharge out of the pond is designed to be equal to or less than the pre-developed discharge of 60 cfs (see attached calculations).

4.2 SOUTH POND

Channel 2 was designed along the access road on the West Side of the site. This channel collects the runoff from the northern part of Area 6 and flows south. Ditch 4

runs north/south along the East Side of Area 6, in the construction parking area, and then runs west. It collects the runoff from the southern portion of Area 6. The channel is then connected to the ditch by a series of lift stations. After the channel and ditch are combined, the runoff is discharged into the South Pond, on the East Side, at a peak rate of 263 cfs (see attached calculations). By connecting the channel/ditch in this manner, a maximum flow path is created from the southeast inlet to the northwest outlet of the pond, which will give the pollutants time to settle. The discharge out of the pond is designed to be equal to or less than the pre-developed discharge of 122 cfs (see attached calculations).

4.3 STORM DRAIN SYSTEM

A storm drain system was developed to collect the runoff from Area 2, Area 5, the power block (Area 4), and CT switchyard (Area 4) areas. The piping collects and directs flow to a point in Area 5 at a peak discharge rate of 178 cfs (see attached calculations). An oil/water separator treats the runoff from the secondary containment area of the fuel tank and plant drains. Then, the discharge from the oil/water separator is piped directly to the lift station located in Area 5. Runoff from the existing switchyard, switchyard expansion and laydown areas, BSN 1 & 2, is collected through a series of ditches and culverts. Ditch 1 (D-1) runs north/south along the East Side of the existing switchyard and BSN-2. Then D-1 runs west and connects to the switchyard expansion area (BSN-1) by culvert 1 (C-1) and flows into Ditch 2 (D-2). In Area 8, the discharge from Ditch 2 is collected and transferred to Area 5 by the use of a lift station. All the runoff collected in Area 5-lift station is then pumped to the existing cooling pond.

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Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 1

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 25 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date

See Page ____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval

Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

Area1-25.prn

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area that drains to Pond I For 25yr/24hr Storm Event
Subarea : Area 1

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns,parks etc.)				
Fair condition; grass cover 50% to 75%	-	1.5(69)	-	-
Streets and roads				
Gravel (w/ right-of-way)	-	13.0(85)	-	-
Total Area (by Hydrologic Soil Group)		14.5		

SUBAREA: Area 1 TOTAL DRAINAGE AREA: 14.5 Acres WEIGHTED CURVE NUMBER: 83

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area that drains to Pond I For 25yr/24hr Storm Event

Subarea #1 - Area 1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	280.0	0.008	a					0.056
Open Channel		1350						2.5	0.150
								Time of Concentration =	0.21*

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---

P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area that drains to Pond I For 25yr/24hr Storm Event

Total watershed area: 0.023 sq mi Rainfall type: II Frequency: 25 years

	Subareas Area 1
Area(sq mi)	0.02*
Rainfall(in)	8.5
Curve number	83*
Runoff(in)	6.46
Tc (hrs)	0.21*
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.05
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) Area 1
11.0	3	3
11.3	5	5
11.6	7	7
11.9	31	31
12.0	59	59
12.1	108	108
12.2	117P	117P
12.3	70	70
12.4	37	37
12.5	24	24
12.6	19	19
12.7	15	15
12.8	13	13
13.0	10	10
13.2	9	9
13.4	8	8
13.6	7	7
13.8	6	6
14.0	6	6
14.3	5	5
14.6	5	5
15.0	4	4
15.5	4	4
16.0	4	4

16.5	3	3
17.0	3	3
17.5	3	3
18.0	3	3
19.0	2	2
20.0	2	2
22.0	2	2
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 2

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 25 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge Calculation for Area 2 For 25yr/24hr Storm Event
Subarea : Area 2

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.65(98)	-	-
Gravel (w/ right-of-way)	-	2.84(85)	-	-
Total Area (by Hydrologic Soil Group)		3.49		

SUBAREA: Area 2 TOTAL DRAINAGE AREA: 3.49 Acres WEIGHTED CURVE NUMBER: 87

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge Calculation for Area 2 For 25yr/24hr Storm Event

Subarea #1 - Area 2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		360.2	0.005	u					0.088
								Time of Concentration =	0.16*

--- Sheet Flow Surface Codes ---
A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---
P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge Calculation for Area 2 For 25yr/24hr Storm Event

Total watershed area: 0.005 sq mi Rainfall type: II Frequency: 25 years

	Subareas Area 2
Area(sq mi)	0.01*
Rainfall(in)	8.5
Curve number	87*
Runoff(in)	6.94
Tc (hrs)	0.16*
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.04
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) Area 2
11.0	1	1
11.3	1	1
11.6	2	2
11.9	8	8
12.0	15	15
12.1	28	28
12.2	30P	30P
12.3	18	18
12.4	9	9
12.5	6	6
12.6	5	5
12.7	4	4
12.8	3	3
13.0	3	3
13.2	2	2
13.4	2	2
13.6	2	2
13.8	2	2
14.0	2	2
14.3	1	1
14.6	1	1
15.0	1	1
15.5	1	1
16.0	1	1
16.5	1	1

17.0	1	1
17.5	1	1
18.0	1	1
19.0	1	1
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 6

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 4 – Power Block

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 25 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-1

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.64(98)	-	-
Gravel (w/ right-of-way)	-	0.64(85)	-	-

Total Area (by Hydrologic Soil Group) 1.28

SUBAREA: 4-1 TOTAL DRAINAGE AREA: 1.28 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-2

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.55(98)	-	-
Gravel (w/ right-of-way)	-	0.55(85)	-	-

Total Area (by Hydrologic Soil Group) 1.1

SUBAREA: 4-2 TOTAL DRAINAGE AREA: 1.1 Acres WEIGHTED CURVE NUMBER: 91

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-3

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.35(98)	-	-
Gravel (w/ right-of-way)	-	0.81(85)	-	-

Total Area (by Hydrologic Soil Group) 1.16

SUBAREA: 4-3 TOTAL DRAINAGE AREA: 1.16 Acres WEIGHTED CURVE NUMBER: 89

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-4

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.58(98)	-	-
Gravel (w/ right-of-way)	-	0.58(85)	-	-

Total Area (by Hydrologic Soil Group) 1.16

SUBAREA: 4-4 TOTAL DRAINAGE AREA: 1.16 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-5

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.54 (98)	-	-
Gravel (w/ right-of-way)	-	0.54 (85)	-	-
Total Area (by Hydrologic Soil Group)		1.08		

SUBAREA: 4-5 TOTAL DRAINAGE AREA: 1.08 Acres WEIGHTED CURVE NUMBER: 91

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-6

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.32 (98)	-	-
Gravel (w/ right-of-way)	-	0.32 (85)	-	-
Total Area (by Hydrologic Soil Group)		.64		

SUBAREA: 4-6 TOTAL DRAINAGE AREA: .64 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-7

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.34 (98)	-	-
Gravel (w/ right-of-way)	-	0.34 (85)	-	-
Total Area (by Hydrologic Soil Group)		.68		

SUBAREA: 4-7 TOTAL DRAINAGE AREA: .68 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-8

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.26 (98)	-	-
Gravel (w/ right-of-way)	-	0.39 (85)	-	-
Total Area (by Hydrologic Soil Group)		.65		

SUBAREA: 4-8 TOTAL DRAINAGE AREA: .65 Acres WEIGHTED CURVE NUMBER: 90

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-9

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.29(98)	-	-
Gravel (w/ right-of-way)	-	0.29(85)	-	-
Total Area (by Hydrologic Soil Group)		.58		

SUBAREA: 4-9 TOTAL DRAINAGE AREA: .58 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm
Subarea : 4-10

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.34(98)	-	-
Gravel (w/ right-of-way)	-	0.34(85)	-	-
Total Area (by Hydrologic Soil Group)		.68		

SUBAREA: 4-10 TOTAL DRAINAGE AREA: .68 Acres WEIGHTED CURVE NUMBER: 92

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm

Subarea #1 - 4-1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		51.3	0.005	u					0.012
								Time of Concentration =	0.08*

Subarea #2 - 4-2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		26.7	0.005	u					0.007
								Time of Concentration =	0.08*

Subarea #3 - 4-3

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		44.7	0.005	u					0.011
								Time of Concentration =	0.08*

Subarea #4 - 4-4

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		36	0.005	u					0.009
								Time of Concentration =	0.08*

□□* - Generated for use by TABULAR method
□ TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10□
Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm

---------- Subarea #5 - 4-5 ----------

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		38.1	0.005	u					0.009
								Time of Concentration =	0.08*

---------- Subarea #6 - 4-6 ----------

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	220.4	0.005	a					0.056
								Time of Concentration =	0.06*

---------- Subarea #7 - 4-7 ----------

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	216	0.005	a					0.055
								Time of Concentration =	0.05*

---------- Subarea #8 - 4-8 ----------

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	252.9	0.005	a					0.062
								Time of Concentration =	0.06*

---------- Subarea #9 - 4-9 ----------

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	226.4	0.005	a					0.057
								Time of Concentration =	0.06*

---------- Subarea #10 - 4-10 ----------

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	233.1	0.005	a					0.058
								Time of Concentration =	0.06*

--- Sheet Flow Surface Codes ---

A Smooth Surface	F Grass, Dense	--- Shallow Concentrated ---	
B Fallow (No Res.)	G Grass, Burmuda	--- Surface Codes ---	
C Cultivated < 20 % Res.	H Woods, Light	P Paved	
D Cultivated > 20 % Res.	I Woods, Dense	U Unpaved	
E Grass-Range, Short	J Range, Natural		

□□* - Generated for use by TABULAR method
□ TABULAR HYDROGRAPH METHOD Version 2.10□
Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm

Total watershed area: 0.014 sq mi Rainfall type: II Frequency: 25 years

	Subareas				
	4-1	4-2	4-3	4-4	4-5
Area(sq mi)	0.00*	0.00*	0.00*	0.00*	0.00*
Rainfall(in)	8.5	8.5	8.5	8.5	8.5
Curve number	92*	91*	89*	92*	91*
Runoff(in)	7.54	7.42	7.18	7.54	7.42
Tc (hrs)	0.08*	0.08*	0.08*	0.08*	0.08*
(Used)	0.10	0.10	0.10	0.10	0.10
TimeToOutlet	0.00	0.00	0.00	0.00	0.00
Ia/P	0.02	0.02	0.03	0.02	0.02
(Used)	0.10	0.10	0.10	0.10	0.10

Time	Total	Subarea Contribution to Total Flow (cfs)				
(hr)	Flow	4-1	4-2	4-3	4-4	4-5
11.0	0	0	0	0	0	0
11.3	1	1	0	0	0	0
11.6	5	1	1	1	1	1
11.9	35	5	4	4	5	4

12.0	67	10	8	8	9	8
12.1	106P	15P	13P	13P	14P	13P
12.2	66	9	8	8	9	8
12.3	24	3	3	3	3	3
12.4	15	2	2	2	2	2
12.5	15	2	2	2	2	2
12.6	11	2	1	1	1	1
12.7	10	1	1	1	1	1
12.8	10	1	1	1	1	1
13.0	7	1	1	1	1	1
13.2	5	1	1	1	1	1
13.4	5	1	1	1	1	1
13.6	5	1	1	1	1	1
13.8	5	1	1	1	1	1
14.0	2	1	0	0	1	0
14.3	1	1	0	0	0	0
14.6	0	0	0	0	0	0
15.0	0	0	0	0	0	0
15.5	0	0	0	0	0	0
16.0	0	0	0	0	0	0
16.5	0	0	0	0	0	0
17.0	0	0	0	0	0	0
17.5	0	0	0	0	0	0
18.0	0	0	0	0	0	0
19.0	0	0	0	0	0	0
20.0	0	0	0	0	0	0
22.0	0	0	0	0	0	0
26.0	0	0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

TABULAR HYDROGRAPH METHOD Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002

County : MANATEE State: FL Checked: ____ Date: _____

Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 25yr/24hr Storm

Continuation of subarea information

	Subareas				
	4-6	4-7	4-8	4-9	4-10
Area(sq mi)	0.00*	0.00*	0.00*	0.00*	0.00*
Rainfall(in)	8.5	8.5	8.5	8.5	8.5
Curve number	92*	92*	90*	92*	92*
Runoff(in)	7.54	7.54	7.30	7.54	7.54
Tc (hrs)	0.06*	0.05*	0.06*	0.06*	0.06*
(Used)	0.10	0.10	0.10	0.10	0.10
TimeToOutlet	0.00	0.00	0.00	0.00	0.00
Ia/P	0.02	0.02	0.03	0.02	0.02
(Used)	0.10	0.10	0.10	0.10	0.10

Time	Subarea Contribution to Total Flow (cfs)				
(hr)	4-6	4-7	4-8	4-9	4-10
11.0	0	0	0	0	0
11.3	0	0	0	0	0
11.6	0	0	0	0	0
11.9	3	3	2	2	3
12.0	5	5	5	4	5
12.1	8P	8P	7P	7P	8P
12.2	5	5	5	4	5
12.3	2	2	2	1	2
12.4	1	1	1	1	1
12.5	1	1	1	1	1
12.6	1	1	1	1	1
12.7	1	1	1	1	1
12.8	1	1	1	1	1
13.0	0	1	0	0	1
13.2	0	0	0	0	0
13.4	0	0	0	0	0
13.6	0	0	0	0	0
13.8	0	0	0	0	0
14.0	0	0	0	0	0
14.3	0	0	0	0	0
14.6	0	0	0	0	0
15.0	0	0	0	0	0
15.5	0	0	0	0	0
16.0	0	0	0	0	0
16.5	0	0	0	0	0
17.0	0	0	0	0	0
17.5	0	0	0	0	0
18.0	0	0	0	0	0
19.0	0	0	0	0	0
20.0	0	0	0	0	0
22.0	0	0	0	0	0
26.0	0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 4 - Switchyard

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 25 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 25yr/24hr Storm
Subarea : 4-11

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.06(98)	-	-
Gravel (w/ right-of-way)	-	1.11(85)	-	-
Total Area (by Hydrologic Soil Group)		1.17		

SUBAREA: 4-11 TOTAL DRAINAGE AREA: 1.17 Acres WEIGHTED CURVE NUMBER: 86

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 25yr/24hr Storm
Subarea : 4-12

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Gravel (w/ right-of-way)	-	1.27(85)	-	-
Total Area (by Hydrologic Soil Group)		1.27		

SUBAREA: 4-12 TOTAL DRAINAGE AREA: 1.27 Acres WEIGHTED CURVE NUMBER: 85

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 25yr/24hr Storm
Subarea : 4-13

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Gravel (w/ right-of-way)	-	0.87(85)	-	-
Total Area (by Hydrologic Soil Group)		.87		

SUBAREA: 4-13 TOTAL DRAINAGE AREA: .87 Acres WEIGHTED CURVE NUMBER: 85

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 25yr/24hr Storm

Subarea #1 - 4-11

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	169.7	0.005	a					0.045
								Time of Concentration =	0.05*

Subarea #2 - 4-12

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	219.4	0.005	a					0.056
								Time of Concentration =	0.06*

Subarea #3 - 4-13

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Rp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	180.9	0.005	a					0.048
								Time of Concentration =	0.05*

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---

P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 25yr/24hr Storm

Total watershed area: 0.005 sq mi Rainfall type: II Frequency: 25 years

	Subareas		
	4-11	4-12	4-13
Area(sq mi)	0.00*	0.00*	0.00*
Rainfall(in)	8.5	8.5	8.5
Curve number	86*	85*	85*
Runoff(in)	6.82	6.70	6.70
Tc (hrs)	0.05*	0.06*	0.05*
(Used)	0.10	0.10	0.10
TimeToOutlet	0.00	0.00	0.00
Ia/P	0.04	0.04	0.04
(Used)	0.10	0.10	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) 4-11	4-12	4-13
11.0	0	0	0	0
11.3	0	0	0	0
11.6	2	1	1	0
11.9	11	4	4	3
12.0	23	8	9	6
12.1	35P	13P	13P	9P
12.2	22	8	8	6
12.3	8	3	3	2
12.4	5	2	2	1
12.5	5	2	2	1
12.6	3	1	1	1
12.7	3	1	1	1
12.8	3	1	1	1
13.0	3	1	1	1
13.2	3	1	1	1
13.4	2	1	1	0
13.6	2	1	1	0
13.8	2	1	1	0
14.0	1	0	1	0
14.3	0	0	0	0
14.6	0	0	0	0
15.0	0	0	0	0
15.5	0	0	0	0
16.0	0	0	0	0
16.5	0	0	0	0
17.0	0	0	0	0
17.5	0	0	0	0
18.0	0	0	0	0
19.0	0	0	0	0
20.0	0	0	0	0
22.0	0	0	0	0
26.0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 5

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 25 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page ____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 5 Discharge (area to Manhole 1) For 25yr/24hr Storm Event
Subarea : 5

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.08(98)	-	-
Gravel (w/ right-of-way)	-	0.51(85)	-	-

Total Area (by Hydrologic Soil Group) .59

SUBAREA: 5 TOTAL DRAINAGE AREA: .59 Acres WEIGHTED CURVE NUMBER: 87

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 5 Discharge (area to Manhole 1) For 25yr/24hr Storm Event

Subarea #1 - 5

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	194.3	0.005	a					0.050

Time of Concentration = 0.05*

--- Sheet Flow Surface Codes ---
A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural
--- Shallow Concentrated --- Surface Codes ---
P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 5 Discharge (area to Manhole 1) For 25yr/24hr Storm Event

Total watershed area: 0.001 sq mi Rainfall type: II Frequency: 25 years

	Subareas 5
Area(sq mi)	0.00*
Rainfall(in)	8.5
Curve number	87*
Runoff(in)	6.94
Tc (hrs)	0.05*
(Used)	0.10
TimeToOutlet	0.00
Ia/P	0.04
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) 5
11.0	0	0
11.3	0	0
11.6	0	0
11.9	2	2
12.0	4	4
12.1	6P	6P
12.2	4	4
12.3	1	1
12.4	1	1
12.5	1	1
12.6	1	1
12.7	1	1
12.8	0	0
13.0	0	0
13.2	0	0
13.4	0	0
13.6	0	0
13.8	0	0
14.0	0	0
14.3	0	0
14.6	0	0
15.0	0	0
15.5	0	0
16.0	0	0
16.5	0	0
17.0	0	0

17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 6

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 25 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-06-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Discharge for Area 6 For 25 year/24 hour Storm
Subarea : 6-1

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns,parks etc.)				
Fair condition; grass cover 50% to 75%	-	1.65(69)	-	-
Streets and roads				
Paved; curbs and storm sewers	-	5.7(98)	-	-
Gravel (w/ right-of-way)	-	4.50(85)	-	-
Total Area (by Hydrologic Soil Group)		11.8		

SUBAREA: 6-1 TOTAL DRAINAGE AREA: 11.85 Acres WEIGHTED CURVE NUMBER: 89

RUNOFF CURVE NUMBER COMPUTATION — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-06-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Discharge for Area 6 For 25 year/24 hour Storm
Subarea : 6-2

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	8.06(98)	-	-
Total Area (by Hydrologic Soil Group)		8.06		

SUBAREA: 6-2 TOTAL DRAINAGE AREA: 8.06 Acres WEIGHTED CURVE NUMBER: 98

RUNOFF CURVE NUMBER COMPUTATION — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-06-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Discharge for Area 6 For 25 year/24 hour Storm
Subarea : 6-3

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	4.58(98)	-	-
Total Area (by Hydrologic Soil Group)		4.58		

SUBAREA: 6-3 TOTAL DRAINAGE AREA: 4.58 Acres WEIGHTED CURVE NUMBER: 98

TIME OF CONCENTRATION AND TRAVEL TIME — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-06-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Discharge for Area 6 For 25 year/24 hour Storm

Subarea #1 - 6-1

Flow Type	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Open Channel	1571						2.5	0.175
Time of Concentration = 0.17*								

Subarea #2 - 6-2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	220	0.004	a					0.061
Sheet		80	0.01	a					0.019
Shallow Concent'd		246	0.01	u					0.042

Time of Concentration = 0.12*

---------- Subarea #3 - 6-3 ----------

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	50	0.01	a					0.013
Open Channel		852						2.5	0.095

Time of Concentration = 0.11*

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---

P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-06-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Area 6 For 25 year/24 hour Storm

Total watershed area: 0.038 sq mi Rainfall type: II Frequency: 25 years

	Subareas 6-1	6-2	6-3
Area(sq mi)	0.02*	0.01*	0.01*
Rainfall(in)	8.5	8.5	8.5
Curve number	89*	98*	98*
Runoff(in)	7.18	8.26	8.26
Tc (hrs)	0.17*	0.12*	0.11*
(Used)	0.20	0.10	0.10
TimeToOutlet	0.00	0.00	0.00
Ia/P	0.03	0.00	0.00
(Used)	0.10	0.10	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) 6-1	6-2	6-3
11.0	6	3	2	1
11.3	10	4	4	2
11.6	15	6	6	3
11.9	83	28	35	20
12.0	159	54	67	38
12.1	263P	98	105P	60P
12.2	208	106P	65	37
12.3	100	64	23	13
12.4	57	33	15	9
12.5	42	22	13	7
12.6	34	17	11	6
12.7	28	14	9	5
12.8	23	11	8	4
13.0	20	9	7	4
13.2	17	8	6	3
13.4	15	7	5	3
13.6	15	7	5	3
13.8	12	6	4	2
14.0	11	5	4	2
14.3	11	5	4	2
14.6	9	4	3	2
15.0	9	4	3	2
15.5	9	4	3	2
16.0	6	3	2	1
16.5	6	3	2	1
17.0	6	3	2	1
17.5	6	3	2	1
18.0	5	2	2	1
19.0	5	2	2	1
20.0	4	2	1	1
22.0	4	2	1	1
26.0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Maintenance Area

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 25 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-07-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Drainage for Maintenance For 25yr/24hr Storm
Subarea : Mainte

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	2.27(98)	-	-
Total Area (by Hydrologic Soil Group)		2.27		
		====		

SUBAREA: Mainte TOTAL DRAINAGE AREA: 2.27 Acres WEIGHTED CURVE NUMBER: 98

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-07-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Drainage for Maintance Area For 25yr/24hr Storm

Subarea #1 - Fuel O

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	37	0.25	a					0.003
Sheet		263	0.005	a					0.064
Shallow Concent'd		30	0.005	p					0.006
								Time of Concentration =	0.07*
									=====

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---

P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-07-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Drainage for Maintenance Area For 25yr/24hr Storm

Total watershed area: 0.004 sq mi Rainfall type: II Frequency: 25 years

	Subareas
	Mainte
Area(sq mi)	0.00*
Rainfall(in)	8.5
Curve number	98*
Runoff(in)	8.26
Tc (hrs)	0.07*
(Used)	0.10
TimeToOutlet	0.00
Ia/P	0.00
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) Mainte
11.0	1	1
11.3	1	1
11.6	2	2
11.9	10	10
12.0	19	19
12.1	30P	30P
12.2	18	18
12.3	6	6
12.4	4	4
12.5	4	4
12.6	3	3
12.7	3	3
12.8	2	2
13.0	2	2
13.2	2	2
13.4	1	1
13.6	1	1
13.8	1	1
14.0	1	1
14.3	1	1
14.6	1	1
15.0	1	1
15.5	1	1
16.0	1	1
16.5	1	1
17.0	1	1
17.5	1	1
18.0	1	1
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 1

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 100 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

Area1-10.prn

RUNOFF CURVE NUMBER COMPUTATION — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-05-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Area that drains to Pond I For 100yr/24hr Storm Event
Subarea : Area 1

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns,parks etc.)				
Fair condition; grass cover 50% to 75%	-	1.5(69)	-	-
Streets and roads				
Gravel (w/ right-of-way)	-	13.0(85)	-	-
Total Area (by Hydrologic Soil Group)		14.5		

SUBAREA: Area 1 TOTAL DRAINAGE AREA: 14.5 Acres — WEIGHTED CURVE NUMBER: 83

TIME OF CONCENTRATION AND TRAVEL TIME — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-05-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Area that drains to Pond I For 100yr/24hr Storm Event

Subarea #1 - Area 1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	280.0	0.008	a					0.056
Open Channel		1350						2.5	0.150
								Time of Concentration =	0.21*

--- Sheet Flow Surface Codes ---

A Smooth Surface	F Grass, Dense	--- Shallow Concentrated ---
B Fallow (No Res.)	G Grass, Burmuda	--- Surface Codes ---
C Cultivated < 20 % Res.	H Woods, Light	P Paved
D Cultivated > 20 % Res.	I Woods, Dense	U Unpaved
E Grass-Range, Short	J Range, Natural	

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-05-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Area that drains to Pond I For 100yr/24hr Storm Event

Total watershed area: 0.023 sq mi Rainfall type: II Frequency: 100 years

	Subareas Area 1
Area(sq mi)	0.02*
Rainfall(in)	11.0
Curve number	83*
Runoff(in)	8.87
Tc (hrs)	0.21*
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.04
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) Area 1
11.0	5	5
11.3	6	6
11.6	9	9
11.9	42	42
12.0	81	81
12.1	149	149
12.2	161P	161P
12.3	97	97
12.4	50	50
12.5	33	33
12.6	26	26
12.7	21	21
12.8	17	17
13.0	14	14
13.2	12	12
13.4	11	11
13.6	10	10
13.8	9	9
14.0	8	8
14.3	7	7
14.6	7	7
15.0	6	6
15.5	5	5
16.0	5	5

16.5	4	4
17.0	4	4
17.5	4	4
18.0	4	4
19.0	3	3
20.0	3	3
22.0	2	2
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 2

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 100 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge Calculation for Area 2 For 100yr/24hr Storm Event
Subarea : Area 2

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.65(98)	-	-
Gravel (w/ right-of-way)	-	2.84(85)	-	-
Total Area (by Hydrologic Soil Group)		3.49		

SUBAREA: Area 2 TOTAL DRAINAGE AREA: 3.49 Acres WEIGHTED CURVE NUMBER: 87

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge Calculation for Area 2 For 100yr/24hr Storm Event

Subarea #1 - Area 2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		360.2	0.005	u					0.088
								Time of Concentration =	0.16*

--- Sheet Flow Surface Codes ---
A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---
P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge Calculation for Area 2 For 100yr/24hr Storm Event

Total watershed area: 0.005 sq mi Rainfall type: II Frequency: 100 years

	Subareas Area 2
Area(sq mi)	0.01*
Rainfall(in)	11.0
Curve number	87*
Runoff(in)	9.39
Tc (hrs)	0.16*
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.03
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) Area 2
11.0	1	1
11.3	2	2
11.6	2	2
11.9	11	11
12.0	21	21
12.1	38	38
12.2	41P	41P
12.3	25	25
12.4	13	13
12.5	8	8
12.6	7	7
12.7	5	5
12.8	4	4
13.0	4	4
13.2	3	3
13.4	3	3
13.6	3	3
13.8	2	2
14.0	2	2
14.3	2	2
14.6	2	2
15.0	2	2
15.5	1	1
16.0	1	1
16.5	1	1

17.0	1	1
17.5	1	1
18.0	1	1
19.0	1	1
20.0	1	1
22.0	1	1
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 6

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 4 – Power Block

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 100 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-1

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.64(98)	-	-
Gravel (w/ right-of-way)	-	0.64(85)	-	-

Total Area (by Hydrologic Soil Group) 1.28

SUBAREA: 4-1 TOTAL DRAINAGE AREA: 1.28 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-2

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.55(98)	-	-
Gravel (w/ right-of-way)	-	0.55(85)	-	-

Total Area (by Hydrologic Soil Group) 1.1

SUBAREA: 4-2 TOTAL DRAINAGE AREA: 1.1 Acres WEIGHTED CURVE NUMBER: 91

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-3

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.35(98)	-	-
Gravel (w/ right-of-way)	-	0.81(85)	-	-

Total Area (by Hydrologic Soil Group) 1.16

SUBAREA: 4-3 TOTAL DRAINAGE AREA: 1.16 Acres WEIGHTED CURVE NUMBER: 89

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-4

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.58(98)	-	-
Gravel (w/ right-of-way)	-	0.58(85)	-	-

Total Area (by Hydrologic Soil Group) 1.16

SUBAREA: 4-4 TOTAL DRAINAGE AREA: 1.16 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-5

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.54(98)	-	-
Gravel (w/ right-of-way)	-	0.54(85)	-	-
Total Area (by Hydrologic Soil Group)		1.08		

SUBAREA: 4-5 TOTAL DRAINAGE AREA: 1.08 Acres WEIGHTED CURVE NUMBER: 91

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-6

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.32(98)	-	-
Gravel (w/ right-of-way)	-	0.32(85)	-	-
Total Area (by Hydrologic Soil Group)		.64		

SUBAREA: 4-6 TOTAL DRAINAGE AREA: .64 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-7

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.34(98)	-	-
Gravel (w/ right-of-way)	-	0.34(85)	-	-
Total Area (by Hydrologic Soil Group)		.68		

SUBAREA: 4-7 TOTAL DRAINAGE AREA: .68 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-8

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.26(98)	-	-
Gravel (w/ right-of-way)	-	0.39(85)	-	-
Total Area (by Hydrologic Soil Group)		.65		

SUBAREA: 4-8 TOTAL DRAINAGE AREA: .65 Acres WEIGHTED CURVE NUMBER: 90

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-9

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.29(98)	-	-
Gravel (w/ right-of-way)	-	0.29(85)	-	-
Total Area (by Hydrologic Soil Group)		.58		

SUBAREA: 4-9 TOTAL DRAINAGE AREA: .58 Acres WEIGHTED CURVE NUMBER: 92

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm
Subarea : 4-10

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.34(98)	-	-
Gravel (w/ right-of-way)	-	0.34(85)	-	-
Total Area (by Hydrologic Soil Group)		.68		

SUBAREA: 4-10 TOTAL DRAINAGE AREA: .68 Acres WEIGHTED CURVE NUMBER: 92

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: ____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm

Subarea #1 - 4-1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		51.3	0.005	u					0.012
Time of Concentration = 0.08*									

Subarea #2 - 4-2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		26.7	0.005	u					0.007
Time of Concentration = 0.08*									

Subarea #3 - 4-3

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		44.7	0.005	u					0.011
Time of Concentration = 0.08*									

Subarea #4 - 4-4

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		36	0.005	u					0.009
Time of Concentration = 0.08*									

* - Generated for use by TABULAR method
TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10
Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: _____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm

Subarea #5 - 4-5

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		38.1	0.005	u					0.009
								Time of Concentration =	0.08*

Subarea #6 - 4-6

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	220.4	0.005	a					0.056
								Time of Concentration =	0.06*

Subarea #7 - 4-7

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	216	0.005	a					0.055
								Time of Concentration =	0.05*

Subarea #8 - 4-8

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	252.9	0.005	a					0.062
								Time of Concentration =	0.06*

Subarea #9 - 4-9

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	226.4	0.005	a					0.057
								Time of Concentration =	0.06*

Subarea #10 - 4-10

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	233.1	0.005	a					0.058
								Time of Concentration =	0.06*

--- Sheet Flow Surface Codes ---

A Smooth Surface	F Grass, Dense	--- Shallow Concentrated ---	
B Fallow (No Res.)	G Grass, Burmuda	---	Surface Codes ---
C Cultivated < 20 % Res.	H Woods, Light		P Paved
D Cultivated > 20 % Res.	I Woods, Dense		U Unpaved
E Grass-Range, Short	J Range, Natural		

* - Generated for use by TABULAR method
TABULAR HYDROGRAPH METHOD Version 2.10
Project : MANATEE - FPL User: FRE Date: 01-05-2002
County : MANATEE State: FL Checked: _____ Date: _____
Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm

Total watershed area: 0.014 sq mi Rainfall type: II Frequency: 100 years

	Subareas				
	4-1	4-2	4-3	4-4	4-5
Area(sq mi)	0.00*	0.00*	0.00*	0.00*	0.00*
Rainfall(in)	11.0	11.0	11.0	11.0	11.0
Curve number	92*	91*	89*	92*	91*
Runoff(in)	10.02	9.90	9.64	10.02	9.90
Tc (hrs)	0.08*	0.08*	0.08*	0.08*	0.08*
(Used)	0.10	0.10	0.10	0.10	0.10
TimeToOutlet	0.00	0.00	0.00	0.00	0.00
Ia/P	0.02	0.02	0.02	0.02	0.02
(Used)	0.10	0.10	0.10	0.10	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs)				
		4-1	4-2	4-3	4-4	4-5
11.0	0	0	0	0	0	0
11.3	5	1	1	1	1	1
11.6	9	1	1	1	1	1
11.9	48	7	6	6	6	6

12.0	90	13	11	11	12	11
12.1	141P	20P	17P	18P	18P	17P
12.2	88	13	11	11	11	10
12.3	30	4	4	4	4	4
12.4	21	3	3	3	3	2
12.5	15	2	2	2	2	2
12.6	15	2	2	2	2	2
12.7	13	2	1	2	2	1
12.8	11	2	1	1	1	1
13.0	10	1	1	1	1	1
13.2	10	1	1	1	1	1
13.4	9	1	1	1	1	1
13.6	5	1	1	1	1	1
13.8	5	1	1	1	1	1
14.0	5	1	1	1	1	1
14.3	5	1	1	1	1	1
14.6	5	1	1	1	1	1
15.0	3	1	0	1	1	0
15.5	1	1	0	0	0	0
16.0	0	0	0	0	0	0
16.5	0	0	0	0	0	0
17.0	0	0	0	0	0	0
17.5	0	0	0	0	0	0
18.0	0	0	0	0	0	0
19.0	0	0	0	0	0	0
20.0	0	0	0	0	0	0
22.0	0	0	0	0	0	0
26.0	0	0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

TABULAR HYDROGRAPH METHOD Version 2.10

Project : MANATEE - FPL User: FRE Date: 01-05-2002

County : MANATEE State: FL Checked: ____ Date: _____

Subtitle: DISCHARGE VALUES FOR Area 4: Power Block For 100yr/24hr Storm

Continuation of subarea information

	Subareas				
	4-6	4-7	4-8	4-9	4-10
Area(sq mi)	0.00*	0.00*	0.00*	0.00*	0.00*
Rainfall(in)	11.0	11.0	11.0	11.0	11.0
Curve number	92*	92*	90*	92*	92*
Runoff(in)	10.02	10.02	9.77	10.02	10.02
Tc (hrs)	0.06*	0.05*	0.06*	0.06*	0.06*
(Used)	0.10	0.10	0.10	0.10	0.10
TimeToOutlet	0.00	0.00	0.00	0.00	0.00
Ia/P	0.02	0.02	0.02	0.02	0.02
(Used)	0.10	0.10	0.10	0.10	0.10

Time	Subarea Contribution to Total Flow (cfs)				
(hr)	4-6	4-7	4-8	4-9	4-10
11.0	0	0	0	0	0
11.3	0	0	0	0	0
11.6	1	1	1	0	1
11.9	3	4	3	3	4
12.0	6	7	6	6	7
12.1	10P	11P	10P	9P	11P
12.2	6	7	6	6	7
12.3	2	2	2	2	2
12.4	1	2	1	1	2
12.5	1	1	1	1	1
12.6	1	1	1	1	1
12.7	1	1	1	1	1
12.8	1	1	1	1	1
13.0	1	1	1	1	1
13.2	1	1	1	1	1
13.4	1	1	1	0	1
13.6	0	0	0	0	0
13.8	0	0	0	0	0
14.0	0	0	0	0	0
14.3	0	0	0	0	0
14.6	0	0	0	0	0
15.0	0	0	0	0	0
15.5	0	0	0	0	0
16.0	0	0	0	0	0
16.5	0	0	0	0	0
17.0	0	0	0	0	0
17.5	0	0	0	0	0
18.0	0	0	0	0	0
19.0	0	0	0	0	0
20.0	0	0	0	0	0
22.0	0	0	0	0	0
26.0	0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 4 – Switchyard

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 100 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 100yr/24hr Storm
Subarea : 4-11

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.06(98)	-	-
Gravel (w/ right-of-way)	-	1.11(85)	-	-

Total Area (by Hydrologic Soil Group) 1.17

SUBAREA: 4-11 TOTAL DRAINAGE AREA: 1.17 Acres WEIGHTED CURVE NUMBER: 86

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 100yr/24hr Storm
Subarea : 4-12

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Gravel (w/ right-of-way)	-	1.27(85)	-	-

Total Area (by Hydrologic Soil Group) 1.27

SUBAREA: 4-12 TOTAL DRAINAGE AREA: 1.27 Acres WEIGHTED CURVE NUMBER: 85

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 100yr/24hr Storm
Subarea : 4-13

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Gravel (w/ right-of-way)	-	0.87(85)	-	-

Total Area (by Hydrologic Soil Group) .87

SUBAREA: 4-13 TOTAL DRAINAGE AREA: .87 Acres WEIGHTED CURVE NUMBER: 85

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 100yr/24hr Storm

Subarea #1 - 4-11

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	169.7	0.005	a					0.045

Time of Concentration = 0.05*

Subarea #2 - 4-12

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	219.4	0.005	a					0.056

Time of Concentration = 0.06*

Subarea #3 - 4-13

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	180.9	0.005	a					0.048
								Time of Concentration =	0.05*

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---

P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Switchyard Area (subareas of 4) For 100yr/24hr Storm

Total watershed area: 0.005 sq mi Rainfall type: II Frequency: 100 years

	Subareas		
	4-11	4-12	4-13
Area(sq mi)	0.00*	0.00*	0.00*
Rainfall(in)	11.0	11.0	11.0
Curve number	86*	85*	85*
Runoff(in)	9.26	9.13	9.13
Tc (hrs)	0.05*	0.06*	0.05*
(Used)	0.10	0.10	0.10
TimeToOutlet	0.00	0.00	0.00
Ia/P	0.03	0.03	0.03
(Used)	0.10	0.10	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) 4-11	4-12	4-13
11.0	0	0	0	0
11.3	2	1	1	0
11.6	3	1	1	1
11.9	16	6	6	4
12.0	31	11	12	8
12.1	48P	17P	18P	13P
12.2	30	11	11	8
12.3	11	4	4	3
12.4	7	2	3	2
12.5	6	2	2	2
12.6	5	2	2	1
12.7	4	1	2	1
12.8	3	1	1	1
13.0	3	1	1	1
13.2	3	1	1	1
13.4	3	1	1	1
13.6	3	1	1	1
13.8	3	1	1	1
14.0	2	1	1	0
14.3	2	1	1	0
14.6	2	1	1	0
15.0	1	0	1	0
15.5	0	0	0	0
16.0	0	0	0	0
16.5	0	0	0	0
17.0	0	0	0	0
17.5	0	0	0	0
18.0	0	0	0	0
19.0	0	0	0	0
20.0	0	0	0	0
22.0	0	0	0	0
26.0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 5

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 100 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 5 Discharge (area to Manhole 1) For 100yr/24hr Storm Event
Subarea : 5

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.08(98)	-	-
Gravel (w/ right-of-way)	-	0.51(85)	-	-
Total Area (by Hydrologic Soil Group)		.59		

SUBAREA: 5 TOTAL DRAINAGE AREA: .59 Acres WEIGHTED CURVE NUMBER: 87

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 5 Discharge (area to Manhole 1) For 100yr/24hr Storm Event

Subarea #1 - 5

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	194.3	0.005	a					0.050
								Time of Concentration =	0.05*

--- Sheet Flow Surface Codes ---

A Smooth Surface	F Grass, Dense	--- Shallow Concentrated ---	
B Fallow (No Res.)	G Grass, Burmuda	--- Surface Codes ---	
C Cultivated < 20 % Res.	H Woods, Light	P Paved	
D Cultivated > 20 % Res.	I Woods, Dense	U Unpaved	
E Grass-Range, Short	J Range, Natural		

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 5 Discharge (area to Manhole 1) For 100yr/24hr Storm Event

Total watershed area: 0.001 sq mi Rainfall type: II Frequency: 100 years

	Subareas 5
Area(sq mi)	0.00*
Rainfall(in)	11.0
Curve number	87*
Runoff(in)	9.39
Tc (hrs)	0.05*
(Used)	0.10
TimeToOutlet	0.00
Ia/P	0.03
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) 5
11.0	0	0
11.3	0	0
11.6	0	0
11.9	3	3
12.0	6	6
12.1	9P	9P
12.2	5	5
12.3	2	2
12.4	1	1
12.5	1	1
12.6	1	1
12.7	1	1
12.8	1	1
13.0	1	1
13.2	0	0
13.4	0	0
13.6	0	0
13.8	0	0
14.0	0	0
14.3	0	0
14.6	0	0
15.0	0	0
15.5	0	0
16.0	0	0
16.5	0	0
17.0	0	0

17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 6

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 100 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-06-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Discharge for Area 6 For 100 year/24 hour Storm
Subarea : 6-1

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns,parks etc.)				
Fair condition; grass cover 50% to 75%	-	1.65(69)	-	-
Streets and roads				
Paved; curbs and storm sewers	-	5.7(98)	-	-
Gravel (w/ right-of-way)	-	4.50(85)	-	-
Total Area (by Hydrologic Soil Group)		11.8		

SUBAREA: 6-1 TOTAL DRAINAGE AREA: 11.85 Acres WEIGHTED CURVE NUMBER: 89

RUNOFF CURVE NUMBER COMPUTATION — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-06-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Discharge for Area 6 For 100 year/24 hour Storm
Subarea : 6-2

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	8.06(98)	-	-
Total Area (by Hydrologic Soil Group)		8.06		

SUBAREA: 6-2 TOTAL DRAINAGE AREA: 8.06 Acres WEIGHTED CURVE NUMBER: 98

RUNOFF CURVE NUMBER COMPUTATION — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-06-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Discharge for Area 6 For 100 year/24 hour Storm
Subarea : 6-3

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	4.58(98)	-	-
Total Area (by Hydrologic Soil Group)		4.58		

SUBAREA: 6-3 TOTAL DRAINAGE AREA: 4.58 Acres WEIGHTED CURVE NUMBER: 98

TIME OF CONCENTRATION AND TRAVEL TIME — Version 2.10

Project : Manatee - FPL — User: FRE — Date: 01-06-2002
County : Manatee — State: FL — Checked: ____ — Date: _____
Subtitle: Discharge for Area 6 For 100 year/24 hour Storm

Subarea #1 - 6-1

Flow Type	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Open Channel	1571						2.5	0.175
Time of Concentration = 0.17*								

Subarea #2 - 6-2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	220	0.004	a					0.061
Sheet		80	0.01	a					0.019
Shallow Concent'd		246	0.01	u					0.042

Time of Concentration = 0.12*

---------- Subarea #3 - 6-3 ----------

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	50	0.01	a					0.013
Open Channel		852						2.5	0.095

Time of Concentration = 0.11*

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---

P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-06-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Discharge for Area 6 For 100 year/24 hour Storm

Total watershed area: 0.038 sq mi Rainfall type: II Frequency: 100 years

	Subareas 6-1	6-2	6-3
Area(sq mi)	0.02*	0.01*	0.01*
Rainfall(in)	11.0	11.0	11.0
Curve number	89*	98*	98*
Runoff(in)	9.64	10.76	10.76
Tc (hrs)	0.17*	0.12*	0.11*
(Used)	0.20	0.10	0.10
TimeToOutlet	0.00	0.00	0.00
Ia/P	0.02	0.00	0.00
(Used)	0.10	0.10	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) 6-1	6-2	6-3
11.0	9	4	3	2
11.3	14	6	5	3
11.6	19	8	7	4
11.9	108	37	45	26
12.0	210	72	88	50
12.1	347P	132	137P	78P
12.2	276	143P	85	48
12.3	132	86	29	17
12.4	76	45	20	11
12.5	56	30	17	9
12.6	45	23	14	8
12.7	37	18	12	7
12.8	31	15	10	6
13.0	26	12	9	5
13.2	23	11	8	4
13.4	21	10	7	4
13.6	19	9	6	4
13.8	17	8	6	3
14.0	15	7	5	3
14.3	14	6	5	3
14.6	12	6	4	2
15.0	11	5	4	2
15.5	11	5	4	2
16.0	9	4	3	2
16.5	9	4	3	2
17.0	9	4	3	2
17.5	7	3	3	1
18.0	6	3	2	1
19.0	6	3	2	1
20.0	5	2	2	1
22.0	5	2	2	1
26.0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Maintenance Area

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 100 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-07-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Drainage for Maintenance Area For 100yr/24hr Storm
Subarea : Mainte

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	2.27(98)	-	-
Total Area (by Hydrologic Soil Group)		2.27		
		====		

SUBAREA: Mainte TOTAL DRAINAGE AREA: 2.27 Acres WEIGHTED CURVE NUMBER: 98

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-07-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Drainage for Maintenance Area For 100yr/24hr Storm

Subarea #1 - Fuel O

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	37	0.25	a					0.003
Sheet		263	0.005	a					0.064
Shallow Concent'd		30	0.005	p					0.006
								Time of Concentration =	0.07*
									=====

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- --- Surface Codes ---

P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-07-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Drainage for Maintenance Area For 100yr/24hr Storm

Total watershed area: 0.004 sq mi Rainfall type: II Frequency: 100 years

	Subareas
	Mainte
Area(sq mi)	0.00*
Rainfall(in)	11.0
Curve number	98*
Runoff(in)	10.76
Tc (hrs)	0.07*
(Used)	0.10
TimeToOutlet	0.00
Ia/P	0.00
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) Mainte
11.0	1	1
11.3	1	1
11.6	2	2
11.9	13	13
12.0	25	25
12.1	39P	39P
12.2	24	24
12.3	8	8
12.4	6	6
12.5	5	5
12.6	4	4
12.7	3	3
12.8	3	3
13.0	3	3
13.2	2	2
13.4	2	2
13.6	2	2
13.8	2	2
14.0	1	1
14.3	1	1
14.6	1	1
15.0	1	1
15.5	1	1
16.0	1	1
16.5	1	1
17.0	1	1
17.5	1	1
18.0	1	1
19.0	1	1
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 8

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 25 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval

Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 8 Discharge For 25yr/24hr Storm Event
Subarea : 8

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	2.01(98)	-	-

Total Area (by Hydrologic Soil Group) 2.01

SUBAREA: 8 TOTAL DRAINAGE AREA: 2.01 Acres WEIGHTED CURVE NUMBER: 98

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 8 Discharge For 25yr/24hr Storm Event

Subarea #1 - 8

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		88	0.005	p					0.017
Open Channel		130						2.5	0.014
								Time of Concentration =	0.10*

--- Sheet Flow Surface Codes ---
A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---
P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 8 Discharge For 25yr/24hr Storm Event

Total watershed area: 0.003 sq mi Rainfall type: II Frequency: 25 years

	Subareas 8
Area(sq mi)	0.00*
Rainfall(in)	8.5
Curve number	98*
Runoff(in)	8.26
Tc (hrs)	0.10*
TimeToOutlet	0.00
Ia/P	0.00
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) 8
11.0	1	1
11.3	1	1
11.6	1	1
11.9	9	9
12.0	17	17
12.1	26P	26P
12.2	16	16
12.3	6	6
12.4	4	4
12.5	3	3
12.6	3	3
12.7	2	2
12.8	2	2
13.0	2	2
13.2	1	1
13.4	1	1
13.6	1	1
13.8	1	1
14.0	1	1
14.3	1	1
14.6	1	1
15.0	1	1
15.5	1	1
16.0	1	1
16.5	1	1
17.0	1	1

17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 3

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Post – Development Discharge Design for Area 8

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 100 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date

See Page ____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval

Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 8 Discharge For 100yr/24hr Storm Event
Subarea : 8

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	2.01(98)	-	-

Total Area (by Hydrologic Soil Group) 2.01

SUBAREA: 8 TOTAL DRAINAGE AREA: 2.01 Acres WEIGHTED CURVE NUMBER: 98

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 8 Discharge For 100yr/24hr Storm Event

Subarea #1 - 8

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.005	a					0.071
Shallow Concent'd		88	0.005	p					0.017
Open Channel		130						2.5	0.014
							Time of Concentration =		0.10*

--- Sheet Flow Surface Codes ---
A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---
P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Area 8 Discharge For 100yr/24hr Storm Event

Total watershed area: 0.003 sq mi Rainfall type: II Frequency: 100 years

	Subareas 8
Area(sq mi)	0.00*
Rainfall(in)	11.0
Curve number	98*
Runoff(in)	10.76
Tc (hrs)	0.10*
TimeToOutlet	0.00
Ia/P	0.00
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) 8
11.0	1	1
11.3	1	1
11.6	2	2
11.9	11	11
12.0	22	22
12.1	34P	34P
12.2	21	21
12.3	7	7
12.4	5	5
12.5	4	4
12.6	4	4
12.7	3	3
12.8	3	3
13.0	2	2
13.2	2	2
13.4	2	2
13.6	2	2
13.8	1	1
14.0	1	1
14.3	1	1
14.6	1	1
15.0	1	1
15.5	1	1
16.0	1	1
16.5	1	1
17.0	1	1

17.5	1	1
18.0	1	1
19.0	1	1
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

____ Nuclear Safety Related
x Not Nuclear Safety Related

Client Name: Florida Power & Light Page 1 of 14

Project Name: Manatee Power Plant Unit:

Project Number: 130770 File Number:

Calculation Title: HYDROLOGY CALCULATION FOR SWITCHYARD AND SWITCHYARD LAYDOWN - AREA BSN - 1 AND BSN - 2

Calculation Is: ☐ Preliminary ☒ Final ☐ Other

Quality Record: ☐ Yes ☐ No

Objective RUNOFF CALCULATION FOR SWITCHYARD AND SWITCHYARD LAYDOWN

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date

See Page_____ of this calculation for additional assumptions.

Verification Method

- ☐ Detailed Review
- ☐ Alternate Calculation
- ☐ Conform Against Similar Previously Verified Calculations
- ☐ Other

This Section Used for Computer Generated Calculations

Program Number/Name: Version:
Run Date: Run Time:
Number of Pages:

Review and Approval

Rev	Revised Pages	Prepared By	Date	Verified By	Date	Project Engineer Approval	Date

Time of concentration Tc TR-55 Manual

Project	Manatee Power Plant		Time of Concentration for:
Location	Manatee, Florida		BSN - 1
Condition	**Present**	Developed	Switch yard + Expansion
	Tc	Tt *through subareas*	

Sheet Flow (Applicable to Tc only)	Segment	S-1
Surface description (table 3-1 TR55)	Shell Rock	
Manning's roughness coeff., n (table 3-1)		0.011
Flow length, L (total L ≤ 300 ft)	ft	300
Change in Height over L	ft	1
2-yr/24-hr rainfall, P_2	in	4.5
Land Slope, s	ft/ft	0.00333333
$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ T_t	hr	0.0840
Total T_t		**0.0840**

Shallow Flow (Applicable to Tc only)	Segment	S-2
Surface description (paved or unpaved)	Paved	
Flow length, L	ft	251.64
Change in height over L	ft	1.44
Watercourse slopes, s	in	0.00572246
Average velocity, V (fig. 3-1)	ft/ft	1.54
$T_t = \frac{L}{3600V}$ T_t	hr	0.045
Total T_t		**0.045**

Channel Flow	Segment	NONE
Cross sectional flow area, a	ft^2	-
Wetted Perimeter, Pw	ft	-
Hydraulic radius, r =a/Pw	ft	0
Channel slope, s	ft/ft	-
Manning's roughness coeff., n		-
$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	0
Flow length, L	ft	-
$Tt = \frac{L}{3600\ V}$ Compute T_t	hr	0
Total T_t		**0**

Watershed or subarea Tc or Tt	hr	**0.129**
		7.77 min.

Runoff Curve Number & Runoff depth

Project	Manatee Power Plant	
Location	Manatee, Florida	
Condition	**Present**	Developed

Runoff Curve No. (CN)

Soil name and Hydrologic group (Appendix A) TR-55	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	Curve number			Area (acres)	Product of CN x area
Shell Rock Pad, B	*good condition*	85			100	8500
					Totals =	100 / 8500

Weighted CN = total product / total area = 8500 / 100 = 85 → Use CN = **85**

		Storm #1	Storm #2	Storm #3
frequency	yr.	**25**		
Rainfall, P_{24}	in.	**8.5**		
Runoff, Q (equ.s - 2-3 and 2-4)	in.	**6.70**		

S = 1.76

Graphical Peak Discharge Method

Project Manatee Power Plant
Location Manatee, Florida

Condition **Present** Developed

Drainage area	Am =	**0.005861**	mi^2 (acres/640)
Runoff curve number	CN =	**85**	
Time of concentration	Tc =	**0.129**	
Rainfall distribution type	I	IA **II Mod** II III	
Pond and swamp areas spread		percent of Am (acres or mi2 covered)	

		Storm #1	Storm #24	Storm #3
Frequency	yr	25	25	
Rainfall, P_{24}	in	8.5	9	
Intial abstraction, Ia	in	0.352941	2.255	
Compute I_a/P_{24}		0.041522	0.250556	
Unit peak discharge, qu	csm/in	580	580	
(use Tc and Ia/P w/ exhibit 4 -)				
Runoff, Q	in	6.696544	6.696544	
Pond swamp adjustment factor, Fp		1	1	
Peak discharge, qp	cfs	**22.76**	22.76	

qp = qu Am QFp

NOTE: Did not use the Graphical peak discharge Method to determine flows

Time (hr)	SCS/NRCS TYPE I Mod (S-P)/P	Cumulative Rainfall (= P) (in)	Cumulative Runoff Pervious (in)	Cumulative Runoff Impervious (in)	Cumulative Runoff (in)	Instantaneous Runoff	Computed Runoff Hydrograph (cfs)
8.0	0.137	1.1645	0.256	0.000	0.256	0.464	0.48
8.25	0.145	1.2325	0.293	0.000	0.293	0.554	0.51
8.5	0.153	1.3005	0.331	0.000	0.331	0.577	0.56
8.8	0.162	1.377	0.376	0.000	0.376	0.675	0.63
9.00	0.171	1.4535	0.423	0.000	0.423	0.700	0.69
9.3	0.181	1.5385	0.476	0.000	0.476	0.806	0.75
9.50	0.191	1.6235	0.532	0.000	0.532	0.832	0.82
9.8	0.202	1.717	0.595	0.000	0.595	0.943	0.89
10.0	0.213	1.8105	0.659	0.000	0.659	0.970	0.95
10.25	0.225	1.9125	0.732	0.000	0.732	1.085	1.03
10.5	0.237	2.0145	0.806	0.000	0.806	1.112	1.10
10.75	0.253	2.1505	0.907	0.000	0.907	1.520	1.31
11.0	0.269	2.2865	1.011	0.000	1.011	1.558	1.54
11.3	0.294	2.499	1.178	0.000	1.178	2.502	2.02
11.50	0.319	2.7115	1.349	0.000	1.349	2.573	2.53
11.8	0.488	4.148	2.590	0.000	2.590	18.625	10.46
12.00	0.656	5.576	3.904	0.000	3.904	19.708	**19.02**
12.3	0.692	5.882	4.191	0.000	4.191	4.311	12.13
12.5	0.729	6.1965	4.488	0.000	4.488	4.454	4.52
12.75	0.748	6.358	4.641	0.000	4.641	2.295	3.39
13.0	0.767	6.5195	4.794	0.000	4.794	2.301	2.32
13.25	0.781	6.6385	4.908	0.000	4.908	1.698	2.01
13.5	0.795	6.7575	5.021	0.000	5.021	1.701	1.70
13.8	0.806	6.851	5.110	0.000	5.110	1.338	1.52
14.00	0.818	6.953	5.208	0.000	5.208	1.461	1.40
14.3	0.827	7.0295	5.281	0.000	5.281	1.097	1.28
14.50	0.835	7.0975	5.346	0.000	5.346	0.976	1.04
14.8	0.843	7.1655	5.411	0.000	5.411	0.977	0.98
15.0	0.85	7.225	5.468	0.000	5.468	0.855	0.92
15.25	0.858	7.293	5.533	0.000	5.533	0.978	0.92
15.5	0.865	7.3525	5.590	0.000	5.590	0.856	0.92
15.75	0.873	7.4205	5.655	0.000	5.655	0.979	0.92
16.0	0.88	7.48	5.713	0.000	5.713	0.857	0.92
16.3	0.885	7.5225	5.753	0.000	5.753	0.613	0.74
16.50	0.889	7.5565	5.786	0.000	5.786	0.490	0.55
16.8	0.894	7.599	5.827	0.000	5.827	0.613	0.55
17.00	0.898	7.633	5.860	0.000	5.860	0.491	0.55
17.3	0.903	7.6755	5.901	0.000	5.901	0.614	0.55
17.5	0.907	7.7095	5.933	0.000	5.933	0.491	0.55
17.75	0.911	7.7435	5.966	0.000	5.966	0.491	0.49
18.0	0.916	7.786	6.007	0.000	6.007	0.614	0.55
18.25	0.921	7.8285	6.048	0.000	6.048	0.614	0.61
18.5	0.925	7.8625	6.081	0.000	6.081	0.492	0.55

SBUH Method:

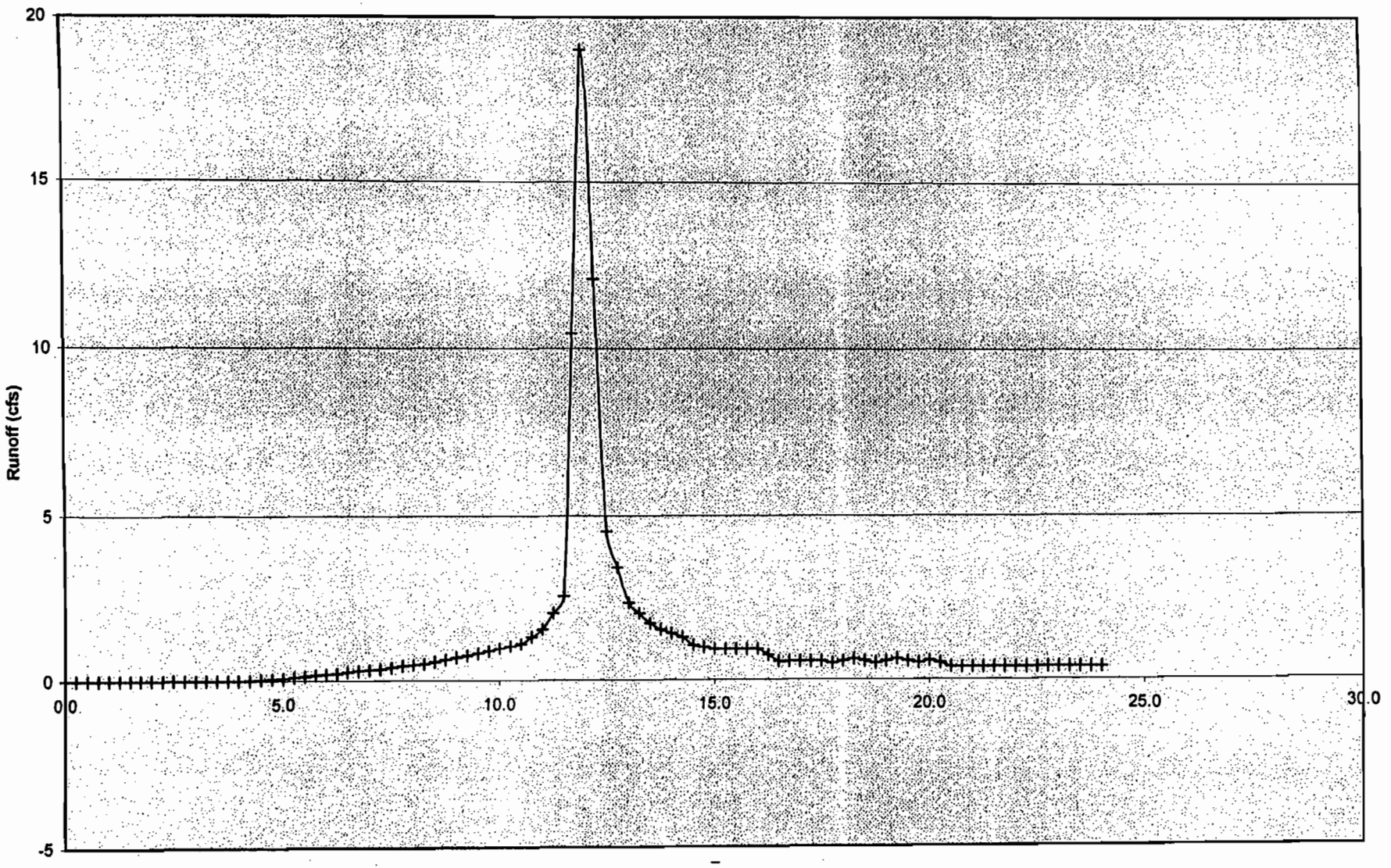
TYPE: II II Mod III

Rainfall Depth	8.5 inches	fraction initial abstraction	0.2
Pervious CN	85	Initial abstraction from pervious area	0.35
Imprevious CN	98	Initial abstraction from impervious area	0.041
Max. Abstraction from Pervious Area, S	1.76	Project Area (acres)	3.75
Max. Abstraction from Impervious Area, S	0.20	Time concentration, (hrs)	0.129
S = (1000/CN) - 10		Directly connected Impervious area	0%

Time (hr)	SCS/NRCS TYPE II Mod Ia = 0.2*S	Cumulative Rainfall (P) (in)	Cumulative Runoff pervious (in)	Cumulative Runoff Impervious (in)	Cumulative Runoff (in)	Incremental Runoff (in)	Composite Runoff Hydrograph (Q)
0.0	0	0	0.000	0.000	0.000		0
0.25	0.002	0.017	0.000	0.000	0.000	0.000	0.00
0.5	0.005	0.0425	0.000	0.000	0.000	0.000	0.00
0.75	0.008	0.068	0.000	0.000	0.000	0.000	0.00
1.0	0.01	0.085	0.000	0.000	0.000	0.000	0.00
1.3	0.013	0.1105	0.000	0.000	0.000	0.000	0.00
1.50	0.015	0.1275	0.000	0.000	0.000	0.000	0.00
1.8	0.018	0.153	0.000	0.000	0.000	0.000	0.00
2.00	0.02	0.17	0.000	0.000	0.000	0.000	0.00
2.3	0.023	0.1955	0.000	0.000	0.000	0.000	0.00
2.5	0.026	0.221	0.000	0.000	0.000	0.000	0.00
2.75	0.029	0.2465	0.000	0.000	0.000	0.000	0.00
3.0	0.032	0.272	0.000	0.000	0.000	0.000	0.00
3.25	0.035	0.2975	0.000	0.000	0.000	0.000	0.00
3.5	0.038	0.323	0.000	0.000	0.000	0.000	0.00
3.8	0.042	0.357	0.000	0.000	0.000	0.000	0.00
4.00	0.045	0.3825	0.000	0.000	0.000	0.007	0.00
4.3	0.049	0.4165	0.002	0.000	0.002	0.026	0.02
4.50	0.053	0.4505	0.005	0.000	0.005	0.044	0.03
4.8	0.058	0.493	0.010	0.000	0.010	0.078	0.06
5.0	0.062	0.527	0.016	0.000	0.016	0.080	0.08
5.25	0.067	0.5695	0.024	0.000	0.024	0.121	0.10
5.5	0.072	0.612	0.033	0.000	0.033	0.142	0.13
5.75	0.078	0.663	0.046	0.000	0.046	0.198	0.17
6.0	0.083	0.7055	0.059	0.000	0.059	0.186	0.19
6.3	0.089	0.7565	0.075	0.000	0.075	0.246	0.22
6.50	0.095	0.8075	0.093	0.000	0.093	0.270	0.26
6.8	0.102	0.867	0.116	0.000	0.116	0.343	0.31
7.00	0.108	0.918	0.137	0.000	0.137	0.316	0.33
7.3	0.115	0.9775	0.163	0.000	0.163	0.393	0.35
7.5	0.122	1.037	0.191	0.000	0.191	0.418	0.40
7.75	0.13	1.105	0.225	0.000	0.225	0.505	0.46

Time (hr)	SCS/NRCS TYPE II Mod. P/P24	Cumulative Rainfall (in)	Cumulative Runoff pervious (in)	Cumulative Runoff Impervious (in)	Cumulative Runoff (in)	Instantaneous Runoff	Computed Runoff Hydrograph (cfs)
18.8	0.929	7.8965	6.113	0.000	6.113	0.492	0.49
19.00	0.934	7.939	6.154	0.000	6.154	0.615	0.55
19.3	0.939	7.9815	6.195	0.000	6.195	0.615	0.61
19.50	0.943	8.0155	6.228	0.000	6.228	0.492	0.55
19.8	0.947	8.0495	6.261	0.000	6.261	0.492	0.49
20.0	0.952	8.092	6.302	0.000	6.302	0.616	0.55
20.25	0.955	8.1175	6.327	0.000	6.327	0.369	0.49
20.5	0.958	8.143	6.351	0.000	6.351	0.370	0.37
20.75	0.961	8.1685	6.376	0.000	6.376	0.370	0.37
21.0	0.964	8.194	6.401	0.000	6.401	0.370	0.37
21.3	0.967	8.2195	6.425	0.000	6.425	0.370	0.37
21.50	0.97	8.245	6.450	0.000	6.450	0.370	0.37
21.8	0.973	8.2705	6.474	0.000	6.474	0.370	0.37
22.00	0.976	8.296	6.499	0.000	6.499	0.370	0.37
22.3	0.979	8.3215	6.524	0.000	6.524	0.370	0.37
22.5	0.982	8.347	6.548	0.000	6.548	0.370	0.37
22.75	0.985	8.3725	6.573	0.000	6.573	0.370	0.37
23.0	0.988	8.398	6.598	0.000	6.598	0.370	0.37
23.25	0.991	8.4235	6.622	0.000	6.622	0.370	0.37
23.5	0.994	8.449	6.647	0.000	6.647	0.370	0.37
23.75	0.997	8.4745	6.672	0.000	6.672	0.370	0.37
24.00	1	8.5	6.697	0.000	6.697	0.370	0.37

SBUH Method Hydrograph



Time of concentration Tc TR-55 Manual

Project	Manatee Power Plant	Time of Concentration for:
Location	Manatee, Florida	BSN - 2
Condition	**Present** Developed	Switchyard Construction Laydown
	Tc Tt through subareas	

Sheet Flow (Applicable to Tc only)	Segment	S-1
Surface description (table 3-1 TR55)		Shell Rock
Manning's roughness coeff., n (table 3-1)		0.011
Flow length, L (total L ≤ 300 ft)	ft	300
Change in Height over L	ft	1
2-yr/24-hr rainfall, P_2	in	4.5
Land Slope, s	ft/ft	0.00333333
$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ T_t	hr	0.0840
Total T_t		**0.0840**

Shallow Flow (Applicable to Tc only)	Segment	S-2
Surface description (paved or unpaved)		Paved
Flow length, L	ft	171
Change in height over L	ft	0.793
Watercourse slopes, s	in	0.00463743
Average velocity, V (fig. 3-1)	ft/ft	1.38
$T_t = \frac{L}{3600V}$ T_t	hr	0.034
Total T_t		**0.034**

Channel Flow	Segment	NONE
Cross sectional flow area, a	ft^2	-
Wetted Perimeter, Pw	ft	-
Hydraulic radius, r =a/Pw	ft	0
Channel slope, s	ft/ft	-
Manning's roughness coeff., n		-
$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	0
Flow length, L	ft	-
$Tt = \frac{L}{3600\ V}$ Compute T_t	hr	0
Total T_t		**0**

Watershed or subarea Tc or Tt (sum of Tt's)	hr	**0.118**
		7.10 min.

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Runoff Curve Number & Runoff depth

Project Manatee Power Plant
Location Manatee, Florida
Condition **Present** Developed

Runoff Curve No. (CN)

Soil name and Hydraulic group (Appendix A) TR-55	Cover description (cover type, hydraulic condition, impervious percent)	Curve number			Area (acres) (in) (%)	Product (CN) x Area
Shell Rock Pad, B	good condition	85			100	8500

Totals = 100 | 8500

Weighted CN = $\frac{\text{total product}}{\text{total area}} = \frac{8500}{100} = 85$ → Use CN = **85**

		Storm #1	Storm #2	Storm #3
frequency	yr.	25		
Rainfall, P_{24}	in.	8.5		
Runoff, Q (equ.s - 2-3 and 2-4)	in.	6.70		

S = 1.76

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Graphical Peak Discharge Method

Project Manatee Power Plant
Location Manatee, Florida

Condition **Present** Developed

Drainage area	Am =	**0.002094**	mi^2 (acres/640)
Runoff curve number	CN =	**85**	
Time of concentration	Tc =	**0.118**	
Rainfall distribution type	I	IA **II Mod** II III	
Pond and swamp areas spread		percent of Am (acres or mi2 covered)	

		Scen #1	Scen #2	Scen #3
Frequency	yr	25	25	
Rainfall, P_{24}	in	8.5	9	
Intial abstraction, Ia	in	0.352941	2.255	
Compute I_a/P_{24}		0.041522	0.250556	
Unit peak discharge, qu	csm/in	580	580	
(use Tc and Ia/P w/ exhibit 4 -)				
Runoff, Q	in	6.696544	6.696544	
Pond swamp adjustment factor, Fp		1	1	
Peak discharge, qp	cfs	**8.13**	8.13	

qp = qu Am QFp

NOTE: Did not use the Graphical peak discharge Method to determine flows

SBUH Method:

TYPE: II II Mod III

Rainfall Depth	8.5 inches	fraction initial abstraction	0.2
Pervious CN	85	Initial abstraction from pervious area	0.35
Imprevious CN	98	Initial abstraction from impervious area	0.041
Max. Abstraction from Pervious Area, S	1.76	Project Area (acres)	1.34
Max. Abstraction from Impervious Area, S	0.20	Time concentration, (hrs)	0.118
S = (1000/CN) - 10		Directly connected Impervious area	0%

time (hr)	SCS/NRCS TYPE II Mod P/P0	Cumulative Rainfall (P) (in)	Cumulative Runoff pervious (in)	Cumulative Runoff Impervious (in)	Cumulative Runoff (in)	Instantaneous Runoff	Composite Runoff Hydrograph (cfs)
0.0	0	0	0.000	0.000	0.000		0
0.25	0.002	0.017	0.000	0.000	0.000	0.000	0.00
0.5	0.005	0.0425	0.000	0.000	0.000	0.000	0.00
0.75	0.008	0.068	0.000	0.000	0.000	0.000	0.00
1.0	0.01	0.085	0.000	0.000	0.000	0.000	0.00
1.3	0.013	0.1105	0.000	0.000	0.000	0.000	0.00
1.50	0.015	0.1275	0.000	0.000	0.000	0.000	0.00
1.8	0.018	0.153	0.000	0.000	0.000	0.000	0.00
2.00	0.02	0.17	0.000	0.000	0.000	0.000	0.00
2.3	0.023	0.1955	0.000	0.000	0.000	0.000	0.00
2.5	0.026	0.221	0.000	0.000	0.000	0.000	0.00
2.75	0.029	0.2465	0.000	0.000	0.000	0.000	0.00
3.0	0.032	0.272	0.000	0.000	0.000	0.000	0.00
3.25	0.035	0.2975	0.000	0.000	0.000	0.000	0.00
3.5	0.038	0.323	0.000	0.000	0.000	0.000	0.00
3.8	0.042	0.357	0.000	0.000	0.000	0.000	0.00
4.00	0.045	0.3825	0.000	0.000	0.000	0.003	0.00
4.3	0.049	0.4165	0.002	0.000	0.002	0.009	0.01
4.50	0.053	0.4505	0.005	0.000	0.005	0.016	0.01
4.8	0.058	0.493	0.010	0.000	0.010	0.028	0.02
5.0	0.062	0.527	0.016	0.000	0.016	0.029	0.03
5.25	0.067	0.5695	0.024	0.000	0.024	0.043	0.04
5.5	0.072	0.612	0.033	0.000	0.033	0.051	0.05
5.75	0.078	0.663	0.046	0.000	0.046	0.071	0.06
6.0	0.083	0.7055	0.059	0.000	0.059	0.066	0.07
6.3	0.089	0.7565	0.075	0.000	0.075	0.088	0.08
6.50	0.095	0.8075	0.093	0.000	0.093	0.096	0.09
6.8	0.102	0.867	0.116	0.000	0.116	0.123	0.11
7.00	0.108	0.918	0.137	0.000	0.137	0.113	0.12
7.3	0.115	0.9775	0.163	0.000	0.163	0.140	0.13
7.5	0.122	1.037	0.191	0.000	0.191	0.149	0.15
7.75	0.13	1.105	0.225	0.000	0.225	0.180	0.17

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Time (hr)	SCS/NRCS TYPE II Mod P_i/P_2	Cumulative Rainfall P_i (in)	Cumulative Runoff Pervious (in)	Cumulative Runoff Impervious (in)	Cumulative Runoff (in)	Instantaneous Runoff	Computed Runoff Hydrograph (cfs)
8.0	0.137	1.1645	0.256	0.000	0.256	0.166	0.17
8.25	0.145	1.2325	0.293	0.000	0.293	0.198	0.18
8.5	0.153	1.3005	0.331	0.000	0.331	0.206	0.20
8.8	0.162	1.377	0.376	0.000	0.376	0.241	0.22
9.00	0.171	1.4535	0.423	0.000	0.423	0.250	0.25
9.3	0.181	1.5385	0.476	0.000	0.476	0.288	0.27
9.50	0.191	1.6235	0.532	0.000	0.532	0.297	0.29
9.8	0.202	1.717	0.595	0.000	0.595	0.337	0.32
10.0	0.213	1.8105	0.659	0.000	0.659	0.346	0.34
10.25	0.225	1.9125	0.732	0.000	0.732	0.388	0.37
10.5	0.237	2.0145	0.806	0.000	0.806	0.397	0.39
10.75	0.253	2.1505	0.907	0.000	0.907	0.543	0.47
11.0	0.269	2.2865	1.011	0.000	1.011	0.557	0.55
11.3	0.294	2.499	1.178	0.000	1.178	0.894	0.73
11.50	0.319	2.7115	1.349	0.000	1.349	0.919	0.91
11.8	0.488	4.148	2.590	0.000	2.590	6.654	3.87
12.00	0.656	5.576	3.904	0.000	3.904	7.041	**6.93**
12.3	0.692	5.882	4.191	0.000	4.191	1.540	4.22
12.5	0.729	6.1965	4.488	0.000	4.488	1.591	1.49
12.75	0.748	6.358	4.641	0.000	4.641	0.820	1.20
13.0	0.767	6.5195	4.794	0.000	4.794	0.822	0.81
13.25	0.781	6.6385	4.908	0.000	4.908	0.607	0.71
13.5	0.795	6.7575	5.021	0.000	5.021	0.608	0.60
13.8	0.806	6.851	5.110	0.000	5.110	0.478	0.54
14.00	0.818	6.953	5.208	0.000	5.208	0.522	0.50
14.3	0.827	7.0295	5.281	0.000	5.281	0.392	0.46
14.50	0.835	7.0975	5.346	0.000	5.346	0.349	0.37
14.8	0.843	7.1655	5.411	0.000	5.411	0.349	0.35
15.0	0.85	7.225	5.468	0.000	5.468	0.306	0.33
15.25	0.858	7.293	5.533	0.000	5.533	0.349	0.33
15.5	0.865	7.3525	5.590	0.000	5.590	0.306	0.33
15.75	0.873	7.4205	5.655	0.000	5.655	0.350	0.33
16.0	0.88	7.48	5.713	0.000	5.713	0.306	0.33
16.3	0.885	7.5225	5.753	0.000	5.753	0.219	0.26
16.50	0.889	7.5565	5.786	0.000	5.786	0.175	0.20
16.8	0.894	7.599	5.827	0.000	5.827	0.219	0.20
17.00	0.898	7.633	5.860	0.000	5.860	0.175	0.20
17.3	0.903	7.6755	5.901	0.000	5.901	0.219	0.20
17.5	0.907	7.7095	5.933	0.000	5.933	0.175	0.20
17.75	0.911	7.7435	5.966	0.000	5.966	0.175	0.17
18.0	0.916	7.786	6.007	0.000	6.007	0.219	0.20
18.25	0.921	7.8285	6.048	0.000	6.048	0.219	0.22
18.5	0.925	7.8625	6.081	0.000	6.081	0.176	0.20

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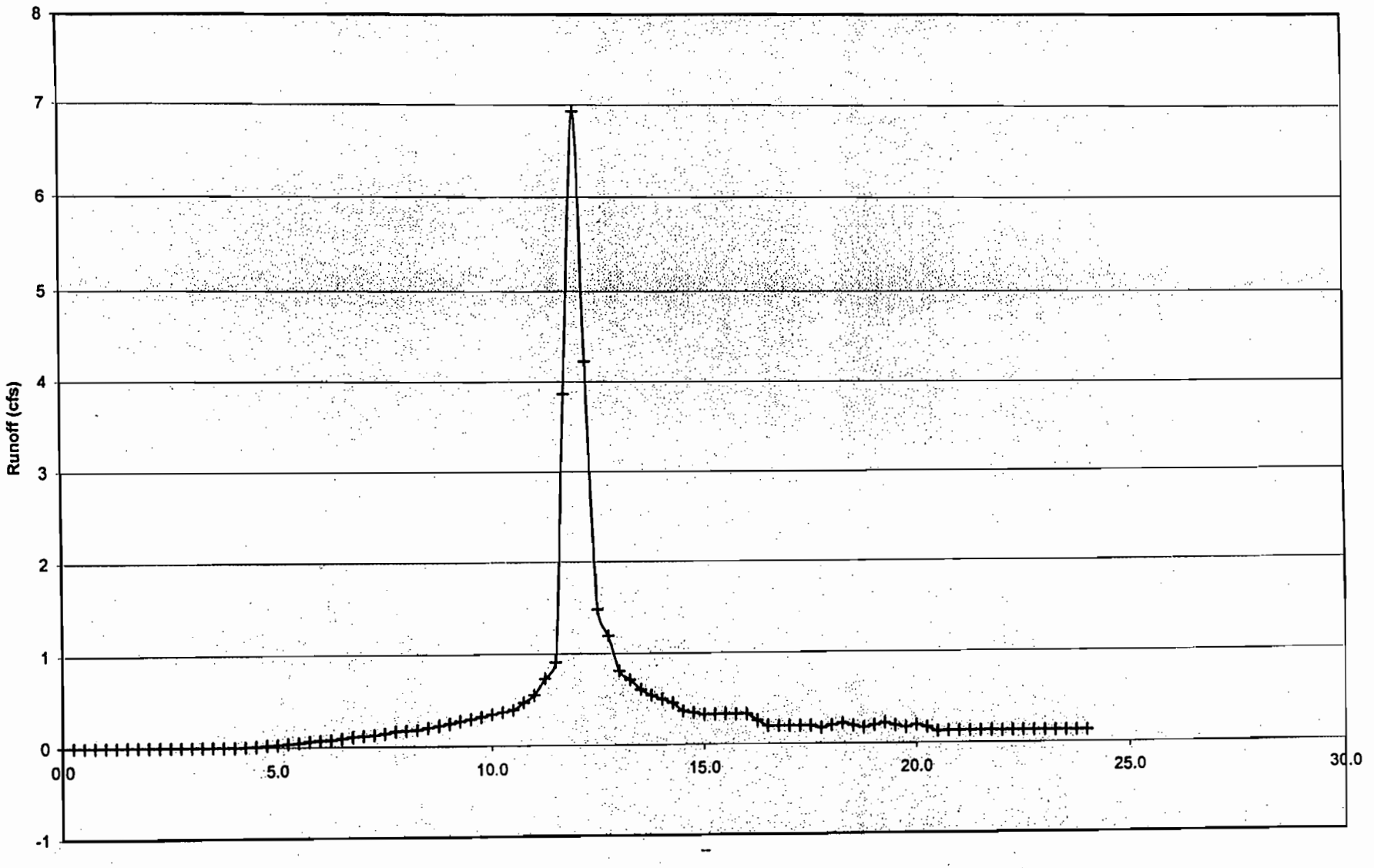
Time (hrs)	SCS/NRCS TYPE II Mod (= P)/P	Cumulative Rainfall (= P) (in)	Cumulative Runoff pervious (in)	Cumulative Runoff Impervious (in)	Cumulative Runoff (in)	Instantaneous Runoff	Computed Runoff Hydrograph (cfs)
18.8	0.929	7.8965	6.113	0.000	6.113	0.176	0.18
19.00	0.934	7.939	6.154	0.000	6.154	0.220	0.20
19.3	0.939	7.9815	6.195	0.000	6.195	0.220	0.22
19.50	0.943	8.0155	6.228	0.000	6.228	0.176	0.20
19.8	0.947	8.0495	6.261	0.000	6.261	0.176	0.18
20.0	0.952	8.092	6.302	0.000	6.302	0.220	0.20
20.25	0.955	8.1175	6.327	0.000	6.327	0.132	0.18
20.5	0.958	8.143	6.351	0.000	6.351	0.132	0.13
20.75	0.961	8.1685	6.376	0.000	6.376	0.132	0.13
21.0	0.964	8.194	6.401	0.000	6.401	0.132	0.13
21.3	0.967	8.2195	6.425	0.000	6.425	0.132	0.13
21.50	0.97	8.245	6.450	0.000	6.450	0.132	0.13
21.8	0.973	8.2705	6.474	0.000	6.474	0.132	0.13
22.00	0.976	8.296	6.499	0.000	6.499	0.132	0.13
22.3	0.979	8.3215	6.524	0.000	6.524	0.132	0.13
22.5	0.982	8.347	6.548	0.000	6.548	0.132	0.13
22.75	0.985	8.3725	6.573	0.000	6.573	0.132	0.13
23.0	0.988	8.398	6.598	0.000	6.598	0.132	0.13
23.25	0.991	8.4235	6.622	0.000	6.622	0.132	0.13
23.5	0.994	8.449	6.647	0.000	6.647	0.132	0.13
23.75	0.997	8.4745	6.672	0.000	6.672	0.132	0.13
24.00	1	8.5	6.697	0.000	6.697	0.132	0.13

SBUH Method Hydrograph



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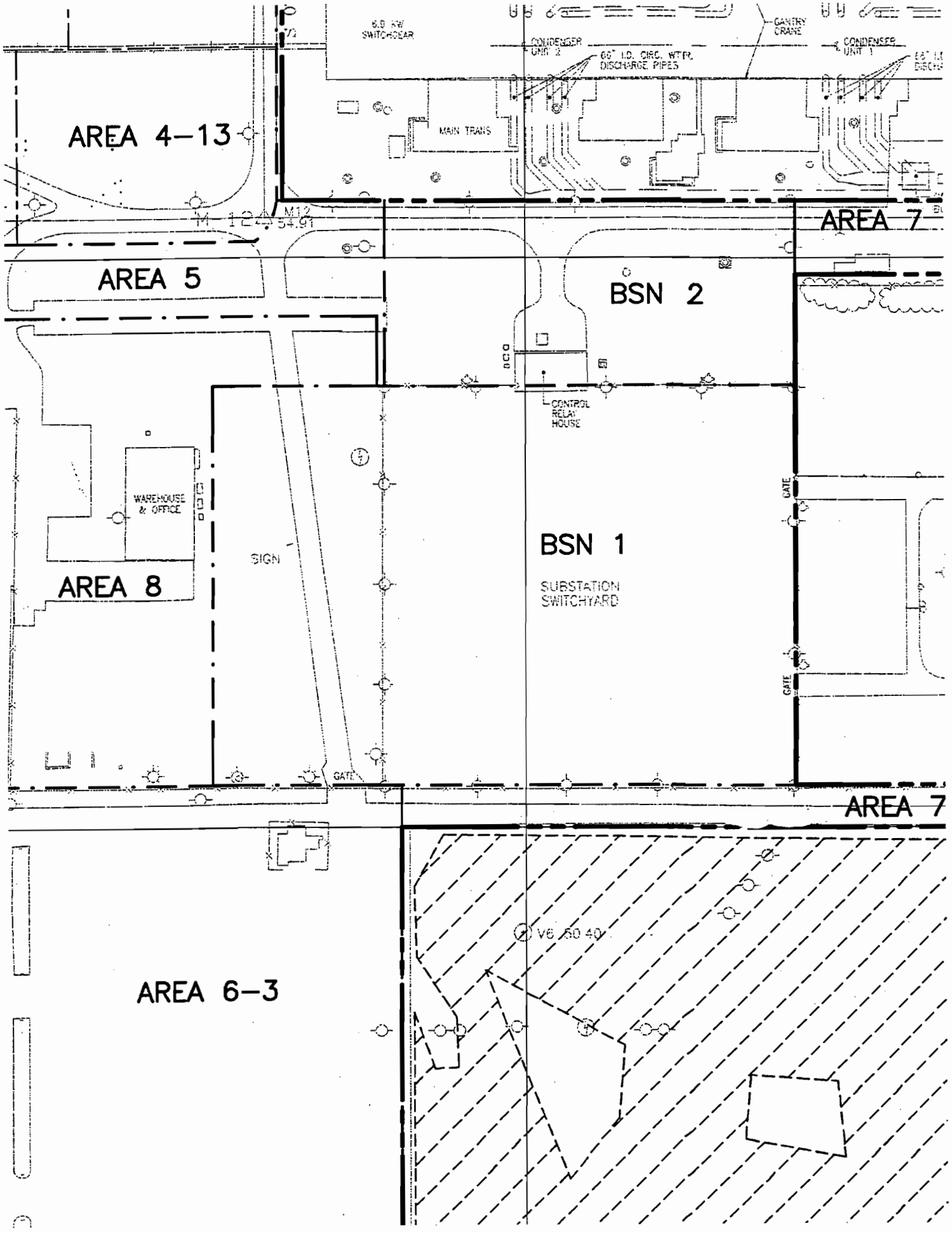

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Calculation Record

Client Name: Florida Power & Light Page 1 of 4

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Pre – Development Discharge Design for 25 year – 24 hour Storm

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 25 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval

Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 25yr/24hr Storm
Subarea : Area 1

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Open space (Lawns,parks etc.)					
Fair condition; grass cover 50% to 75%		-	13.1(69)	-	-
Streets and roads					
Gravel (w/ right-of-way)		-	1.40(85)	-	-
Total Area (by Hydrologic Soil Group)			14.5		

SUBAREA: Area 1 TOTAL DRAINAGE AREA: 14.5 Acres WEIGHTED CURVE NUMBER: 71

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 25yr/24hr Storm
Subarea : 6-1

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Open space (Lawns,parks etc.)					
Fair condition; grass cover 50% to 75%		-	10.9(69)	-	-
Streets and roads					
Paved; curbs and storm sewers		-	3.70(98)	-	-
Total Area (by Hydrologic Soil Group)			14.6		

SUBAREA: 6-1 TOTAL DRAINAGE AREA: 14.6 Acres WEIGHTED CURVE NUMBER: 76

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 25yr/24hr Storm
Subarea : 6-2

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Streets and roads					
Paved; curbs and storm sewers		-	0.13(98)	-	-
OTHER AGRICULTURAL LANDS					
Woods - grass combination	good	-	0.69(58)	-	-
Total Area (by Hydrologic Soil Group)			.82		

SUBAREA: 6-2 TOTAL DRAINAGE AREA: .82 Acres WEIGHTED CURVE NUMBER: 64

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 25yr/24hr Storm
Subarea : 6-3

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Streets and roads					
Paved; curbs and storm sewers		-	9.74(98)	-	-

Total Area (by Hydrologic Soil Group) 9.74

SUBAREA: 6-3 TOTAL DRAINAGE AREA: 9.74 Acres WEIGHTED CURVE NUMBER: 98

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 25yr/24hr Storm

Subarea #1 - Area 1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300.0	0.006	e					0.537
Shallow Concent'd		35	0.006	u					0.008
Open Channel		525						2.5	0.058
								Time of Concentration =	0.60*

Subarea #2 - 6-1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.003	e					0.708
Shallow Concent'd		342	0.006	u					0.076
Open Channel		935						2.5	0.104
								Time of Concentration =	0.89*

Subarea #3 - 6-2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.003	h					1.552
Shallow Concent'd		32	0.003	u					0.010
								Time of Concentration =	1.56*

Subarea #4 - 6-3

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.002	e					0.833
Open Channel		235						2.5	0.026
								Time of Concentration =	0.86*

--- Sheet Flow Surface Codes ---

A Smooth Surface	F Grass, Dense	--- Shallow Concentrated ---	
B Fallow (No Res.)	G Grass, Burmuda	---	Surface Codes ---
C Cultivated < 20 % Res.	H Woods, Light		P Paved
D Cultivated > 20 % Res.	I Woods, Dense		U Unpaved
E Grass-Range, Short	J Range, Natural		

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 25yr/24hr Storm

Total watershed area: 0.062 sq mi Rainfall type: II Frequency: 25 years

Subareas

	Area 1	6-1	6-2	6-3
Area(sq mi)	0.02*	0.02*	0.00*	0.02*
Rainfall(in)	8.5	8.5	8.5	8.5
Curve number	71*	76*	64*	98*
Runoff(in)	5.02	5.61	4.18	8.26
Tc (hrs)	0.60*	0.89*	1.56*	0.86*
(Used)	0.50	1.00	1.50	0.75
TimeToOutlet	0.00	0.00	0.00	0.00
Ia/P	0.10	0.07	0.13	0.00
(Used)	0.10	0.10	0.10	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) Area 1	6-1	6-2	6-3
11.0	5	2	1	0	2
11.3	7	3	2	0	2
11.6	10	4	3	0	3
11.9	15	6	4	0	5
12.0	21	11	4	0	6
12.1	34	19	6	0	9
12.2	58	35	9	0	14
12.3	91	53	14	0	24
12.4	119	60P	22	0	37
12.5	137P	58	30	1P	48
12.6	137	46	37	1	53P

12.7	129	34	42	1	52
12.8	119	26	46P	1	46
13.0	89	16	40	1	32
13.2	65	11	31	1	22
13.4	46	8	22	1	15
13.6	37	7	17	1	12
13.8	29	6	13	1	9
14.0	25	5	11	1	8
14.3	20	5	8	1	6
14.6	15	4	6	0	5
15.0	13	4	5	0	4
15.5	11	3	4	0	4
16.0	10	3	4	0	3
16.5	9	3	3	0	3
17.0	8	2	3	0	3
17.5	8	2	3	0	3
18.0	7	2	3	0	2
19.0	6	2	2	0	2
20.0	6	2	2	0	2
22.0	5	1	2	0	2
26.0	0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

BLACK & VEATCH

Calculation Record

Client Name: Florida Power & Light Page 1 of 4

Project Name: Manatee Power Plant Project No.: 130770

Calculation Title: Pre – Development Discharge Design for 100 year – 24 hour Storm

Calculation No./File No.:

Calculation Is: (check all that apply) ☐ Preliminary ☒ Final ☐ Nuclear Safety-Related

Objective To determine the time of concentration, Curve Number, and discharge values for the drainage area. The discharge calculated is based on a 100 year 24 hour storm event.

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page _____ of this calculation for additional assumptions.

This Section Used for Computer Generated Calculations

Program Name/Number: TR 55 Version: 2.10

Evidence of or reference to computer program verification, if applicable:

Bases or reference thereto supporting application of the computer program to the physical problem:

Review and Approval						
Rev	Prepared By	Date	Verified By	Date	Approved By	Date
	Elisabeth Freeman	1/15/02				

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 100yr/24hr Storm
Subarea : Area 1

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns,parks etc.)				
Fair condition; grass cover 50% to 75%	-	13.1(69)	-	-
Streets and roads				
Gravel (w/ right-of-way)	-	1.40(85)	-	-
Total Area (by Hydrologic Soil Group)		14.5		

SUBAREA: Area 1 TOTAL DRAINAGE AREA: 14.5 Acres WEIGHTED CURVE NUMBER: 71

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 100yr/24hr Storm
Subarea : 6-1

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns,parks etc.)				
Fair condition; grass cover 50% to 75%	-	10.9(69)	-	-
Streets and roads				
Paved; curbs and storm sewers	-	3.70(98)	-	-
Total Area (by Hydrologic Soil Group)		14.6		

SUBAREA: 6-1 TOTAL DRAINAGE AREA: 14.6 Acres WEIGHTED CURVE NUMBER: 76

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 100yr/24hr Storm
Subarea : 6-2

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	0.13(98)	-	-
OTHER AGRICULTURAL LANDS				
Woods - grass combination good	-	0.69(58)	-	-
Total Area (by Hydrologic Soil Group)		.82		

SUBAREA: 6-2 TOTAL DRAINAGE AREA: .82 Acres WEIGHTED CURVE NUMBER: 64

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 100yr/24hr Storm
Subarea : 6-3

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Streets and roads				
Paved; curbs and storm sewers	-	9.74(98)	-	-

Total Area (by Hydrologic Soil Group) 9.74

SUBAREA: 6-3 TOTAL DRAINAGE AREA: 9.74 Acres WEIGHTED CURVE NUMBER: 98

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 100yr/24hr Storm

Subarea #1 - Area 1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300.0	0.006	e					0.537
Shallow Concent'd		35	0.006	u					0.008
Open Channel		525						2.5	0.058
								Time of Concentration =	0.60*

Subarea #2 - 6-1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.003	e					0.708
Shallow Concent'd		342	0.006	u					0.076
Open Channel		935						2.5	0.104
								Time of Concentration =	0.89*

Subarea #3 - 6-2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.003	h					1.552
Shallow Concent'd		32	0.003	u					0.010
								Time of Concentration =	1.56*

Subarea #4 - 6-3

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	4.5	300	0.002	e					0.833
Open Channel		235						2.5	0.026
								Time of Concentration =	0.86*

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---

P Paved
U Unpaved

* - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.10

Project : Manatee - FPL User: FRE Date: 01-05-2002
County : Manatee State: FL Checked: ____ Date: _____
Subtitle: Pre-Development Areas for Ponds I & II 100yr/24hr Storm

Total watershed area: 0.062 sq mi Rainfall type: II Frequency: 100 years

	Subareas			
	Area 1	6-1	6-2	6-3
Area(sq mi)	0.02*	0.02*	0.00*	0.02*
Rainfall(in)	11.0	11.0	11.0	11.0
Curve number	71*	76*	64*	98*
Runoff(in)	7.27	7.95	6.29	10.76
Tc (hrs)	0.60*	0.89*	1.56*	0.86*
(Used)	0.50	1.00	1.50	0.75
TimeToOutlet	0.00	0.00	0.00	0.00
Ia/P	0.07	0.06	0.10	0.00
(Used)	0.10	0.10	0.10	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) Area 1	6-1	6-2	6-3
11.0	7	3	2	0	2
11.3	10	4	3	0	3
11.6	13	5	4	0	4
11.9	20	9	5	0	6
12.0	29	15	6	0	8
12.1	48	28	9	0	11
12.2	83	51	13	0	19
12.3	129	77	20	0	32
12.4	166	87P	30	1	48
12.5	188P	83	42	1	62
12.6	188	66	52	1	69P

12.7	177	49	60	1	67
12.8	164	37	65P	2P	60
13.0	123	23	57	2	41
13.2	89	16	43	2	28
13.4	66	12	32	2	20
13.6	51	10	24	2	15
13.8	41	9	19	1	12
14.0	34	8	15	1	10
14.3	27	7	11	1	8
14.6	23	6	9	1	7
15.0	18	5	7	0	6
15.5	16	5	6	0	5
16.0	13	4	5	0	4
16.5	13	4	5	0	4
17.0	11	3	4	0	4
17.5	10	3	4	0	3
18.0	10	3	4	0	3
19.0	9	3	3	0	3
20.0	7	2	3	0	2
22.0	6	2	2	0	2
26.0	0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

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Calculation Record

____ Nuclear Safety Related
x Not Nuclear Safety Related

Client Name: Florida Power & Light

Project Name: Manatee Power Plant

Unit:

Project Number: 130770

File Number:

Calculation Title: CULVERT ANALYSIS AREA BSN - 1 AND BSN - 2

Calculation Is: ☐ Preliminary ☒ Final ☐ Other

Quality Record: ☐ Yes ☐ No

Objective HYDRAULIC ANALYSIS FOR CHDPE CULVERT C-1

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page____ of this calculation for additional assumptions.

Verification Method

- ☐ Detailed Review
- ☐ Alternate Calculation
- ☐ Conform Against Similar Previously Verified Calculations
- ☐ Other

This Section Used for Computer Generated Calculations

Program Number/Name: CULVERTMASTER
Version: 1.0
Run Date: 01/15/02
Run Time:
Number of Pages: 2

Review and Approval							
Rev	Revised Pages	Prepared By	Date	Verified By	Date	Project Engineer Approval	Date
		SEBASTIAN KULESZA	01/15/02				

Culvert Designer/Analyzer Report
CULVERT C-1 AREA BSN-1 & BSN-2

Peak Discharge Method: User-Specified			
Design Discharge	30.89 cfs	Check Discharge	30.89 cfs

Grades Model: Inverts			
Invert Upstream	50.00 ft	Invert Downstream	49.60 ft
Length	80.00 ft	Slope	0.005000 ft/ft
Drop	0.40 ft		

Headwater Model: Maximum Allowable HW	
Headwater Elevation	53.00 ft

Tailwater properties: Trapezoidal Channel

Tailwater conditions for Design Storm.			
Discharge	30.89 cfs	Bottom Elevation	49.60 ft
Depth	0.98 ft	Velocity	5.31 ft/s

Tailwater conditions for Check Storm.			
Discharge	30.89 cfs	Bottom Elevation	49.60 ft
Depth	0.98 ft	Velocity	5.31 ft/s

Name	Description	Discharge	HW Elev.	Velocity
x Trial-2	2-21 inch Circular	30.89 cfs	52.60 ft	

Culvert Designer/Analyzer Report
CULVERT C-1 AREA BSN-1 & BSN-2

Design:Trial-2

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	53.00 ft	Storm Event	Design
Computed Headwater Eleva	52.60 ft	Discharge	30.89 cfs
Headwater Depth/Height	1.48	Tailwater Elevation	50.58 ft
Inlet Control HW Elev.	52.51 ft	Control Type	Outlet Control
Outlet Control HW Elev.	52.60 ft		

Grades			
Upstream Invert	50.00 ft	Downstream Invert	49.60 ft
Length	80.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	1.45 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	1.45 ft
Velocity Downstream	7.23 ft/s	Critical Slope	0.007912 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.012
Section Material	HDPE (Smooth Interior)	Span	1.75 ft
Section Size	21 inch	Rise	1.75 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev.	52.60 ft	Upstream Velocity Head	0.64 ft
Ke	0.20	Entrance Loss	0.13 ft

Inlet Control Properties			
Inlet Control HW Elev.	52.51 ft	Flow Control	Submerged
Inlet Type	Groove end projecting	Area Full	4.8 ft²
K	0.00450	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	3
C	0.03170	Equation Form	1
Y	0.69000		

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Calculation Record

____ Nuclear Safety Related
x Not Nuclear Safety Related

Client Name: Florida Power & Light Page 1 of 2

Project Name: Manatee Power Plant Unit:

Project Number: 130770 File Number:

Calculation Title: CONCRETE DITCH ANALYSIS FOR AREA BSN - 1 AND BSN - 2

Calculation Is: ☐ Preliminary ☒ Final ☐ Other

Quality Record: ☐ Yes ☐ No

Objective HYDRAULIC ANALYSIS FOR CONCRETE DITCH D - 1 AND D - 2

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page_____ of this calculation for additional assumptions.

Verification Method

- ☐ Detailed Review
- ☐ Alternate Calculation
- ☐ Conform Against Similar Previously Verified Calculations
- ☐ Other

This Section Used for Computer Generated Calculations

Program Number/Name: FLOWMASTER Version: 5.0
Run Date: 01/15/02 Run Time:
Number of Pages: 2

Review and Approval							
Rev	Revised Pages	Prepared By	Date	Verified By	Date	Project Engineer Approval	Date
		SEBASTIAN KULESZA	01/15/02				

CONCRETE LINED DITCH D-1 AND D-2 AREA BSN -1 & BSN - 2
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	DITCH D-1 AND
Flow Element	Trapezoidal Cha
Method	Manning's Formu
Solve For	Channel Depth

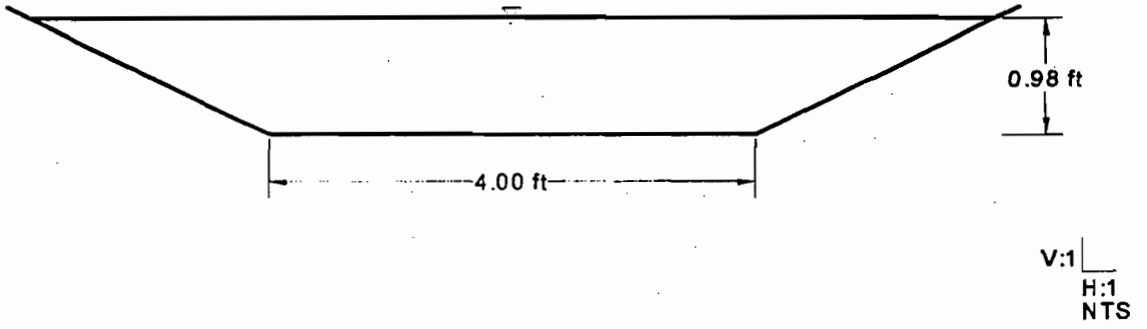
Input Data		
Mannings Coeffic	0.013	
Slope	003500	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	30.89	cfs

Results		
Depth	0.98	ft
Flow Area	5.8	ft²
Wetted Perime	8.37	ft
Top Width	7.91	ft
Critical Depth	1.03	ft
Critical Slope	0.002907	ft/ft
Velocity	5.31	ft/s
Velocity Head	0.44	ft
Specific Energ	1.42	ft
Froude Numbe	1.09	
Flow Type	upercritical	

Concrete Lined Ditch D-1 and D-2 Area BSN-1 & BSN-2
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	DITCH D-1 AND
Flow Element	Trapezoidal Cha
Method	Manning's Formu
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.013	
Slope	003500	ft/ft
Depth	0.98	ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	30.89	cfs



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Calculation Record

____ Nuclear Safety Related
x Not Nuclear Safety Related

Client Name: Florida Power & Light Page 1 of 2

Project Name: Manatee Power Plant Unit:

Project Number: 130770 File Number:

Calculation Title: CONCRETE LINED DITCH CAPACITY CALCULATION FOR AREA 8 DITCH D-3

Calculation Is: ☐ Preliminary ☒ Final ☐ Other

Quality Record: ☐ Yes ☐ No

Objective HYDRAULIC CALCULATION FOR CONCRETE DITCH D-3

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date

See Page____ of this calculation for additional assumptions.

Verification Method

- ☐ Detailed Review
- ☐ Alternate Calculation
- ☐ Conform Against Similar Previously Verified Calculations
- ☐ Other

This Section Used for Computer Generated Calculations

Program Number/Name: FLOWMASTER Version: 5
Run Date: 01/15/02 Run Time:
Number of Pages: 2

Review and Approval

Rev	Revised Pages	Prepared By	Date	Verified By	Date	Project Engineer Approval	Date
		SEBASTIAN KULESZA	01/15/02				

AREA 8 DITCH D-3
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CONCRETE LINED
Flow Element	Trapezoidal Channe
Method	Manning's Formula
Solve For	Channel Depth

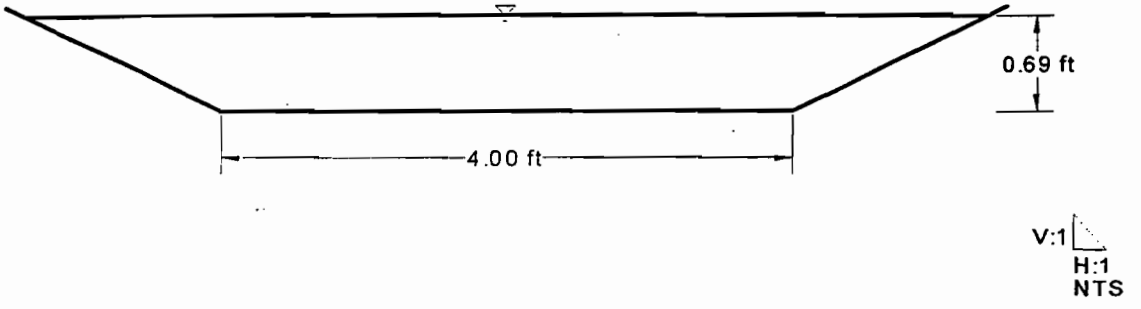
Input Data		
Mannings Coeffic	0.013	
Slope	009000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	26.00	cfs

Results		
Depth	0.69	ft
Flow Area	3.7	ft²
Wetted Perime	7.08	ft
Top Width	6.75	ft
Critical Depth	0.93	ft
Critical Slope	0.002977	ft/ft
Velocity	7.03	ft/s
Velocity Head	0.77	ft
Specific Energ	1.46	ft
Froude Numbe	1.68	
Flow Type	upercritical	

Cross Section
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	CONCRETE LINED
Flow Element	Trapezoidal Channe
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.013	
Slope	009000	ft/ft
Depth	0.69	ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	26.00	cfs



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Calculation Record

____ Nuclear Safety Related
x Not Nuclear Safety Related

Client Name: Florida Power & Light Page 1 of 2

Project Name: Manatee Power Plant Unit:

Project Number: 130770 File Number:

Calculation Title: CONCRETE DITCH ANALYSIS FOR AREA 6.2 AND 6.3

Calculation Is: ☐ Preliminary ☒ Final ☐ Other

Quality Record: ☐ Yes ☐ No

Objective HYDRAULIC ANALYSIS FOR CONCRETE DITCH D - 4

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date

See Page____ of this calculation for additional assumptions.

Verification Method

- ☐ Detailed Review
- ☐ Alternate Calculation
- ☐ Conform Against Similar Previously Verified Calculations
- ☐ Other

This Section Used for Computer Generated Calculations

Program Number/Name: FLOWMASTER Version: 5.0

Run Date: 01/15/02 Run Time:

Number of Pages: 2

Review and Approval

Rev	Revised Pages	Prepared By	Date	Verified By	Date	Project Engineer Approval	Date
		SEBASTIAN KULESZA	01/15/02				

CONCRETE LINED DITCH D-4 AREA 6-2 AND 6-3
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	DITCH D-1 AND
Flow Element	Trapezoidal Cha
Method	Manning's Formu
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	003500	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	165.00	cfs

Results		
Depth	2.29	ft
Flow Area	19.7	ft²
Wetted Perime	14.25	ft
Top Width	13.17	ft
Critical Depth	2.52	ft
Critical Slope	0.002336	ft/ft
Velocity	8.39	ft/s
Velocity Head	1.09	ft
Specific Energ	3.38	ft
Froude Numbe	1.21	
Flow Type	upercritical	

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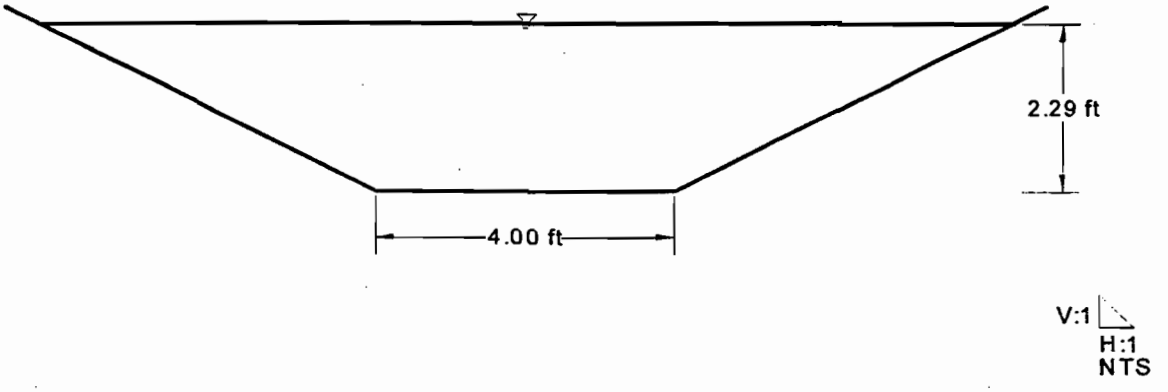
Cross Section
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	DITCH D-1 AND
Flow Element	Trapezoidal Cha
Method	Manning's Formu
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.013	
Slope	003500	ft/ft
Depth	2.29	ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	165.00	cfs



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Calculation Record

____ Nuclear Safety Related
x Not Nuclear Safety Related

Client Name: Florida Power & Light Page 1 of 19

Project Name: Manatee Power Plant Unit:

Project Number: 130770 File Number:

Calculation Title: STORM DRAIN CALCULATION FOR POWER BLOCK AREA 2, 4, 5

Calculation Is: ☐ Preliminary ☒ Final ☐ Other

Quality Record: ☐ Yes ☐ No

Objective HYDRAULIC ANALYSIS FOR STORM DRAIN

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date

See Page_____ of this calculation for additional assumptions.

Verification Method

- ☐ Detailed Review
- ☐ Alternate Calculation
- ☐ Conform Against Similar Previously Verified Calculations
- ☐ Other

This Section Used for Computer Generated Calculations

Program Number/Name: STORMCAD Version: 1.0
Run Date: 01/15/02 Run Time:
Number of Pages: 19

Review and Approval

Rev	Revised Pages	Prepared By	Date	Verified By	Date	Project Engineer Approval	Date
		SEBASTIAN KULESZA	01/15/02				

```
------------------ Beginning Calculation Cycle ------------------
Discharge: 15.00 cfs  at node DI-1
Discharge: 29.00 cfs  at node DI-2
Discharge: 42.00 cfs  at node DI-3
Discharge: 13.00 cfs  at node DI-5
Discharge: 30.00 cfs  at node DI-4
Discharge: 43.00 cfs  at node J-1
Discharge: 60.00 cfs  at node DI-6
Discharge: 102.00 cfs  at node J-2
Discharge: 8.00 cfs  at node DI-7
Discharge: 16.00 cfs  at node DI-8
Discharge: 125.00 cfs  at node DI-9
Discharge: 132.00 cfs  at node DI-10
Discharge: 132.00 cfs  at node DI-11
Beginning iteration 1
Discharge: 15.00 cfs  at node DI-1
Discharge: 29.00 cfs  at node DI-2
Discharge: 42.00 cfs  at node DI-3
Discharge: 13.00 cfs  at node DI-5
Discharge: 30.00 cfs  at node DI-4
Discharge: 43.00 cfs  at node J-1
Discharge: 60.00 cfs  at node DI-6
Discharge: 102.00 cfs  at node J-2
Discharge: 8.00 cfs  at node DI-7
Discharge: 16.00 cfs  at node DI-8
Discharge: 125.00 cfs  at node DI-9
Discharge: 132.00 cfs  at node DI-10
Discharge: 132.00 cfs  at node DI-11
Discharge Convergence Achieved in 1 iterations: relative error:  0.0

--------------------- Calculations Complete ---------------------

** Analysis Options **
Friction method:  Manning's Formula
HGL Convergence Test:  0.001000
Maximum Network Traversals:  5
Number of Flow Profile Steps:  5
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3


 ----------------- Network Quick View -----------------------
```

Label	Length	Size	Discharge	Hydraulic Grade Upstream	Hydraulic Grade Downstream
P-1	148.00	18 inch	15.00	54.27	52.83
P-2	165.00	24 inch	29.00	52.83	51.45
P-3	57.00	30 inch	42.00	51.11	50.73
P-5	33.00	18 inch	13.00	53.56	53.32
P-6	118.00	30 inch	43.00	53.32	52.70
P-7	155.00	30 inch	60.00	52.70	51.04
B-1	347.00	4 x 3 ft	102.00	50.37	48.88
P-8	177.00	18 inch	8.00	53.10	52.54
P-9	214.00	18 inch	16.00	52.54	49.58
B-2	136.00	4 x 3 ft	125.00	48.88	48.27
P-4	75.00	24 inch	30.00	53.95	53.32
B-3	158.00	4 x 3 ft	132.00	48.27	47.48

| ---------- Elevations ---------- |

Label	Discharge	Ground	Upstream HGL	Downstream HGL
DI-1	15.00	55.00	54.27	54.27
DI-2	29.00	55.00	52.83	52.83
DI-3	42.00	55.00	51.11	51.11
DI-6	60.00	55.00	52.70	52.70
DI-5	13.00	55.00	53.56	53.56
DI-7	8.00	55.00	53.10	53.10
DI-8	16.00	55.00	52.54	52.54
DI-9	125.00	55.00	48.88	48.88
DI-10	132.00	55.00	48.27	48.27
DI-4	30.00	55.00	53.95	53.95
J-1	43.00	55.00	53.32	53.32
J-2	102.00	55.00	50.37	50.37
DI-11	132.00	55.00	47.48	47.48

Elapsed: 0 minute(s) 1 second(s)

Pipe Report

Pipe	Up Node	Dn Node	Q (cfs)	Length (ft)	S (ft/ft)	Size	Roughness	Up Invert (ft)	Dn Invert (ft)	Up Gr Elev (ft)	Dn Gr Elev (ft)	Up Cover (ft)	Dn Cover (ft)	Up HGL (ft)	Dn HGL (ft)
P-8	DI-7	DI-8	8.00	177.00	0.005000	18 inch	0.009	52.00	51.12	55.00	55.00	1.50	2.38	53.10	52.54
P-9	DI-8	DI-9	16.00	214.00	0.012617	18 inch	0.009	51.12	48.42	55.00	55.00	2.38	5.09	52.54	49.58
P-4	DI-4	J-1	30.00	75.00	0.005000	24 inch	0.009	51.17	50.79	55.00	55.00	1.83	2.21	53.95	53.32
P-5	DI-5	J-1	13.00	33.00	0.011364	18 inch	0.009	52.00	51.63	55.00	55.00	1.50	1.87	53.56	53.32
P-6	J-1	DI-6	43.00	118.00	0.005000	30 inch	0.009	50.13	49.54	55.00	55.00	2.37	2.97	53.32	52.70
P-7	DI-6	J-2	60.00	155.00	0.005710	30 inch	0.009	49.54	48.65	55.00	55.00	2.97	3.85	52.70	51.04
P-1	DI-1	DI-2	15.00	148.00	0.005000	18 inch	0.009	51.71	50.97	55.00	55.00	1.79	2.53	54.27	52.83
P-2	DI-2	DI-3	29.00	165.00	0.005000	24 inch	0.009	50.43	49.60	55.00	55.00	2.57	3.40	52.83	51.45
P-3	DI-3	J-2	42.00	57.00	0.005000	30 inch	0.009	48.94	48.65	55.00	55.00	3.57	3.85	51.11	50.73
B-1	J-2	DI-9	102.00	347.00	0.005000	4 x 3 ft	0.013	48.65	46.92	55.00	55.00	3.35	5.09	50.37	48.88
B-2	DI-9	DI-10	125.00	136.00	0.005000	4 x 3 ft	0.013	46.92	46.24	55.00	55.00	5.09	5.77	48.88	48.27
B-3	DI-10	DI-11	132.00	158.00	0.005000	4 x 3 ft	0.013	46.24	45.45	55.00	55.00	5.77	6.56	48.27	47.48

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Combined Pipe/Node Report

Pipe	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System Flow Time (min)	Upstream HGL (ft)	Downstream HGL (ft)
P-8	DI-7	DI-8	177.00	18 inch	5.20	52.00	51.12	0.005000	3.60	53.10	52.54
P-9	DI-8	DI-9	214.00	18 inch	10.05	51.12	48.42	0.012617	4.17	52.54	49.58
P-4	DI-4	J-1	75.00	24 inch	9.55	51.17	50.79	0.005000	9.60	53.95	53.32
P-5	DI-5	J-1	33.00	18 inch	7.36	52.00	51.63	0.011364	4.80	53.56	53.32
P-6	J-1	DI-6	118.00	30 inch	8.76	50.13	49.54	0.005000	9.73	53.32	52.70
P-7	DI-6	J-2	155.00	30 inch	12.31	49.54	48.65	0.005710	9.96	52.70	51.04
P-1	DI-1	DI-2	148.00	18 inch	8.49	51.71	50.97	0.005000	4.80	54.27	52.83
P-2	DI-2	DI-3	165.00	24 inch	9.40	50.43	49.60	0.005000	5.09	52.83	51.45
P-3	DI-3	J-2	57.00	30 inch	9.45	48.94	48.65	0.005000	5.38	51.11	50.73
B-1	J-2	DI-9	347.00	4 x 3 ft	6.96	48.65	46.92	0.005000	10.17	50.37	48.88
B-2	DI-9	DI-10	136.00	4 x 3 ft	7.81	46.92	46.24	0.005000	11.00	48.88	48.27
B-3	DI-10	DI-11	158.00	4 x 3 ft	8.11	46.24	45.45	0.005000	11.29	48.27	47.48

DOT Report

Pipe	-Node- Upstream Downstream	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	-Section- Shape Size	Length (ft)	Average Velocity (ft/s)	Description
P-8	DI-7	55.00	53.10	0.004209	8.00	Circular	177.00	5.20	
	DI-8	55.00	52.54	0.005000	10.73	18 inch			
P-9	DI-8	55.00	52.54	0.011424	16.00	Circular	214.00	10.05	
	DI-9	55.00	49.58	0.012617	17.04	18 inch			
P-4	DI-4	55.00	53.95	0.008430	30.00	Circular	75.00	9.55	
	J-1	55.00	53.32	0.005000	23.10	24 inch			
P-5	DI-5	55.00	53.56	0.007342	13.00	Circular	33.00	7.36	
	J-1	55.00	53.32	0.011364	16.17	18 inch			
P-6	J-1	55.00	53.32	0.005268	43.00	Circular	118.00	8.76	
	DI-6	55.00	52.70	0.005000	41.89	30 inch			
P-7	DI-6	55.00	52.70	0.010207	60.00	Circular	155.00	12.31	
	J-2	55.00	51.04	0.005710	44.77	30 inch			
P-1	DI-1	55.00	54.27	0.009774	15.00	Circular	148.00	8.49	
	DI-2	55.00	52.83	0.005000	10.73	18 inch			
P-2	DI-2	55.00	52.83	0.007760	29.00	Circular	165.00	9.40	
	DI-3	55.00	51.45	0.005000	23.10	24 inch			
P-3	DI-3	55.00	51.11	0.004812	42.00	Circular	57.00	9.45	
	J-2	55.00	50.73	0.005000	41.89	30 inch			
B-1	J-2	55.00	50.37	0.004869	102.00	Box	347.00	6.96	
	DI-9	55.00	48.88	0.005000	175.03	4 x 3 ft			
B-2	DI-9	55.00	48.88	0.004972	125.00	Box	136.00	7.81	
	DI-10	55.00	48.27	0.005000	175.03	4 x 3 ft			
B-3	DI-10	55.00	48.27	0.005000	132.00	Box	158.00	8.11	
	DI-11	55.00	47.48	0.005000	175.03	4 x 3 ft			

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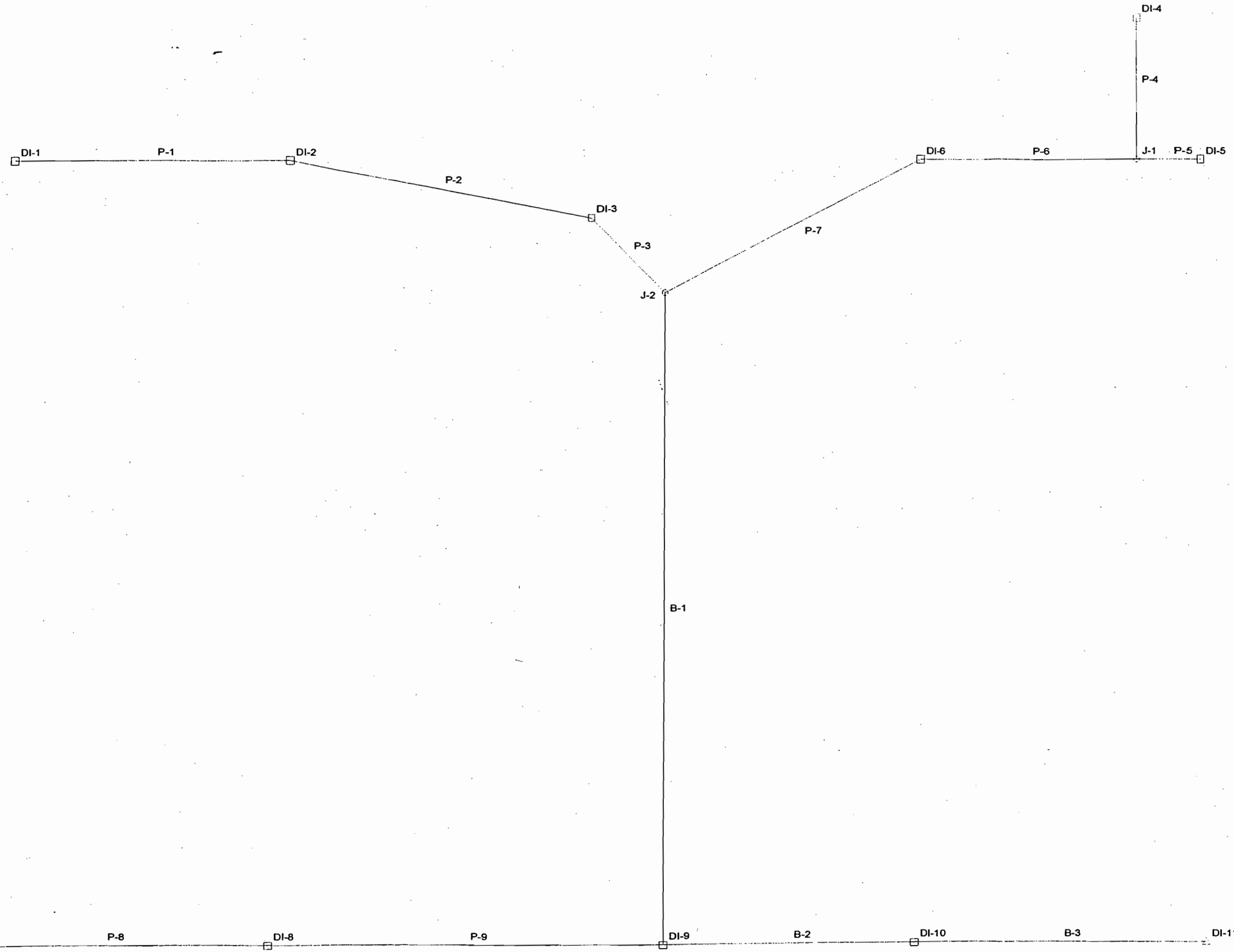
Node Report

Node	Upstream Flow Time (min)	System Flow Time (min)	Discharge (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	HGL In (ft)	HGL Out (ft)	Sump Elevation (ft)
DI-7	0.00	3.60	8.00	55.00	55.00	53.10	53.10	52.00
DI-8	4.17	4.17	16.00	55.00	55.00	52.54	52.54	51.12
DI-4	0.00	9.60	30.00	55.00	55.00	53.95	53.95	51.17
DI-5	0.00	4.80	13.00	55.00	55.00	53.56	53.56	52.00
J-1	9.73	9.73	43.00	55.00	55.00	53.32	53.32	50.13
DI-6	9.96	9.96	60.00	55.00	55.00	52.70	52.70	49.54
DI-1	0.00	4.80	15.00	55.00	55.00	54.27	54.27	51.71
DI-2	5.09	5.09	29.00	55.00	55.00	52.83	52.83	50.43
DI-3	5.38	5.38	42.00	55.00	55.00	51.11	51.11	48.94
J-2	10.17	10.17	102.00	55.00	55.00	50.37	50.37	48.65
DI-9	11.00	11.00	125.00	55.00	55.00	48.88	48.88	46.92
DI-10	11.29	11.29	132.00	55.00	55.00	48.27	48.27	46.24
DI-11	11.61	11.61	N/A	55.00	55.00	47.48	47.48	45.45



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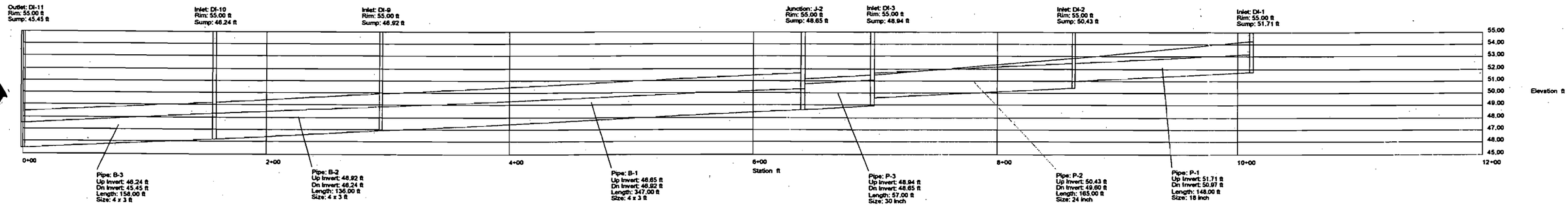
Project Engineer: Black & Veatch
StormCAD v1.0



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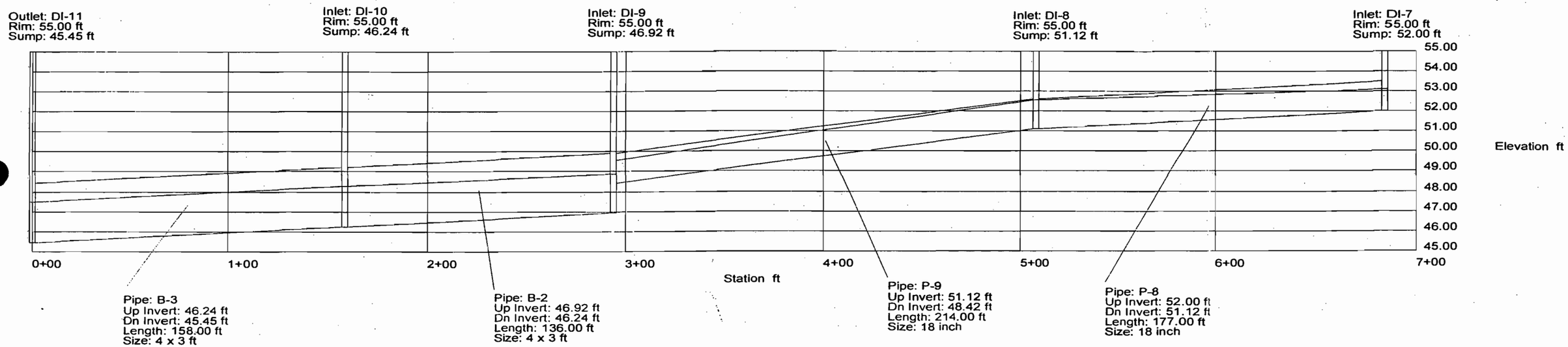

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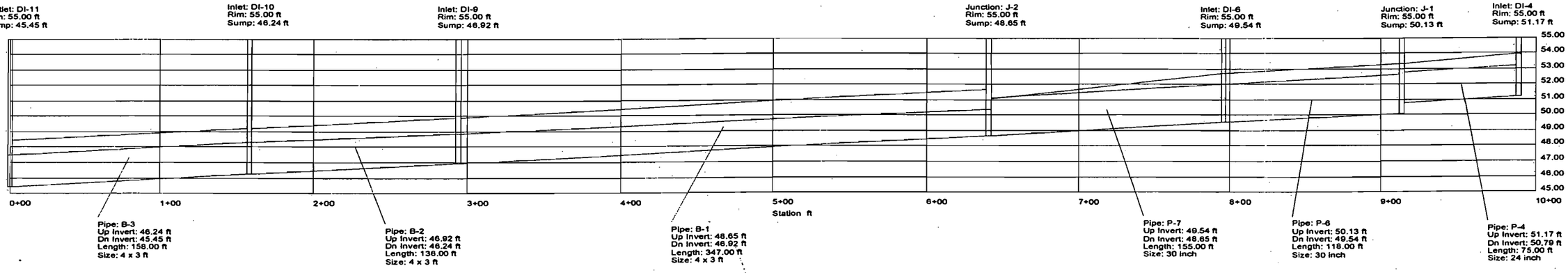

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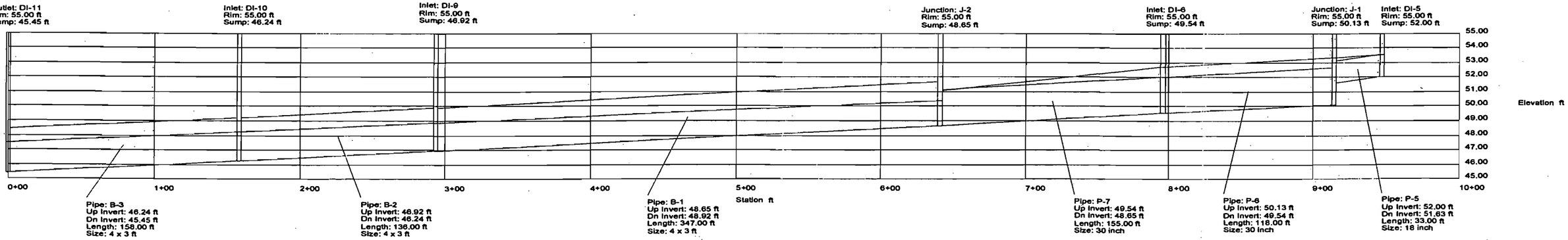

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```
------------------ Beginning Calculation Cycle --------------------
Discharge: 13.00 cfs  at node DI-12
Discharge: 26.00 cfs  at node DI-13
Discharge: 140.00 cfs  at node DI-10
Discharge: 175.00 cfs  at node DI-14
Discharge: 178.00 cfs  at node DI-15
Discharge: 178.00 cfs  at node Outlet
Beginning iteration 1
Discharge: 13.00 cfs  at node DI-12
Discharge: 26.00 cfs  at node DI-13
Discharge: 140.00 cfs  at node DI-10
Discharge: 175.00 cfs  at node DI-14
Discharge: 178.00 cfs  at node DI-15
Discharge: 178.00 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0

---------------------- Calculations Complete ----------------------

** Analysis Options **
Friction method:  Manning's Formula
HGL Convergence Test:  0.001000
Maximum Network Traversals:  5
Number of Flow Profile Steps:  5
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3


 ----------------- Network Quick View -------------------------
```

				Hydraulic Grade	
Label	Length	Size	Discharge	Upstream	Downstream
P-10	335.00	18 inch	13.00	51.70	49.24
P-11	278.00	24 inch	26.00	49.24	47.48
B-4	89.00	4 x 3 ft	140.00	47.64	47.48
B-5	132.00	4 x 3 ft	175.00	47.48	46.76
B-6	30.00	4 x 3 ft	178.00	46.75	46.59

		Elevations		
Label	Discharge	Ground	Upstream HGL	Downstream HGL
DI-10	140.00	55.00	47.64	47.64
DI-12	13.00	55.00	51.70	51.70
DI-13	26.00	55.00	49.24	49.24
DI-14	175.00	55.00	47.48	47.48
DI-15	178.00	55.00	46.75	46.75
Outlet	178.00	55.00	46.59	46.59

```
Elapsed: 0 minute(s) 1 second(s)
```

Pipe Report

Pipe	Up Node	Dn Node	Q (cfs)	Length (ft)	S (ft/ft)	Size	Roughness	Up Invert (ft)	Dn Invert (ft)	Up Gr Elev (ft)	Dn Gr Elev (ft)	Up Cover (ft)	Dn Cover (ft)	Up HGL (ft)	Dn HGL (ft)
B-4	DI-10	DI-14	140.00	89.00	0.004607	4 x 3 ft	0.013	45.41	45.00	55.00	55.00	6.59	7.00	47.64	47.48
P-10	DI-12	DI-13	13.00	335.00	0.005015	18 inch	0.009	48.12	46.44	55.00	55.00	5.38	7.06	51.70	49.24
P-11	DI-13	DI-14	26.00	278.00	0.005036	24 inch	0.009	46.40	45.00	55.00	55.00	6.60	8.00	49.24	47.48
B-5	DI-14	DI-15	175.00	132.00	0.005000	4 x 3 ft	0.013	44.96	44.30	55.00	55.00	7.04	7.70	47.48	46.76
B-6	DI-15	Outlet	178.00	30.00	0.005333	4 x 3 ft	0.013	44.26	44.10	55.00	55.00	7.74	7.90	46.75	46.59

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Combined Pipe/Node Report

Pipe	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System Flow Time (min)	Upstream HGL (ft)	Downstream HGL (ft)
B-4	DI-10	DI-14	89.00	4 x 3 ft	7.45	45.41	45.00	0.004607	11.61	47.64	47.48
P-10	DI-12	DI-13	335.00	18 inch	7.36	48.12	46.44	0.005015	3.00	51.70	49.24
P-11	DI-13	DI-14	278.00	24 inch	8.28	46.40	45.00	0.005036	3.76	49.24	47.48
B-5	DI-14	DI-15	132.00	4 x 3 ft	8.79	44.96	44.30	0.005000	11.81	47.48	46.76
B-6	DI-15	Outlet	30.00	4 x 3 ft	8.94	44.26	44.10	0.005333	12.06	46.75	46.59

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DOT Report

Pipe	-Node- Upstream Downstream	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	-Section- Shape Size	Length (ft)	Average Velocity (ft/s)	Description
B-4	DI-10	55.00	47.64	0.003873	140.00	Box	89.00	7.45	
	DI-14	55.00	47.48	0.004607	168.01	4 x 3 ft			
P-10	DI-12	55.00	51.70	0.007342	13.00	Circular	335.00	7.36	
	DI-13	55.00	49.24	0.005015	10.74	18 inch			
P-11	DI-13	55.00	49.24	0.006332	26.00	Circular	278.00	8.28	
	DI-14	55.00	47.48	0.005036	23.19	24 inch			
B-5	DI-14	55.00	47.48	0.005015	175.00	Box	132.00	8.79	
	DI-15	55.00	46.76	0.005000	175.03	4 x 3 ft			
B-6	DI-15	55.00	46.75	0.005333	178.00	Box	30.00	8.94	
	Outlet	55.00	46.59	0.005333	180.77	4 x 3 ft			

Node Report

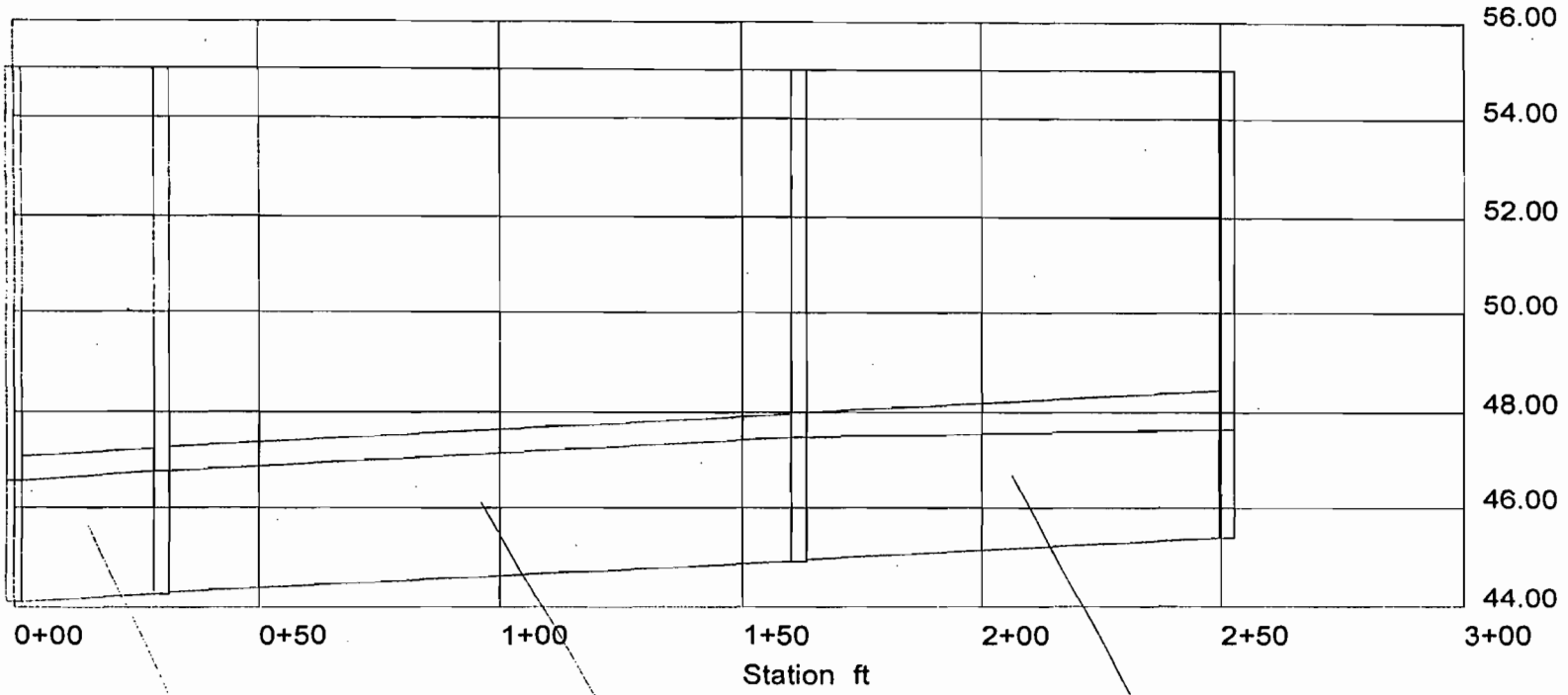
Node	Upstream Flow Time (min)	System Flow Time (min)	Discharge (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	HGL In (ft)	HGL Out (ft)	Sump Elevation (ft)
DI-10	0.00	11.61	140.00	55.00	55.00	47.64	47.64	45.41
DI-12	0.00	3.00	13.00	55.00	55.00	51.70	51.70	48.12
DI-13	3.76	3.76	26.00	55.00	55.00	49.24	49.24	46.40
DI-14	11.81	11.81	175.00	55.00	55.00	47.48	47.48	44.96
DI-15	12.06	12.06	178.00	55.00	55.00	46.75	46.75	44.26
Outlet	12.12	12.12	N/A	55.00	55.00	46.59	46.59	44.10

Outlet: Outlet
Rim: 55.00 ft
Sump: 44.10 ft

Inlet: DI-15
Rim: 55.00 ft
Sump: 44.26 ft

Inlet: DI-14
Rim: 55.00 ft
Sump: 44.96 ft

Inlet: DI-10
Rim: 55.00 ft
Sump: 45.41 ft



Pipe: B-6
Up Invert: 44.26 ft
Dn Invert: 44.10 ft
Length: 30.00 ft
Size: 4 x 3 ft

Pipe: B-5
Up Invert: 44.96 ft
Dn Invert: 44.30 ft
Length: 132.00 ft
Size: 4 x 3 ft

Pipe: B-4
Up Invert: 45.41 ft
Dn Invert: 45.00 ft
Length: 89.00 ft
Size: 4 x 3 ft

BLACK & VEATCH

Calculation Record

____ Nuclear Safety Related
x Not Nuclear Safety Related

Client Name: Florida Power & Light Page 1 of 20

Project Name: Manatee Power Plant Unit:

Project Number: 130770 File Number:

Calculation Title: HEC-1 ANALYSIS FOR SOUTH POND 25-YEAR, 24-HOUR

Calculation Is: ☐ Preliminary ☒ Final ☐ Other

Quality Record: ☐ Yes ☐ No

Objective HEC-1 STORAGE CAPACITY AND ROUTING

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page_____ of this calculation for additional assumptions.

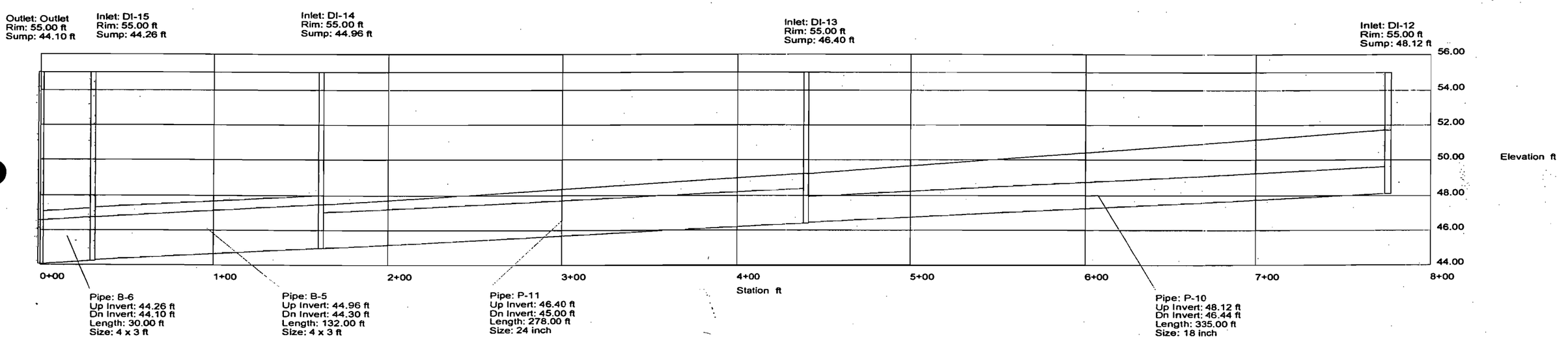
Verification Method

- ☐ Detailed Review
- ☐ Alternate Calculation
- ☐ Conform Against Similar Previously Verified Calculations
- ☐ Other

This Section Used for Computer Generated Calculations

Program Number/Name: HEC-1 Version: 4.1
Run Date: 01/15/02 Run Time:
Number of Pages: 20

Review and Approval							
Rev	Revised Pages	Prepared By	Date	Verified By	Date	Project Engineer Approval	Date
		SEBASTIAN KULESZA	01/15/02				



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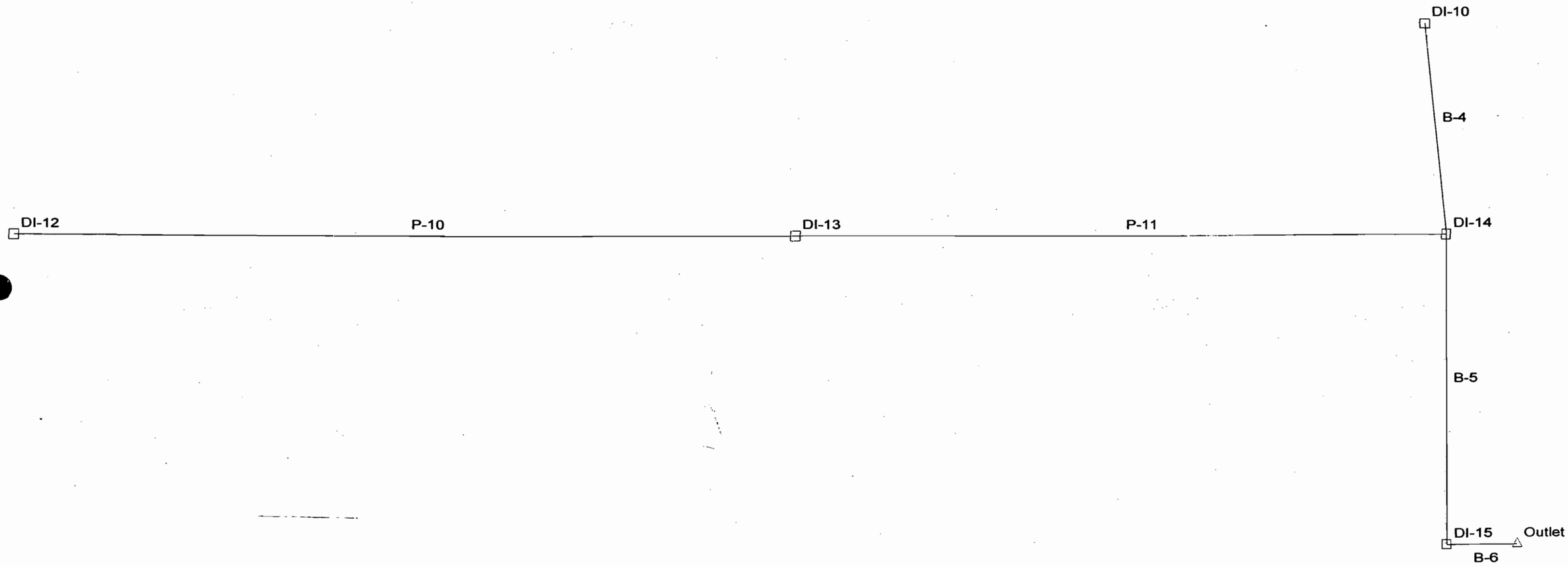

Project Title: Manatee Power Plant
d:\manatee\stormcad\switchya.stm
01/17/02 10:05:12 AM

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Project Engineer: Black & Veatch
StormCAD v1.0

```
*FREE
ID  Black & Veatch
ID  Overland Park, KS
ID
ID  FPL
ID  Manatee Power Project - SOUTH POND
ID
ID  ********************************************************************
ID  DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
ID  - W/DETENTION BASINS IN PLACE
ID  ********************************************************************
ID
ID
ID  January 2002,SK
ID  Filename: dayl.I
*DIAGRAM
*NOLIST
IT  6,01OCT00,0000,241
IO  5
KK Day One
BA 0.03828
QI      0      0      0      0      0      0      0      0      0      0
QI      0      0      0      0      0      0      0      0      0      0
QI      0      0      0      0      0      0      0      0      0      0
QI      0      0      0      0      0      0      0      0      0      0
QI      0      0      0      0      0      0      0      0      0      0
QI      0      0      0      0      0      0      0      0      0      0
QI      0      0      0      0      0      0      0      0      0      0
QI      0      0      0      0      0      0      0      0      0      0
QI      6      6      6     10     10     10     15     15     15     83
QI     83    159    263    208    100     57     42     34     28     23
QI     23     20     20     17     17     15     15     15     15     12
QI     12     11     11     11     11     11     11      9      9      9
QI      9      9      9      9      9      9      9      9      9      9
QI      9      6      6      6      6      6      6      6      6      6
QI      6      6      6      6      6      6      6      6      6      6
QI      6      5      5      5      5      5      5      5      5      5
QI      5      5      5      5      5      5      5      5      5      5
QI      4      4      4      4      4      4      4      4      4      4
QI      4      4      4      4      4      4      4      4      4      4
QI      4      4      4      4      4      4      4      4      4      4
QI      4      4      4      4      4      4      4      4      4      4
QI      3      3      3      3      3      2      2      2      2      2
QI      2      2      2      2      1      1      1      1      1      1
QI      0      0      0      0      0      0      0      0      0      0
KK SOUTH POND
KM 3IN OUTLET W/ 2FT WIDE FILTER
KM OVERFLOW 60 FT FLAT CRESTED WEIR FLOW AT CREST EL=51.50
KM TOP EMBANKMENT EL=53.50
KO 2
RS 1,ELEV,44.00
SV     0.00, 6.44,  6.72,  7.13,   7.83,  8.19,   9.12,   9.32,   10.11,    10.89
SE       44,   50,  50.2,  50.5,     51, 51.25,  51.50,   52.0,   52.50,     53.0
SQ        0, 0.00,  0.10,  0.18,   0.27,  0.30,   0.33,  70.91,  200.44,   365.70
ZZ
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 01 JUN 88           *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:24:38 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*     U.S. ARMY CORPS OF ENGINEERS      *
*   THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*            (916) 551-1748             *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X        XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
*** FREE ***
             1          ID    Black & Veatch
             2          ID    Overland Park, KS
             3          ID
             4          ID    FPL
             5          ID    Manatee Power Project - SOUTH POND
             6          ID
             7          ID    ************************************************************
             8          ID    DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
             9          ID    - W/DETENTION BASINS IN PLACE
            10          ID    ************************************************************
            11          ID
            12          ID
            13          ID    January 2002,SK
            14          ID    Filename: day1.I
                        *DIAGRAM
*** NOLIST ***
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   17          Day
                 V
                 V
   43     SOUTH_PO

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 01 JUN 88           *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:24:38 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*     U.S. ARMY CORPS OF ENGINEERS      *
*   THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*            (916) 551-1748             *
*                                       *
*****************************************
```


Black & Veatch
Overland Park, KS

FPL
Manatee Power Project - SOUTH POND

```
************************************************************
DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
- W/DETENTION BASINS IN PLACE
************************************************************
```

January 2002,SK
Filename: day1.I

```
 16 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
```

```
 IT          HYDROGRAPH TIME DATA
                   NMIN          6  MINUTES IN COMPUTATION INTERVAL
                  IDATE      1OCT 0  STARTING DATE
                  ITIME        0000  STARTING TIME
                     NQ         241  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE      2OCT 0  ENDING DATE
                 NDTIME        0000  ENDING TIME
                  ICENT          19  CENTURY MARK

               COMPUTATION INTERVAL      .10 HOURS
                   TOTAL TIME BASE    24.00 HOURS

       ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            ************
            *          *
 43 KK      * SOUTH_PO *     ND
            *          *
            ************

 47 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          2  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

 48 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC      44.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

 49 SV          STORAGE          .0      6.4     6.7     7.1     7.8     8.2     9.1     9.3    10.1    10.8

 50 SE          ELEVATION     44.00    50.00   50.20   50.50   51.00   51.25   51.50   52.00   52.50   53.00

 51 SQ          DISCHARGE        0.       0.      0.      0.      0.      0.      0.     71.    200.    366.

                                                  ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO       71.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)
```

HYDROGRAPH AT STATION SOUTH_PO

DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
1 OCT 0000	1	0.	.0	44.0	1 OCT 0806	82	0.	.1	44.1	1 OCT 1612	163	5.	9.1	51.5
1 OCT 0006	2	0.	.0	44.0	1 OCT 0812	83	0.	.1	44.1	1 OCT 1618	164	5.	9.1	51.5
1 OCT 0012	3	0.	.0	44.0	1 OCT 0818	84	0.	.2	44.2	1 OCT 1624	165	5.	9.1	51.5
1 OCT 0018	4	0.	.0	44.0	1 OCT 0824	85	0.	.3	44.3	1 OCT 1630	166	5.	9.1	51.5
1 OCT 0024	5	0.	.0	44.0	1 OCT 0830	86	0.	.4	44.3	1 OCT 1636	167	5.	9.1	51.5
1 OCT 0030	6	0.	.0	44.0	1 OCT 0836	87	0.	.5	44.4	1 OCT 1642	168	5.	9.1	51.5
1 OCT 0036	7	0.	.0	44.0	1 OCT 0842	88	0.	.6	44.5	1 OCT 1648	169	5.	9.1	51.5
1 OCT 0042	8	0.	.0	44.0	1 OCT 0848	89	0.	.7	44.7	1 OCT 1654	170	5.	9.1	51.5
1 OCT 0048	9	0.	.0	44.0	1 OCT 0854	90	0.	1.1	45.0	1 OCT 1700	171	4.	9.1	51.5
1 OCT 0054	10	0.	.0	44.0	1 OCT 0900	91	0.	1.8	45.7	1 OCT 1706	172	4.	9.1	51.5
1 OCT 0100	11	0.	.0	44.0	1 OCT 0906	92	0.	2.8	46.6	1 OCT 1712	173	4.	9.1	51.5
1 OCT 0106	12	0.	.0	44.0	1 OCT 0912	93	0.	4.5	48.2	1 OCT 1718	174	4.	9.1	51.5
1 OCT 0112	13	0.	.0	44.0	1 OCT 0918	94	0.	6.5	50.0	1 OCT 1724	175	4.	9.1	51.5
1 OCT 0118	14	0.	.0	44.0	1 OCT 0924	95	0.	7.8	50.9	1 OCT 1730	176	4.	9.1	51.5
1 OCT 0124	15	0.	.0	44.0	1 OCT 0930	96	0.	8.4	51.3	1 OCT 1736	177	4.	9.1	51.5
1 OCT 0130	16	0.	.0	44.0	1 OCT 0936	97	0.	8.8	51.4	1 OCT 1742	178	4.	9.1	51.5
1 OCT 0136	17	0.	.0	44.0	1 OCT 0942	98	1.	9.1	51.5	1 OCT 1748	179	4.	9.1	51.5
1 OCT 0142	18	0.	.0	44.0	1 OCT 0948	99	37.	9.2	51.8	1 OCT 1754	180	4.	9.1	51.5
1 OCT 0148	19	0.	.0	44.0	1 OCT 0954	100	23.	9.2	51.7	1 OCT 1800	181	4.	9.1	51.5
1 OCT 0154	20	0.	.0	44.0	1 OCT 1000	101	23.	9.2	51.7	1 OCT 1806	182	4.	9.1	51.5
1 OCT 0200	21	0.	.0	44.0	1 OCT 1006	102	21.	9.2	51.6	1 OCT 1812	183	4.	9.1	51.5
1 OCT 0206	22	0.	.0	44.0	1 OCT 1012	103	20.	9.2	51.6	1 OCT 1818	184	4.	9.1	51.5
1 OCT 0212	23	0.	.0	44.0	1 OCT 1018	104	18.	9.2	51.6	1 OCT 1824	185	4.	9.1	51.5
1 OCT 0218	24	0.	.0	44.0	1 OCT 1024	105	17.	9.2	51.6	1 OCT 1830	186	4.	9.1	51.5
1 OCT 0224	25	0.	.0	44.0	1 OCT 1030	106	16.	9.2	51.6	1 OCT 1836	187	4.	9.1	51.5
1 OCT 0230	26	0.	.0	44.0	1 OCT 1036	107	15.	9.2	51.6	1 OCT 1842	188	4.	9.1	51.5
1 OCT 0236	27	0.	.0	44.0	1 OCT 1042	108	15.	9.2	51.6	1 OCT 1848	189	4.	9.1	51.5
1 OCT 0242	28	0.	.0	44.0	1 OCT 1048	109	15.	9.2	51.6	1 OCT 1854	190	4.	9.1	51.5
1 OCT 0248	29	0.	.0	44.0	1 OCT 1054	110	13.	9.2	51.6	1 OCT 1900	191	4.	9.1	51.5
1 OCT 0254	30	0.	.0	44.0	1 OCT 1100	111	12.	9.2	51.6	1 OCT 1906	192	4.	9.1	51.5
1 OCT 0300	31	0.	.0	44.0	1 OCT 1106	112	11.	9.2	51.6	1 OCT 1912	193	4.	9.1	51.5
1 OCT 0306	32	0.	.0	44.0	1 OCT 1112	113	11.	9.1	51.6	1 OCT 1918	194	4.	9.1	51.5

1 OCT 0312	33	0.	.0	44.0	*	1 OCT 1118	114	11.	9.2	51.6	*	1 OCT 1924	195	4.	9.1	51.5
1 OCT 0318	34	0.	.0	44.0	*	1 OCT 1124	115	11.	9.2	51.6	*	1 OCT 1930	196	4.	9.1	51.5
1 OCT 0324	35	0.	.0	44.0	*	1 OCT 1130	116	11.	9.2	51.6	*	1 OCT 1936	197	4.	9.1	51.5
1 OCT 0330	36	0.	.0	44.0	*	1 OCT 1136	117	11.	9.2	51.6	*	1 OCT 1942	198	4.	9.1	51.5
1 OCT 0336	37	0.	.0	44.0	*	1 OCT 1142	118	10.	9.1	51.6	*	1 OCT 1948	199	4.	9.1	51.5
1 OCT 0342	38	0.	.0	44.0	*	1 OCT 1148	119	9.	9.1	51.6	*	1 OCT 1954	200	4.	9.1	51.5
1 OCT 0348	39	0.	.0	44.0	*	1 OCT 1154	120	9.	9.1	51.6	*	1 OCT 2000	201	4.	9.1	51.5
1 OCT 0354	40	0.	.0	44.0	*	1 OCT 1200	121	9.	9.1	51.6	*	1 OCT 2006	202	4.	9.1	51.5
1 OCT 0400	41	0.	.0	44.0	*	1 OCT 1206	122	9.	9.1	51.6	*	1 OCT 2012	203	4.	9.1	51.5
1 OCT 0406	42	0.	.0	44.0	*	1 OCT 1212	123	9.	9.1	51.6	*	1 OCT 2018	204	4.	9.1	51.5
1 OCT 0412	43	0.	.0	44.0	*	1 OCT 1218	124	9.	9.1	51.6	*	1 OCT 2024	205	4.	9.1	51.5
1 OCT 0418	44	0.	.0	44.0	*	1 OCT 1224	125	9.	9.1	51.6	*	1 OCT 2030	206	4.	9.1	51.5
1 OCT 0424	45	0.	.0	44.0	*	1 OCT 1230	126	9.	9.1	51.6	*	1 OCT 2036	207	4.	9.1	51.5
1 OCT 0430	46	0.	.0	44.0	*	1 OCT 1236	127	9.	9.1	51.6	*	1 OCT 2042	208	4.	9.1	51.5
1 OCT 0436	47	0.	.0	44.0	*	1 OCT 1242	128	9.	9.1	51.6	*	1 OCT 2048	209	4.	9.1	51.5
1 OCT 0442	48	0.	.0	44.0	*	1 OCT 1248	129	9.	9.1	51.6	*	1 OCT 2054	210	4.	9.1	51.5
1 OCT 0448	49	0.	.0	44.0	*	1 OCT 1254	130	9.	9.1	51.6	*	1 OCT 2100	211	3.	9.1	51.5
1 OCT 0454	50	0.	.0	44.0	*	1 OCT 1300	131	9.	9.1	51.6	*	1 OCT 2106	212	3.	9.1	51.5
1 OCT 0500	51	0.	.0	44.0	*	1 OCT 1306	132	7.	9.1	51.5	*	1 OCT 2112	213	3.	9.1	51.5
1 OCT 0506	52	0.	.0	44.0	*	1 OCT 1312	133	6.	9.1	51.5	*	1 OCT 2118	214	3.	9.1	51.5
1 OCT 0512	53	0.	.0	44.0	*	1 OCT 1318	134	6.	9.1	51.5	*	1 OCT 2124	215	3.	9.1	51.5
1 OCT 0518	54	0.	.0	44.0	*	1 OCT 1324	135	6.	9.1	51.5	*	1 OCT 2130	216	2.	9.1	51.5
1 OCT 0524	55	0.	.0	44.0	*	1 OCT 1330	136	6.	9.1	51.5	*	1 OCT 2136	217	2.	9.1	51.5
1 OCT 0530	56	0.	.0	44.0	*	1 OCT 1336	137	6.	9.1	51.5	*	1 OCT 2142	218	2.	9.1	51.5
1 OCT 0536	57	0.	.0	44.0	*	1 OCT 1342	138	6.	9.1	51.5	*	1 OCT 2148	219	2.	9.1	51.5
1 OCT 0542	58	0.	.0	44.0	*	1 OCT 1348	139	6.	9.1	51.5	*	1 OCT 2154	220	2.	9.1	51.5
1 OCT 0548	59	0.	.0	44.0	*	1 OCT 1354	140	6.	9.1	51.5	*	1 OCT 2200	221	2.	9.1	51.5
1 OCT 0554	60	0.	.0	44.0	*	1 OCT 1400	141	6.	9.1	51.5	*	1 OCT 2206	222	2.	9.1	51.5
1 OCT 0600	61	0.	.0	44.0	*	1 OCT 1406	142	6.	9.1	51.5	*	1 OCT 2212	223	2.	9.1	51.5
1 OCT 0606	62	0.	.0	44.0	*	1 OCT 1412	143	6.	9.1	51.5	*	1 OCT 2218	224	2.	9.1	51.5
1 OCT 0612	63	0.	.0	44.0	*	1 OCT 1418	144	6.	9.1	51.5	*	1 OCT 2224	225	1.	9.1	51.5
1 OCT 0618	64	0.	.0	44.0	*	1 OCT 1424	145	6.	9.1	51.5	*	1 OCT 2230	226	1.	9.1	51.5
1 OCT 0624	65	0.	.0	44.0	*	1 OCT 1430	146	6.	9.1	51.5	*	1 OCT 2236	227	1.	9.1	51.5
1 OCT 0630	66	0.	.0	44.0	*	1 OCT 1436	147	6.	9.1	51.5	*	1 OCT 2242	228	1.	9.1	51.5
1 OCT 0636	67	0.	.0	44.0	*	1 OCT 1442	148	6.	9.1	51.5	*	1 OCT 2248	229	1.	9.1	51.5
1 OCT 0642	68	0.	.0	44.0	*	1 OCT 1448	149	6.	9.1	51.5	*	1 OCT 2254	230	1.	9.1	51.5
1 OCT 0648	69	0.	.0	44.0	*	1 OCT 1454	150	6.	9.1	51.5	*	1 OCT 2300	231	0.	9.1	51.5
1 OCT 0654	70	0.	.0	44.0	*	1 OCT 1500	151	6.	9.1	51.5	*	1 OCT 2306	232	0.	9.1	51.5
1 OCT 0700	71	0.	.0	44.0	*	1 OCT 1506	152	5.	9.1	51.5	*	1 OCT 2312	233	0.	9.1	51.5
1 OCT 0706	72	0.	.0	44.0	*	1 OCT 1512	153	5.	9.1	51.5	*	1 OCT 2318	234	0.	9.1	51.5
1 OCT 0712	73	0.	.0	44.0	*	1 OCT 1518	154	5.	9.1	51.5	*	1 OCT 2324	235	0.	9.1	51.5
1 OCT 0718	74	0.	.0	44.0	*	1 OCT 1524	155	5.	9.1	51.5	*	1 OCT 2330	236	0.	9.1	51.5
1 OCT 0724	75	0.	.0	44.0	*	1 OCT 1530	156	5.	9.1	51.5	*	1 OCT 2336	237	0.	9.1	51.5
1 OCT 0730	76	0.	.0	44.0	*	1 OCT 1536	157	5.	9.1	51.5	*	1 OCT 2342	238	0.	9.1	51.5
1 OCT 0736	77	0.	.0	44.0	*	1 OCT 1542	158	5.	9.1	51.5	*	1 OCT 2348	239	0.	9.1	51.5
1 OCT 0742	78	0.	.0	44.0	*	1 OCT 1548	159	5.	9.1	51.5	*	1 OCT 2354	240	0.	9.1	51.5
1 OCT 0748	79	0.	.0	44.0	*	1 OCT 1554	160	5.	9.1	51.5	*	2 OCT 0000	241	0.	9.1	51.5
1 OCT 0754	80	0.	.0	44.0	*	1 OCT 1600	161	5.	9.1	51.5	*					
1 OCT 0800	81	0.	.0	44.0	*	1 OCT 1606	162	5.	9.1	51.5	*					

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)	(CFS)				
37.	9.80		10.	4.	4.	4.
		(INCHES)	2.397	3.480	3.480	3.480
		(AC-FT)	5.	7.	7.	7.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.00-HR
(AC-FT)	(HR)				
9.	9.80	9.	6.	6.	6.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.00-HR
(FEET)	(HR)				
51.76	9.80	51.57	48.67	48.67	48.67

CUMULATIVE AREA = .04 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	Day	263.	9.20	27.	8.	8.	.04		
ROUTED TO	SOUTH_PO	37.	9.80	10.	4.	4.	.04	51.76	9.80

*** NORMAL END OF HEC-1 ***

```
*FREE
ID  Black & Veatch
ID  Overland Park, KS
ID
ID  FPL
ID  Manatee Power Project - SOUTH POND
ID
ID  ********************************************************************
ID  DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
ID  - W/DETENTION BASINS IN PLACE
ID  ********************************************************************
ID
ID
ID  January 2002,SK
ID  Filename: DAY2.I
*DIAGRAM
*NOLIST
IT  6,01OCT00,0000,241
IO  5
KK Day Two
BA 0.03828
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
KK SOUTH_POND
KM 3IN OUTLET W/ 2FT WIDE FILTER
KM OVERFLOW 60 FT FLAT CRESTED WEIR FLOW AT CREST EL=51.50
KM TOP EMBANKMENT EL=53.50
KO 2
RS 1,ELEV,51.5
SV     0.00, 6.44,  6.72,  7.13,   7.83,  8.19,   9.12,   9.32,   10.11,    10.89
SE       44,   50,  50.2,  50.5,     51, 51.25,  51.50,   52.0,   52.50,     53.0
SQ        0, 0.00,  0.10,  0.18,   0.27,  0.30,   0.33,  70.91,  200.44,   365.70
ZZ
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 01 JUN 88           *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:25:23 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET             *
*        DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
*** FREE ***
               1          ID    Black & Veatch
               2          ID    Overland Park, KS
               3          ID
               4          ID    FPL
               5          ID    Manatee Power Project - SOUTH POND
               6          ID
               7          ID    ************************************************************
               8          ID    DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
               9          ID    - W/DETENTION BASINS IN PLACE
              10          ID    ************************************************************
              11          ID
              12          ID
              13          ID    January 2002,SK
              14          ID    Filename: DAY2.I
                         *DIAGRAM
*** NOLIST ***
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   17         Day
               V
               V
   42    SOUTH_PO

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 01 JUN 88           *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:25:23 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET             *
*        DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748              *
*                                       *
*****************************************
```


```
Black & Veatch
Overland Park, KS

FPL
Manatee Power Project - SOUTH POND

************************************************************
DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
- W/DETENTION BASINS IN PLACE
************************************************************

January 2002,SK
Filename: DAY2.I

 16 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
```

```
IT          HYDROGRAPH TIME DATA
                 NMIN           6  MINUTES IN COMPUTATION INTERVAL
                IDATE      1OCT 0  STARTING DATE
                ITIME        0000  STARTING TIME
                   NQ         241  NUMBER OF HYDROGRAPH ORDINATES
               NDDATE      2OCT 0  ENDING DATE
               NDTIME        0000  ENDING TIME
               ICENT           19  CENTURY MARK

          COMPUTATION INTERVAL      .10 HOURS
            TOTAL TIME BASE    24.00 HOURS

      ENGLISH UNITS
           DRAINAGE AREA         SQUARE MILES
           PRECIPITATION DEPTH   INCHES
           LENGTH, ELEVATION     FEET
           FLOW                  CUBIC FEET PER SECOND
           STORAGE VOLUME        ACRE-FEET
           SURFACE AREA          ACRES
           TEMPERATURE           DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
42 KK     *  SOUTH_PO  *     ND
          *            *
          **************

46 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           2  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

          HYDROGRAPH ROUTING DATA

47 RS          STORAGE ROUTING
                    NSTPS           1  NUMBER OF SUBREACHES
                     ITYP        ELEV  TYPE OF INITIAL CONDITION
                   RSVRIC       51.50  INITIAL CONDITION
                        X         .00 WORKING R AND D COEFFICIENT

48 SV            STORAGE          .0       6.4       6.7       7.1       7.8       8.2       9.1       9.3      10.1      10.8

49 SE          ELEVATION       44.00     50.00     50.20     50.50     51.00     51.25     51.50     52.00     52.50     53.00

50 SQ          DISCHARGE          0.        0.        0.        0.        0.        0.        0.       71.      200.      366.

                                                                  ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO       71.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*****************************************************************************************************************************

                                                HYDROGRAPH AT STATION SOUTH_PO

*****************************************************************************************************************************

 DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE  *  DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE  *  DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE
                                            *                                            *
 1 OCT 0000   1        0.      9.1    51.5  *  1 OCT 0806  82        0.      8.9    51.4  *  1 OCT 1612 163        0.      8.7    51.4
 1 OCT 0006   2        0.      9.1    51.5  *  1 OCT 0812  83        0.      8.9    51.4  *  1 OCT 1618 164        0.      8.7    51.4
 1 OCT 0012   3        0.      9.1    51.5  *  1 OCT 0818  84        0.      8.9    51.4  *  1 OCT 1624 165        0.      8.7    51.4
 1 OCT 0018   4        0.      9.1    51.5  *  1 OCT 0824  85        0.      8.9    51.4  *  1 OCT 1630 166        0.      8.7    51.4
 1 OCT 0024   5        0.      9.1    51.5  *  1 OCT 0830  86        0.      8.9    51.4  *  1 OCT 1636 167        0.      8.7    51.4
 1 OCT 0030   6        0.      9.1    51.5  *  1 OCT 0836  87        0.      8.9    51.4  *  1 OCT 1642 168        0.      8.7    51.4
 1 OCT 0036   7        0.      9.1    51.5  *  1 OCT 0842  88        0.      8.9    51.4  *  1 OCT 1648 169        0.      8.7    51.4
 1 OCT 0042   8        0.      9.1    51.5  *  1 OCT 0848  89        0.      8.9    51.4  *  1 OCT 1654 170        0.      8.7    51.4
 1 OCT 0048   9        0.      9.1    51.5  *  1 OCT 0854  90        0.      8.9    51.4  *  1 OCT 1700 171        0.      8.7    51.4
 1 OCT 0054  10        0.      9.1    51.5  *  1 OCT 0900  91        0.      8.9    51.4  *  1 OCT 1706 172        0.      8.7    51.4
 1 OCT 0100  11        0.      9.1    51.5  *  1 OCT 0906  92        0.      8.9    51.4  *  1 OCT 1712 173        0.      8.7    51.4
 1 OCT 0106  12        0.      9.1    51.5  *  1 OCT 0912  93        0.      8.9    51.4  *  1 OCT 1718 174        0.      8.7    51.4
 1 OCT 0112  13        0.      9.1    51.5  *  1 OCT 0918  94        0.      8.9    51.4  *  1 OCT 1724 175        0.      8.7    51.4
 1 OCT 0118  14        0.      9.1    51.5  *  1 OCT 0924  95        0.      8.9    51.4  *  1 OCT 1730 176        0.      8.7    51.4
 1 OCT 0124  15        0.      9.1    51.5  *  1 OCT 0930  96        0.      8.9    51.4  *  1 OCT 1736 177        0.      8.7    51.4
 1 OCT 0130  16        0.      9.1    51.5  *  1 OCT 0936  97        0.      8.9    51.4  *  1 OCT 1742 178        0.      8.6    51.4
 1 OCT 0136  17        0.      9.1    51.5  *  1 OCT 0942  98        0.      8.9    51.4  *  1 OCT 1748 179        0.      8.6    51.4
 1 OCT 0142  18        0.      9.1    51.5  *  1 OCT 0948  99        0.      8.9    51.4  *  1 OCT 1754 180        0.      8.6    51.4
 1 OCT 0148  19        0.      9.1    51.5  *  1 OCT 0954 100        0.      8.9    51.4  *  1 OCT 1800 181        0.      8.6    51.4
 1 OCT 0154  20        0.      9.1    51.5  *  1 OCT 1000 101        0.      8.9    51.4  *  1 OCT 1806 182        0.      8.6    51.4
 1 OCT 0200  21        0.      9.1    51.5  *  1 OCT 1006 102        0.      8.8    51.4  *  1 OCT 1812 183        0.      8.6    51.4
 1 OCT 0206  22        0.      9.1    51.5  *  1 OCT 1012 103        0.      8.8    51.4  *  1 OCT 1818 184        0.      8.6    51.4
 1 OCT 0212  23        0.      9.1    51.5  *  1 OCT 1018 104        0.      8.8    51.4  *  1 OCT 1824 185        0.      8.6    51.4
 1 OCT 0218  24        0.      9.1    51.5  *  1 OCT 1024 105        0.      8.8    51.4  *  1 OCT 1830 186        0.      8.6    51.4
 1 OCT 0224  25        0.      9.1    51.5  *  1 OCT 1030 106        0.      8.8    51.4  *  1 OCT 1836 187        0.      8.6    51.4
 1 OCT 0230  26        0.      9.1    51.5  *  1 OCT 1036 107        0.      8.8    51.4  *  1 OCT 1842 188        0.      8.6    51.4
 1 OCT 0236  27        0.      9.0    51.5  *  1 OCT 1042 108        0.      8.8    51.4  *  1 OCT 1848 189        0.      8.6    51.4
 1 OCT 0242  28        0.      9.0    51.5  *  1 OCT 1048 109        0.      8.8    51.4  *  1 OCT 1854 190        0.      8.6    51.4
 1 OCT 0248  29        0.      9.0    51.5  *  1 OCT 1054 110        0.      8.8    51.4  *  1 OCT 1900 191        0.      8.6    51.4
 1 OCT 0254  30        0.      9.0    51.5  *  1 OCT 1100 111        0.      8.8    51.4  *  1 OCT 1906 192        0.      8.6    51.4
 1 OCT 0300  31        0.      9.0    51.5  *  1 OCT 1106 112        0.      8.8    51.4  *  1 OCT 1912 193        0.      8.6    51.4
 1 OCT 0306  32        0.      9.0    51.5  *  1 OCT 1112 113        0.      8.8    51.4  *  1 OCT 1918 194        0.      8.6    51.4
```

1 OCT 0312	33	0.	9.0	51.5	*	1 OCT 1118	114	0.	8.8	51.4	*	1 OCT 1924	195	0.	8.6	51.4
1 OCT 0318	34	0.	9.0	51.5	*	1 OCT 1124	115	0.	8.8	51.4	*	1 OCT 1930	196	0.	8.6	51.4
1 OCT 0324	35	0.	9.0	51.5	*	1 OCT 1130	116	0.	8.8	51.4	*	1 OCT 1936	197	0.	8.6	51.4
1 OCT 0330	36	0.	9.0	51.5	*	1 OCT 1136	117	0.	8.8	51.4	*	1 OCT 1942	198	0.	8.6	51.4
1 OCT 0336	37	0.	9.0	51.5	*	1 OCT 1142	118	0.	8.8	51.4	*	1 OCT 1948	199	0.	8.6	51.4
1 OCT 0342	38	0.	9.0	51.5	*	1 OCT 1148	119	0.	8.8	51.4	*	1 OCT 1954	200	0.	8.6	51.4
1 OCT 0348	39	0.	9.0	51.5	*	1 OCT 1154	120	0.	8.8	51.4	*	1 OCT 2000	201	0.	8.6	51.4
1 OCT 0354	40	0.	9.0	51.5	*	1 OCT 1200	121	0.	8.8	51.4	*	1 OCT 2006	202	0.	8.6	51.4
1 OCT 0400	41	0.	9.0	51.5	*	1 OCT 1206	122	0.	8.8	51.4	*	1 OCT 2012	203	0.	8.6	51.4
1 OCT 0406	42	0.	9.0	51.5	*	1 OCT 1212	123	0.	8.8	51.4	*	1 OCT 2018	204	0.	8.6	51.4
1 OCT 0412	43	0.	9.0	51.5	*	1 OCT 1218	124	0.	8.8	51.4	*	1 OCT 2024	205	0.	8.6	51.4
1 OCT 0418	44	0.	9.0	51.5	*	1 OCT 1224	125	0.	8.8	51.4	*	1 OCT 2030	206	0.	8.6	51.4
1 OCT 0424	45	0.	9.0	51.5	*	1 OCT 1230	126	0.	8.8	51.4	*	1 OCT 2036	207	0.	8.6	51.4
1 OCT 0430	46	0.	9.0	51.5	*	1 OCT 1236	127	0.	8.8	51.4	*	1 OCT 2042	208	0.	8.6	51.4
1 OCT 0436	47	0.	9.0	51.5	*	1 OCT 1242	128	0.	8.8	51.4	*	1 OCT 2048	209	0.	8.6	51.4
1 OCT 0442	48	0.	9.0	51.5	*	1 OCT 1248	129	0.	8.8	51.4	*	1 OCT 2054	210	0.	8.6	51.4
1 OCT 0448	49	0.	9.0	51.5	*	1 OCT 1254	130	0.	8.8	51.4	*	1 OCT 2100	211	0.	8.6	51.4
1 OCT 0454	50	0.	9.0	51.5	*	1 OCT 1300	131	0.	8.8	51.4	*	1 OCT 2106	212	0.	8.6	51.3
1 OCT 0500	51	0.	9.0	51.5	*	1 OCT 1306	132	0.	8.8	51.4	*	1 OCT 2112	213	0.	8.6	51.3
1 OCT 0506	52	0.	9.0	51.5	*	1 OCT 1312	133	0.	8.8	51.4	*	1 OCT 2118	214	0.	8.6	51.3
1 OCT 0512	53	0.	9.0	51.5	*	1 OCT 1318	134	0.	8.8	51.4	*	1 OCT 2124	215	0.	8.6	51.3
1 OCT 0518	54	0.	9.0	51.5	*	1 OCT 1324	135	0.	8.8	51.4	*	1 OCT 2130	216	0.	8.6	51.3
1 OCT 0524	55	0.	9.0	51.5	*	1 OCT 1330	136	0.	8.8	51.4	*	1 OCT 2136	217	0.	8.5	51.3
1 OCT 0530	56	0.	9.0	51.5	*	1 OCT 1336	137	0.	8.8	51.4	*	1 OCT 2142	218	0.	8.5	51.3
1 OCT 0536	57	0.	9.0	51.5	*	1 OCT 1342	138	0.	8.8	51.4	*	1 OCT 2148	219	0.	8.5	51.3
1 OCT 0542	58	0.	9.0	51.5	*	1 OCT 1348	139	0.	8.8	51.4	*	1 OCT 2154	220	0.	8.5	51.3
1 OCT 0548	59	0.	9.0	51.5	*	1 OCT 1354	140	0.	8.7	51.4	*	1 OCT 2200	221	0.	8.5	51.3
1 OCT 0554	60	0.	9.0	51.5	*	1 OCT 1400	141	0.	8.7	51.4	*	1 OCT 2206	222	0.	8.5	51.3
1 OCT 0600	61	0.	9.0	51.5	*	1 OCT 1406	142	0.	8.7	51.4	*	1 OCT 2212	223	0.	8.5	51.3
1 OCT 0606	62	0.	9.0	51.5	*	1 OCT 1412	143	0.	8.7	51.4	*	1 OCT 2218	224	0.	8.5	51.3
1 OCT 0612	63	0.	9.0	51.5	*	1 OCT 1418	144	0.	8.7	51.4	*	1 OCT 2224	225	0.	8.5	51.3
1 OCT 0618	64	0.	8.9	51.5	*	1 OCT 1424	145	0.	8.7	51.4	*	1 OCT 2230	226	0.	8.5	51.3
1 OCT 0624	65	0.	8.9	51.5	*	1 OCT 1430	146	0.	8.7	51.4	*	1 OCT 2236	227	0.	8.5	51.3
1 OCT 0630	66	0.	8.9	51.5	*	1 OCT 1436	147	0.	8.7	51.4	*	1 OCT 2242	228	0.	8.5	51.3
1 OCT 0636	67	0.	8.9	51.5	*	1 OCT 1442	148	0.	8.7	51.4	*	1 OCT 2248	229	0.	8.5	51.3
1 OCT 0642	68	0.	8.9	51.5	*	1 OCT 1448	149	0.	8.7	51.4	*	1 OCT 2254	230	0.	8.5	51.3
1 OCT 0648	69	0.	8.9	51.5	*	1 OCT 1454	150	0.	8.7	51.4	*	1 OCT 2300	231	0.	8.5	51.3
1 OCT 0654	70	0.	8.9	51.4	*	1 OCT 1500	151	0.	8.7	51.4	*	1 OCT 2306	232	0.	8.5	51.3
1 OCT 0700	71	0.	8.9	51.4	*	1 OCT 1506	152	0.	8.7	51.4	*	1 OCT 2312	233	0.	8.5	51.3
1 OCT 0706	72	0.	8.9	51.4	*	1 OCT 1512	153	0.	8.7	51.4	*	1 OCT 2318	234	0.	8.5	51.3
1 OCT 0712	73	0.	8.9	51.4	*	1 OCT 1518	154	0.	8.7	51.4	*	1 OCT 2324	235	0.	8.5	51.3
1 OCT 0718	74	0.	8.9	51.4	*	1 OCT 1524	155	0.	8.7	51.4	*	1 OCT 2330	236	0.	8.5	51.3
1 OCT 0724	75	0.	8.9	51.4	*	1 OCT 1530	156	0.	8.7	51.4	*	1 OCT 2336	237	0.	8.5	51.3
1 OCT 0730	76	0.	8.9	51.4	*	1 OCT 1536	157	0.	8.7	51.4	*	1 OCT 2342	238	0.	8.5	51.3
1 OCT 0736	77	0.	8.9	51.4	*	1 OCT 1542	158	0.	8.7	51.4	*	1 OCT 2348	239	0.	8.5	51.3
1 OCT 0742	78	0.	8.9	51.4	*	1 OCT 1548	159	0.	8.7	51.4	*	1 OCT 2354	240	0.	8.5	51.3
1 OCT 0748	79	0.	8.9	51.4	*	1 OCT 1554	160	0.	8.7	51.4	*	2 OCT 0000	241	0.	8.5	51.3
1 OCT 0754	80	0.	8.9	51.4	*	1 OCT 1600	161	0.	8.7	51.4	*					
1 OCT 0800	81	0.	8.9	51.4	*	1 OCT 1606	162	0.	8.7	51.4	*					

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)	(CFS)				
0.	.10		0.	0.	0.	0.
		(INCHES)	.080	.311	.311	.311
		(AC-FT)	0.	1.	1.	1.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.00-HR
(AC-FT)	(HR)				
9.	.10	9.	9.	9.	9.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.00-HR
(FEET)	(HR)				
51.50	.00	51.48	51.41	51.41	51.41

CUMULATIVE AREA = .04 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	Day	0.	.10	0.	0.	0.	.04		
ROUTED TO	SOUTH_PO	0.	.10	0.	0.	0.	.04	51.50	.00

*** NORMAL END OF HEC-1 ***

```
*FREE
ID  Black & Veatch
ID  Overland Park, KS
ID
ID  FPL
ID  Manatee Power Project - SOUTH POND
ID
ID  ********************************************************************
ID  DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
ID  - W/DETENTION BASINS IN PLACE
ID  ********************************************************************
ID
ID
ID  January 2002,SK
ID  Filename: DAY3.I
*DIAGRAM
*NOLIST
IT  6,01OCT00,0000,241
IO  5
KK Day Three
BA 0.03828
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
QI      0     0     0     0     0     0     0     0     0     0
KK SOUTH_POND
KM 3IN OUTLET W/ 2FT WIDE FILTER
KM OVERFLOW 60 FT FLAT CRESTED WEIR FLOW AT CREST EL=51.50
KM TOP EMBANKMENT EL=53.50
KO 2
RS 1,ELEV,51.3
SV     0.00, 6.44,  6.72,  7.13,   7.83,  8.19,   9.12,   9.32,   10.11,    10.89
SE       44,   50,  50.2,  50.5,     51, 51.25,  51.50,   52.0,   52.50,     53.0
SQ        0, 0.00,  0.10,  0.18,   0.27,  0.30,   0.33,  70.91,  200.44,   365.70
ZZ
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 01 JUN 88           *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:25:56 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
         LINE          ID.....1.......2.......3.......4.......5.......6.......7.......8.......9......10

*** FREE ***
              1        ID    Black & Veatch
              2        ID    Overland Park, KS
              3        ID
              4        ID    FPL
              5        ID    Manatee Power Project - SOUTH POND
              6        ID
              7        ID    ************************************************************
              8        ID    DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
              9        ID    - W/DETENTION BASINS IN PLACE
             10        ID    ************************************************************
             11        ID
             12        ID
             13        ID    January 2002,SK
             14        ID    Filename: DAY3.I
                       *DIAGRAM
*** NOLIST ***
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE       (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

  NO.       (.) CONNECTOR         (<---) RETURN OF DIVERTED OR PUMPED FLOW

   17          Day
                V
                V
   42     SOUTH_PO

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 01 JUN 88           *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:25:56 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```


Black & Veatch
Overland Park, KS

FPL
Manatee Power Project - SOUTH POND

DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
- W/DETENTION BASINS IN PLACE

January 2002,SK
Filename: DAY3.I

```
 16 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
```

```
 IT          HYDROGRAPH TIME DATA
                   NMIN          6  MINUTES IN COMPUTATION INTERVAL
                  IDATE      1OCT 0  STARTING DATE
                  ITIME        0000  STARTING TIME
                     NQ         241  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE      2OCT 0  ENDING DATE
                 NDTIME        0000  ENDING TIME
                  ICENT          19  CENTURY MARK

               COMPUTATION INTERVAL      .10 HOURS
                  TOTAL TIME BASE    24.00 HOURS

       ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 42 KK      *  SOUTH_PO  *      ND
            *            *
            **************

 46 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          2  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

          HYDROGRAPH ROUTING DATA

 47 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC      51.30  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

 48 SV          STORAGE          .0      6.4     6.7     7.1     7.8     8.2     9.1     9.3    10.1    10.8

 49 SE          ELEVATION      44.00   50.00   50.20   50.50   51.00   51.25   51.50   52.00   52.50   53.00

 50 SQ          DISCHARGE        0.      0.      0.      0.      0.      0.      0.     71.    200.    366.

                                                  ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO       71.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

********************************************************************************************************************************

                                                HYDROGRAPH AT STATION SOUTH_PO

********************************************************************************************************************************
```

DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
1 OCT 0000	1	0.	8.4	51.3	1 OCT 0806	82	0.	8.2	51.2	1 OCT 1612	163	0.	8.0	51.1
1 OCT 0006	2	0.	8.4	51.3	1 OCT 0812	83	0.	8.2	51.2	1 OCT 1618	164	0.	8.0	51.1
1 OCT 0012	3	0.	8.4	51.3	1 OCT 0818	84	0.	8.2	51.2	1 OCT 1624	165	0.	8.0	51.1
1 OCT 0018	4	0.	8.4	51.3	1 OCT 0824	85	0.	8.2	51.2	1 OCT 1630	166	0.	8.0	51.1
1 OCT 0024	5	0.	8.4	51.3	1 OCT 0830	86	0.	8.2	51.2	1 OCT 1636	167	0.	8.0	51.1
1 OCT 0030	6	0.	8.4	51.3	1 OCT 0836	87	0.	8.2	51.2	1 OCT 1642	168	0.	8.0	51.1
1 OCT 0036	7	0.	8.4	51.3	1 OCT 0842	88	0.	8.2	51.2	1 OCT 1648	169	0.	8.0	51.1
1 OCT 0042	8	0.	8.4	51.3	1 OCT 0848	89	0.	8.2	51.2	1 OCT 1654	170	0.	8.0	51.1
1 OCT 0048	9	0.	8.4	51.3	1 OCT 0854	90	0.	8.2	51.2	1 OCT 1700	171	0.	8.0	51.1
1 OCT 0054	10	0.	8.4	51.3	1 OCT 0900	91	0.	8.2	51.2	1 OCT 1706	172	0.	8.0	51.1
1 OCT 0100	11	0.	8.4	51.3	1 OCT 0906	92	0.	8.1	51.2	1 OCT 1712	173	0.	8.0	51.1
1 OCT 0106	12	0.	8.3	51.3	1 OCT 0912	93	0.	8.1	51.2	1 OCT 1718	174	0.	8.0	51.1
1 OCT 0112	13	0.	8.3	51.3	1 OCT 0918	94	0.	8.1	51.2	1 OCT 1724	175	0.	8.0	51.1
1 OCT 0118	14	0.	8.3	51.3	1 OCT 0924	95	0.	8.1	51.2	1 OCT 1730	176	0.	7.9	51.1
1 OCT 0124	15	0.	8.3	51.3	1 OCT 0930	96	0.	8.1	51.2	1 OCT 1736	177	0.	7.9	51.1
1 OCT 0130	16	0.	8.3	51.3	1 OCT 0936	97	0.	8.1	51.2	1 OCT 1742	178	0.	7.9	51.1
1 OCT 0136	17	0.	8.3	51.3	1 OCT 0942	98	0.	8.1	51.2	1 OCT 1748	179	0.	7.9	51.1
1 OCT 0142	18	0.	8.3	51.3	1 OCT 0948	99	0.	8.1	51.2	1 OCT 1754	180	0.	7.9	51.1
1 OCT 0148	19	0.	8.3	51.3	1 OCT 0954	100	0.	8.1	51.2	1 OCT 1800	181	0.	7.9	51.1
1 OCT 0154	20	0.	8.3	51.3	1 OCT 1000	101	0.	8.1	51.2	1 OCT 1806	182	0.	7.9	51.1
1 OCT 0200	21	0.	8.3	51.3	1 OCT 1006	102	0.	8.1	51.2	1 OCT 1812	183	0.	7.9	51.1
1 OCT 0206	22	0.	8.3	51.3	1 OCT 1012	103	0.	8.1	51.2	1 OCT 1818	184	0.	7.9	51.1
1 OCT 0212	23	0.	8.3	51.3	1 OCT 1018	104	0.	8.1	51.2	1 OCT 1824	185	0.	7.9	51.1
1 OCT 0218	24	0.	8.3	51.3	1 OCT 1024	105	0.	8.1	51.2	1 OCT 1830	186	0.	7.9	51.1
1 OCT 0224	25	0.	8.3	51.3	1 OCT 1030	106	0.	8.1	51.2	1 OCT 1836	187	0.	7.9	51.1
1 OCT 0230	26	0.	8.3	51.3	1 OCT 1036	107	0.	8.1	51.2	1 OCT 1842	188	0.	7.9	51.1
1 OCT 0236	27	0.	8.3	51.3	1 OCT 1042	108	0.	8.1	51.2	1 OCT 1848	189	0.	7.9	51.1
1 OCT 0242	28	0.	8.3	51.3	1 OCT 1048	109	0.	8.1	51.2	1 OCT 1854	190	0.	7.9	51.1
1 OCT 0248	29	0.	8.3	51.3	1 OCT 1054	110	0.	8.1	51.2	1 OCT 1900	191	0.	7.9	51.1
1 OCT 0254	30	0.	8.3	51.3	1 OCT 1100	111	0.	8.1	51.2	1 OCT 1906	192	0.	7.9	51.1
1 OCT 0300	31	0.	8.3	51.3	1 OCT 1106	112	0.	8.1	51.2	1 OCT 1912	193	0.	7.9	51.1
1 OCT 0306	32	0.	8.3	51.3	1 OCT 1112	113	0.	8.1	51.2	1 OCT 1918	194	0.	7.9	51.1

1 OCT 0312	33	0.	8.3	51.3	*	1 OCT 1118	114	0.	8.1	51.2	*	1 OCT 1924	195	0.	7.9	51.1
1 OCT 0318	34	0.	8.3	51.3	*	1 OCT 1124	115	0.	8.1	51.2	*	1 OCT 1930	196	0.	7.9	51.1
1 OCT 0324	35	0.	8.3	51.3	*	1 OCT 1130	116	0.	8.1	51.2	*	1 OCT 1936	197	0.	7.9	51.0
1 OCT 0330	36	0.	8.3	51.3	*	1 OCT 1136	117	0.	8.1	51.2	*	1 OCT 1942	198	0.	7.9	51.0
1 OCT 0336	37	0.	8.3	51.3	*	1 OCT 1142	118	0.	8.1	51.2	*	1 OCT 1948	199	0.	7.9	51.0
1 OCT 0342	38	0.	8.3	51.3	*	1 OCT 1148	119	0.	8.1	51.2	*	1 OCT 1954	200	0.	7.9	51.0
1 OCT 0348	39	0.	8.3	51.3	*	1 OCT 1154	120	0.	8.1	51.2	*	1 OCT 2000	201	0.	7.9	51.0
1 OCT 0354	40	0.	8.3	51.3	*	1 OCT 1200	121	0.	8.1	51.2	*	1 OCT 2006	202	0.	7.9	51.0
1 OCT 0400	41	0.	8.3	51.3	*	1 OCT 1206	122	0.	8.1	51.2	*	1 OCT 2012	203	0.	7.9	51.0
1 OCT 0406	42	0.	8.3	51.3	*	1 OCT 1212	123	0.	8.1	51.2	*	1 OCT 2018	204	0.	7.9	51.0
1 OCT 0412	43	0.	8.3	51.3	*	1 OCT 1218	124	0.	8.1	51.2	*	1 OCT 2024	205	0.	7.9	51.0
1 OCT 0418	44	0.	8.3	51.3	*	1 OCT 1224	125	0.	8.1	51.2	*	1 OCT 2030	206	0.	7.9	51.0
1 OCT 0424	45	0.	8.3	51.3	*	1 OCT 1230	126	0.	8.1	51.2	*	1 OCT 2036	207	0.	7.9	51.0
1 OCT 0430	46	0.	8.3	51.3	*	1 OCT 1236	127	0.	8.1	51.2	*	1 OCT 2042	208	0.	7.9	51.0
1 OCT 0436	47	0.	8.3	51.3	*	1 OCT 1242	128	0.	8.1	51.2	*	1 OCT 2048	209	0.	7.9	51.0
1 OCT 0442	48	0.	8.3	51.3	*	1 OCT 1248	129	0.	8.1	51.2	*	1 OCT 2054	210	0.	7.9	51.0
1 OCT 0448	49	0.	8.3	51.3	*	1 OCT 1254	130	0.	8.1	51.2	*	1 OCT 2100	211	0.	7.9	51.0
1 OCT 0454	50	0.	8.3	51.3	*	1 OCT 1300	131	0.	8.1	51.2	*	1 OCT 2106	212	0.	7.9	51.0
1 OCT 0500	51	0.	8.3	51.3	*	1 OCT 1306	132	0.	8.1	51.2	*	1 OCT 2112	213	0.	7.9	51.0
1 OCT 0506	52	0.	8.2	51.3	*	1 OCT 1312	133	0.	8.0	51.2	*	1 OCT 2118	214	0.	7.9	51.0
1 OCT 0512	53	0.	8.2	51.3	*	1 OCT 1318	134	0.	8.0	51.2	*	1 OCT 2124	215	0.	7.9	51.0
1 OCT 0518	54	0.	8.2	51.3	*	1 OCT 1324	135	0.	8.0	51.1	*	1 OCT 2130	216	0.	7.9	51.0
1 OCT 0524	55	0.	8.2	51.3	*	1 OCT 1330	136	0.	8.0	51.1	*	1 OCT 2136	217	0.	7.9	51.0
1 OCT 0530	56	0.	8.2	51.3	*	1 OCT 1336	137	0.	8.0	51.1	*	1 OCT 2142	218	0.	7.9	51.0
1 OCT 0536	57	0.	8.2	51.3	*	1 OCT 1342	138	0.	8.0	51.1	*	1 OCT 2148	219	0.	7.9	51.0
1 OCT 0542	58	0.	8.2	51.3	*	1 OCT 1348	139	0.	8.0	51.1	*	1 OCT 2154	220	0.	7.8	51.0
1 OCT 0548	59	0.	8.2	51.3	*	1 OCT 1354	140	0.	8.0	51.1	*	1 OCT 2200	221	0.	7.8	51.0
1 OCT 0554	60	0.	8.2	51.3	*	1 OCT 1400	141	0.	8.0	51.1	*	1 OCT 2206	222	0.	7.8	51.0
1 OCT 0600	61	0.	8.2	51.3	*	1 OCT 1406	142	0.	8.0	51.1	*	1 OCT 2212	223	0.	7.8	51.0
1 OCT 0606	62	0.	8.2	51.3	*	1 OCT 1412	143	0.	8.0	51.1	*	1 OCT 2218	224	0.	7.8	51.0
1 OCT 0612	63	0.	8.2	51.3	*	1 OCT 1418	144	0.	8.0	51.1	*	1 OCT 2224	225	0.	7.8	51.0
1 OCT 0618	64	0.	8.2	51.3	*	1 OCT 1424	145	0.	8.0	51.1	*	1 OCT 2230	226	0.	7.8	51.0
1 OCT 0624	65	0.	8.2	51.3	*	1 OCT 1430	146	0.	8.0	51.1	*	1 OCT 2236	227	0.	7.8	51.0
1 OCT 0630	66	0.	8.2	51.3	*	1 OCT 1436	147	0.	8.0	51.1	*	1 OCT 2242	228	0.	7.8	51.0
1 OCT 0636	67	0.	8.2	51.3	*	1 OCT 1442	148	0.	8.0	51.1	*	1 OCT 2248	229	0.	7.8	51.0
1 OCT 0642	68	0.	8.2	51.3	*	1 OCT 1448	149	0.	8.0	51.1	*	1 OCT 2254	230	0.	7.8	51.0
1 OCT 0648	69	0.	8.2	51.3	*	1 OCT 1454	150	0.	8.0	51.1	*	1 OCT 2300	231	0.	7.8	51.0
1 OCT 0654	70	0.	8.2	51.3	*	1 OCT 1500	151	0.	8.0	51.1	*	1 OCT 2306	232	0.	7.8	51.0
1 OCT 0700	71	0.	8.2	51.3	*	1 OCT 1506	152	0.	8.0	51.1	*	1 OCT 2312	233	0.	7.8	51.0
1 OCT 0706	72	0.	8.2	51.3	*	1 OCT 1512	153	0.	8.0	51.1	*	1 OCT 2318	234	0.	7.8	51.0
1 OCT 0712	73	0.	8.2	51.3	*	1 OCT 1518	154	0.	8.0	51.1	*	1 OCT 2324	235	0.	7.8	51.0
1 OCT 0718	74	0.	8.2	51.3	*	1 OCT 1524	155	0.	8.0	51.1	*	1 OCT 2330	236	0.	7.8	51.0
1 OCT 0724	75	0.	8.2	51.3	*	1 OCT 1530	156	0.	8.0	51.1	*	1 OCT 2336	237	0.	7.8	51.0
1 OCT 0730	76	0.	8.2	51.2	*	1 OCT 1536	157	0.	8.0	51.1	*	1 OCT 2342	238	0.	7.8	51.0
1 OCT 0736	77	0.	8.2	51.2	*	1 OCT 1542	158	0.	8.0	51.1	*	1 OCT 2348	239	0.	7.8	51.0
1 OCT 0742	78	0.	8.2	51.2	*	1 OCT 1548	159	0.	8.0	51.1	*	1 OCT 2354	240	0.	7.8	51.0
1 OCT 0748	79	0.	8.2	51.2	*	1 OCT 1554	160	0.	8.0	51.1	*	2 OCT 0000	241	0.	7.8	51.0
1 OCT 0754	80	0.	8.2	51.2	*	1 OCT 1600	161	0.	8.0	51.1	*					
1 OCT 0800	81	0.	8.2	51.2	*	1 OCT 1606	162	0.	8.0	51.1	*					

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.00-HR
		(CFS)				
0.	.10		0.	0.	0.	0.
		(INCHES)	.074	.281	.281	.281
		(AC-FT)	0.	1.	1.	1.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.00-HR
8.	.10	8.	8.	8.	8.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.00-HR
51.30	.00	51.28	51.16	51.16	51.16

CUMULATIVE AREA = .04 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	Day	0.	.10	0.	0.	0.	.04		
ROUTED TO	SOUTH_PO	0.	.10	0.	0.	0.	.04	51.30	.00

*** NORMAL END OF HEC-1 ***

```
*FREE
ID  Black & Veatch
ID  Overland Park, KS
ID
ID  FPL
ID  Manatee Power Project - SOUTH POND
ID
ID  ********************************************************************
ID  DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
ID  - W/DETENTION BASINS IN PLACE
ID  ********************************************************************
ID
ID
ID  January 2002,SK
ID  Filename: DAY4.I
*DIAGRAM
*NOLIST
IT  6,01OCT00,0000,241
IO  5
KK Day Four
BA 0.03828
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
QI       0      0      0      0      0      0      0      0      0      0
KK SOUTH_POND
KM 3IN OUTLET W/ 2FT WIDE FILTER
KM OVERFLOW 60 FT FLAT CRESTED WEIR FLOW AT CREST EL=51.50
KM TOP EMBANKMENT EL=53.3
KO 2
RS 1,ELEV,51.00
SV     0.00, 6.44,  6.72,  7.13,   7.83,  8.19,   9.12,   9.32,   10.11,    10.89
SE       44,   50,  50.2,  50.5,     51, 51.25,  51.50,   52.0,   52.50,     53.0
SQ        0, 0.00,  0.10,  0.18,   0.27,  0.30,   0.33,  70.91,  200.44,   365.70
ZZ
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 01 JUN 88           *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:26:29 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
*** FREE ***
               1        ID    Black & Veatch
               2        ID    Overland Park, KS
               3        ID
               4        ID    FPL
               5        ID    Manatee Power Project - SOUTH POND
               6        ID
               7        ID    ************************************************************
               8        ID    DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
               9        ID    - W/DETENTION BASINS IN PLACE
              10        ID    ************************************************************
              11        ID
              12        ID
              13        ID    January 2002,SK
              14        ID    Filename: DAY4.I
                        *DIAGRAM
*** NOLIST ***
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   17         Day
               V
               V
   42     SOUTH_PO

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 01 JUN 88           *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:26:29 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```


```
Black & Veatch
Overland Park, KS

FPL
Manatee Power Project - SOUTH POND

************************************************************
DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
- W/DETENTION BASINS IN PLACE
************************************************************

January 2002,SK
Filename: DAY4.I

 16 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
```

```
 IT          HYDROGRAPH TIME DATA
                   NMIN           6  MINUTES IN COMPUTATION INTERVAL
                  IDATE      1OCT 0  STARTING DATE
                  ITIME        0000  STARTING TIME
                     NQ         241  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE      2OCT 0  ENDING DATE
                 NDTIME        0000  ENDING TIME
                  ICENT          19  CENTURY MARK

               COMPUTATION INTERVAL      .10 HOURS
                   TOTAL TIME BASE    24.00 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             *************
             *           *
 42 KK       * SOUTH_PO  *     ND
             *           *
             *************

 46 KO           OUTPUT CONTROL VARIABLES
                      IPRNT           2  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

 47 RS           STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC       51.00  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

 48 SV             STORAGE          .0       6.4       6.7       7.1       7.8       8.2       9.1       9.3      10.1      10.8

 49 SE           ELEVATION       44.00     50.00     50.20     50.50     51.00     51.25     51.50     52.00     52.50     53.00

 50 SQ           DISCHARGE          0.        0.        0.        0.        0.        0.        0.       71.      200.      366.

                                                          ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO       71.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

********************************************************************************************************************************

                                                    HYDROGRAPH AT STATION SOUTH_PO

********************************************************************************************************************************

 DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE *  DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE *  DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE
                                           *                                           *
  1 OCT 0000   1       0.      7.8    51.0 *   1 OCT 0806  82       0.      7.7    50.9 *   1 OCT 1612 163       0.      7.5    50.8
  1 OCT 0006   2       0.      7.8    51.0 *   1 OCT 0812  83       0.      7.7    50.9 *   1 OCT 1618 164       0.      7.5    50.8
  1 OCT 0012   3       0.      7.8    51.0 *   1 OCT 0818  84       0.      7.7    50.9 *   1 OCT 1624 165       0.      7.5    50.8
  1 OCT 0018   4       0.      7.8    51.0 *   1 OCT 0824  85       0.      7.7    50.9 *   1 OCT 1630 166       0.      7.5    50.8
  1 OCT 0024   5       0.      7.8    51.0 *   1 OCT 0830  86       0.      7.6    50.9 *   1 OCT 1636 167       0.      7.5    50.8
  1 OCT 0030   6       0.      7.8    51.0 *   1 OCT 0836  87       0.      7.6    50.9 *   1 OCT 1642 168       0.      7.5    50.8
  1 OCT 0036   7       0.      7.8    51.0 *   1 OCT 0842  88       0.      7.6    50.9 *   1 OCT 1648 169       0.      7.5    50.8
  1 OCT 0042   8       0.      7.8    51.0 *   1 OCT 0848  89       0.      7.6    50.9 *   1 OCT 1654 170       0.      7.5    50.8
  1 OCT 0048   9       0.      7.8    51.0 *   1 OCT 0854  90       0.      7.6    50.9 *   1 OCT 1700 171       0.      7.5    50.8
  1 OCT 0054  10       0.      7.8    51.0 *   1 OCT 0900  91       0.      7.6    50.9 *   1 OCT 1706 172       0.      7.5    50.8
  1 OCT 0100  11       0.      7.8    51.0 *   1 OCT 0906  92       0.      7.6    50.9 *   1 OCT 1712 173       0.      7.5    50.7
  1 OCT 0106  12       0.      7.8    51.0 *   1 OCT 0912  93       0.      7.6    50.9 *   1 OCT 1718 174       0.      7.5    50.7
  1 OCT 0112  13       0.      7.8    51.0 *   1 OCT 0918  94       0.      7.6    50.9 *   1 OCT 1724 175       0.      7.5    50.7
  1 OCT 0118  14       0.      7.8    51.0 *   1 OCT 0924  95       0.      7.6    50.9 *   1 OCT 1730 176       0.      7.5    50.7
  1 OCT 0124  15       0.      7.8    51.0 *   1 OCT 0930  96       0.      7.6    50.9 *   1 OCT 1736 177       0.      7.5    50.7
  1 OCT 0130  16       0.      7.8    51.0 *   1 OCT 0936  97       0.      7.6    50.9 *   1 OCT 1742 178       0.      7.5    50.7
  1 OCT 0136  17       0.      7.8    51.0 *   1 OCT 0942  98       0.      7.6    50.9 *   1 OCT 1748 179       0.      7.5    50.7
  1 OCT 0142  18       0.      7.8    51.0 *   1 OCT 0948  99       0.      7.6    50.9 *   1 OCT 1754 180       0.      7.5    50.7
  1 OCT 0148  19       0.      7.8    51.0 *   1 OCT 0954 100       0.      7.6    50.9 *   1 OCT 1800 181       0.      7.5    50.7
  1 OCT 0154  20       0.      7.8    51.0 *   1 OCT 1000 101       0.      7.6    50.8 *   1 OCT 1806 182       0.      7.5    50.7
  1 OCT 0200  21       0.      7.8    51.0 *   1 OCT 1006 102       0.      7.6    50.8 *   1 OCT 1812 183       0.      7.5    50.7
  1 OCT 0206  22       0.      7.8    51.0 *   1 OCT 1012 103       0.      7.6    50.8 *   1 OCT 1818 184       0.      7.5    50.7
  1 OCT 0212  23       0.      7.8    51.0 *   1 OCT 1018 104       0.      7.6    50.8 *   1 OCT 1824 185       0.      7.5    50.7
  1 OCT 0218  24       0.      7.8    51.0 *   1 OCT 1024 105       0.      7.6    50.8 *   1 OCT 1830 186       0.      7.5    50.7
  1 OCT 0224  25       0.      7.8    51.0 *   1 OCT 1030 106       0.      7.6    50.8 *   1 OCT 1836 187       0.      7.5    50.7
  1 OCT 0230  26       0.      7.8    51.0 *   1 OCT 1036 107       0.      7.6    50.8 *   1 OCT 1842 188       0.      7.5    50.7
  1 OCT 0236  27       0.      7.8    51.0 *   1 OCT 1042 108       0.      7.6    50.8 *   1 OCT 1848 189       0.      7.4    50.7
  1 OCT 0242  28       0.      7.8    51.0 *   1 OCT 1048 109       0.      7.6    50.8 *   1 OCT 1854 190       0.      7.4    50.7
  1 OCT 0248  29       0.      7.8    51.0 *   1 OCT 1054 110       0.      7.6    50.8 *   1 OCT 1900 191       0.      7.4    50.7
  1 OCT 0254  30       0.      7.8    51.0 *   1 OCT 1100 111       0.      7.6    50.8 *   1 OCT 1906 192       0.      7.4    50.7
  1 OCT 0300  31       0.      7.8    51.0 *   1 OCT 1106 112       0.      7.6    50.8 *   1 OCT 1912 193       0.      7.4    50.7
  1 OCT 0306  32       0.      7.8    51.0 *   1 OCT 1112 113       0.      7.6    50.8 *   1 OCT 1918 194       0.      7.4    50.7
```

1 OCT 0312	33	0.	7.8	50.9	*	1 OCT 1118	114	0.	7.6	50.8	*	1 OCT 1924	195	0.	7.4	50.7			
1 OCT 0318	34	0.	7.8	50.9	*	1 OCT 1124	115	0.	7.6	50.8	*	1 OCT 1930	196	0.	7.4	50.7			
1 OCT 0324	35	0.	7.8	50.9	*	1 OCT 1130	116	0.	7.6	50.8	*	1 OCT 1936	197	0.	7.4	50.7			
1 OCT 0330	36	0.	7.8	50.9	*	1 OCT 1136	117	0.	7.6	50.8	*	1 OCT 1942	198	0.	7.4	50.7			
1 OCT 0336	37	0.	7.8	50.9	*	1 OCT 1142	118	0.	7.6	50.8	*	1 OCT 1948	199	0.	7.4	50.7			
1 OCT 0342	38	0.	7.7	50.9	*	1 OCT 1148	119	0.	7.6	50.8	*	1 OCT 1954	200	0.	7.4	50.7			
1 OCT 0348	39	0.	7.7	50.9	*	1 OCT 1154	120	0.	7.6	50.8	*	1 OCT 2000	201	0.	7.4	50.7			
1 OCT 0354	40	0.	7.7	50.9	*	1 OCT 1200	121	0.	7.6	50.8	*	1 OCT 2006	202	0.	7.4	50.7			
1 OCT 0400	41	0.	7.7	50.9	*	1 OCT 1206	122	0.	7.6	50.8	*	1 OCT 2012	203	0.	7.4	50.7			
1 OCT 0406	42	0.	7.7	50.9	*	1 OCT 1212	123	0.	7.6	50.8	*	1 OCT 2018	204	0.	7.4	50.7			
1 OCT 0412	43	0.	7.7	50.9	*	1 OCT 1218	124	0.	7.6	50.8	*	1 OCT 2024	205	0.	7.4	50.7			
1 OCT 0418	44	0.	7.7	50.9	*	1 OCT 1224	125	0.	7.6	50.8	*	1 OCT 2030	206	0.	7.4	50.7			
1 OCT 0424	45	0.	7.7	50.9	*	1 OCT 1230	126	0.	7.6	50.8	*	1 OCT 2036	207	0.	7.4	50.7			
1 OCT 0430	46	0.	7.7	50.9	*	1 OCT 1236	127	0.	7.6	50.8	*	1 OCT 2042	208	0.	7.4	50.7			
1 OCT 0436	47	0.	7.7	50.9	*	1 OCT 1242	128	0.	7.6	50.8	*	1 OCT 2048	209	0.	7.4	50.7			
1 OCT 0442	48	0.	7.7	50.9	*	1 OCT 1248	129	0.	7.6	50.8	*	1 OCT 2054	210	0.	7.4	50.7			
1 OCT 0448	49	0.	7.7	50.9	*	1 OCT 1254	130	0.	7.6	50.8	*	1 OCT 2100	211	0.	7.4	50.7			
1 OCT 0454	50	0.	7.7	50.9	*	1 OCT 1300	131	0.	7.6	50.8	*	1 OCT 2106	212	0.	7.4	50.7			
1 OCT 0500	51	0.	7.7	50.9	*	1 OCT 1306	132	0.	7.6	50.8	*	1 OCT 2112	213	0.	7.4	50.7			
1 OCT 0506	52	0.	7.7	50.9	*	1 OCT 1312	133	0.	7.6	50.8	*	1 OCT 2118	214	0.	7.4	50.7			
1 OCT 0512	53	0.	7.7	50.9	*	1 OCT 1318	134	0.	7.6	50.8	*	1 OCT 2124	215	0.	7.4	50.7			
1 OCT 0518	54	0.	7.7	50.9	*	1 OCT 1324	135	0.	7.6	50.8	*	1 OCT 2130	216	0.	7.4	50.7			
1 OCT 0524	55	0.	7.7	50.9	*	1 OCT 1330	136	0.	7.5	50.8	*	1 OCT 2136	217	0.	7.4	50.7			
1 OCT 0530	56	0.	7.7	50.9	*	1 OCT 1336	137	0.	7.5	50.8	*	1 OCT 2142	218	0.	7.4	50.7			
1 OCT 0536	57	0.	7.7	50.9	*	1 OCT 1342	138	0.	7.5	50.8	*	1 OCT 2148	219	0.	7.4	50.7			
1 OCT 0542	58	0.	7.7	50.9	*	1 OCT 1348	139	0.	7.5	50.8	*	1 OCT 2154	220	0.	7.4	50.7			
1 OCT 0548	59	0.	7.7	50.9	*	1 OCT 1354	140	0.	7.5	50.8	*	1 OCT 2200	221	0.	7.4	50.7			
1 OCT 0554	60	0.	7.7	50.9	*	1 OCT 1400	141	0.	7.5	50.8	*	1 OCT 2206	222	0.	7.4	50.7			
1 OCT 0600	61	0.	7.7	50.9	*	1 OCT 1406	142	0.	7.5	50.8	*	1 OCT 2212	223	0.	7.4	50.7			
1 OCT 0606	62	0.	7.7	50.9	*	1 OCT 1412	143	0.	7.5	50.8	*	1 OCT 2218	224	0.	7.4	50.7			
1 OCT 0612	63	0.	7.7	50.9	*	1 OCT 1418	144	0.	7.5	50.8	*	1 OCT 2224	225	0.	7.4	50.7			
1 OCT 0618	64	0.	7.7	50.9	*	1 OCT 1424	145	0.	7.5	50.8	*	1 OCT 2230	226	0.	7.4	50.7			
1 OCT 0624	65	0.	7.7	50.9	*	1 OCT 1430	146	0.	7.5	50.8	*	1 OCT 2236	227	0.	7.4	50.7			
1 OCT 0630	66	0.	7.7	50.9	*	1 OCT 1436	147	0.	7.5	50.8	*	1 OCT 2242	228	0.	7.4	50.7			
1 OCT 0636	67	0.	7.7	50.9	*	1 OCT 1442	148	0.	7.5	50.8	*	1 OCT 2248	229	0.	7.4	50.7			
1 OCT 0642	68	0.	7.7	50.9	*	1 OCT 1448	149	0.	7.5	50.8	*	1 OCT 2254	230	0.	7.4	50.7			
1 OCT 0648	69	0.	7.7	50.9	*	1 OCT 1454	150	0.	7.5	50.8	*	1 OCT 2300	231	0.	7.4	50.7			
1 OCT 0654	70	0.	7.7	50.9	*	1 OCT 1500	151	0.	7.5	50.8	*	1 OCT 2306	232	0.	7.4	50.7			
1 OCT 0700	71	0.	7.7	50.9	*	1 OCT 1506	152	0.	7.5	50.8	*	1 OCT 2312	233	0.	7.4	50.7			
1 OCT 0706	72	0.	7.7	50.9	*	1 OCT 1512	153	0.	7.5	50.8	*	1 OCT 2318	234	0.	7.4	50.7			
1 OCT 0712	73	0.	7.7	50.9	*	1 OCT 1518	154	0.	7.5	50.8	*	1 OCT 2324	235	0.	7.4	50.7			
1 OCT 0718	74	0.	7.7	50.9	*	1 OCT 1524	155	0.	7.5	50.8	*	1 OCT 2330	236	0.	7.4	50.7			
1 OCT 0724	75	0.	7.7	50.9	*	1 OCT 1530	156	0.	7.5	50.8	*	1 OCT 2336	237	0.	7.4	50.7			
1 OCT 0730	76	0.	7.7	50.9	*	1 OCT 1536	157	0.	7.5	50.8	*	1 OCT 2342	238	0.	7.4	50.7			
1 OCT 0736	77	0.	7.7	50.9	*	1 OCT 1542	158	0.	7.5	50.8	*	1 OCT 2348	239	0.	7.4	50.7			
1 OCT 0742	78	0.	7.7	50.9	*	1 OCT 1548	159	0.	7.5	50.8	*	1 OCT 2354	240	0.	7.4	50.7			
1 OCT 0748	79	0.	7.7	50.9	*	1 OCT 1554	160	0.	7.5	50.8	*	2 OCT 0000	241	0.	7.4	50.7			
1 OCT 0754	80	0.	7.7	50.9	*	1 OCT 1600	161	0.	7.5	50.8	*								
1 OCT 0800	81	0.	7.7	50.9	*	1 OCT 1606	162	0.	7.5	50.8	*								

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)	(CFS)				
0.	.10		0.	0.	0.	0.
		(INCHES)	.064	.232	.232	.232
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.00-HR
(AC-FT)	(HR)				
8.	.10	8.	8.	8.	8.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.00-HR
(FEET)	(HR)				
51.00	.00	50.95	50.82	50.82	50.82

CUMULATIVE AREA = .04 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	Day	0.	.10	0.	0.	0.	.04		
ROUTED TO	SOUTH_PO	0.	.10	0.	0.	0.	.04	51.00	.00

*** NORMAL END OF HEC-1 ***

```
*FREE
ID  Black & Veatch
ID  Overland Park, KS
ID
ID  FPL
ID  Manatee Power Project - SOUTH POND
ID
ID  ********************************************************************
ID  DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
ID  - W/DETENTION BASINS IN PLACE
ID  ********************************************************************
ID
ID
ID  January 2002,SK
ID  Filename: DAY5.I
*DIAGRAM
*NOLIST
IT  6,01OCT00,0000,241
IO  5
KK Day Five
BA 0.03828
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
QI       0     0     0     0     0     0     0     0     0     0
KK SOUTH_POND
KM 3IN OUTLET W/ 2FT WIDE FILTER
KM OVERFLOW 60 FT FLAT CRESTED WEIR FLOW AT CREST EL=51.50
KM TOP EMBANKMENT EL=53.50
KO 2
RS 1,ELEV,50.70
SV     0.00, 6.44,  6.72,  7.13,   7.83,  8.19,   9.12,   9.32,   10.11,    10.89
SE       44,   50,  50.2,  50.5,     51, 51.25,  51.50,   52.0,   52.50,     53.0
SQ        0, 0.00,  0.10,  0.18,   0.27,  0.30,   0.33,  70.91,  200.44,   365.70
ZZ
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*          REVISED 01 JUN 88            *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:26:57 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET             *
*        DAVIS, CALIFORNIA 95616        *
*          (916) 551-1748               *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
         LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

*** FREE ***
             1          ID    Black & Veatch
             2          ID    Overland Park, KS
             3          ID
             4          ID    FPL
             5          ID    Manatee Power Project - SOUTH POND
             6          ID
             7          ID    ************************************************************
             8          ID    DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
             9          ID    - W/DETENTION BASINS IN PLACE
            10          ID    ************************************************************
            11          ID
            12          ID
            13          ID    January 2002,SK
            14          ID    Filename: DAY5.I
                      *DIAGRAM
*** NOLIST ***
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   17         Day
               V
               V
   42     SOUTH_PO

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*          REVISED 01 JUN 88            *
*                                       *
*  RUN DATE  01/17/2002  TIME  08:26:57 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET             *
*        DAVIS, CALIFORNIA 95616        *
*          (916) 551-1748               *
*                                       *
*****************************************
```


```
Black & Veatch
Overland Park, KS

FPL
Manatee Power Project - SOUTH POND

************************************************************
DEVELOPED CONDITION: 25-YEAR, 24-HR STORM ANALYSES
- W/DETENTION BASINS IN PLACE
************************************************************

January 2002,SK
Filename: DAY5.I

 16 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
```

```
 IT          HYDROGRAPH TIME DATA
                   NMIN           6  MINUTES IN COMPUTATION INTERVAL
                  IDATE      1OCT 0  STARTING DATE
                  ITIME        0000  STARTING TIME
                     NQ         241  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE      2OCT 0  ENDING DATE
                 NDTIME        0000  ENDING TIME
                  ICENT          19  CENTURY MARK

               COMPUTATION INTERVAL      .10 HOURS
                  TOTAL TIME BASE    24.00 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            ..............
            .            .
 42 KK      .  SOUTH_PO  .     ND
            .            .
            ..............

 46 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           2  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

          HYDROGRAPH ROUTING DATA

 47 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC       50.70  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

 48 SV           STORAGE          .0       6.4       6.7       7.1       7.8       8.2       9.1       9.3      10.1      10.8

 49 SE          ELEVATION       44.00     50.00     50.20     50.50     51.00     51.25     51.50     52.00     52.50     53.00

 50 SQ          DISCHARGE          0.        0.        0.        0.        0.        0.        0.       71.      200.      366.

                                                          ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO       71.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)
```

HYDROGRAPH AT STATION SOUTH_PO

DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
1 OCT 0000	1	0.	7.4	50.7	1 OCT 0806	82	0.	7.3	50.6	1 OCT 1612	163	0.	7.1	50.5
1 OCT 0006	2	0.	7.4	50.7	1 OCT 0812	83	0.	7.3	50.6	1 OCT 1618	164	0.	7.1	50.5
1 OCT 0012	3	0.	7.4	50.7	1 OCT 0818	84	0.	7.3	50.6	1 OCT 1624	165	0.	7.1	50.5
1 OCT 0018	4	0.	7.4	50.7	1 OCT 0824	85	0.	7.3	50.6	1 OCT 1630	166	0.	7.1	50.5
1 OCT 0024	5	0.	7.4	50.7	1 OCT 0830	86	0.	7.3	50.6	1 OCT 1636	167	0.	7.1	50.5
1 OCT 0030	6	0.	7.4	50.7	1 OCT 0836	87	0.	7.3	50.6	1 OCT 1642	168	0.	7.1	50.5
1 OCT 0036	7	0.	7.4	50.7	1 OCT 0842	88	0.	7.3	50.6	1 OCT 1648	169	0.	7.1	50.5
1 OCT 0042	8	0.	7.4	50.7	1 OCT 0848	89	0.	7.3	50.6	1 OCT 1654	170	0.	7.1	50.5
1 OCT 0048	9	0.	7.4	50.7	1 OCT 0854	90	0.	7.3	50.6	1 OCT 1700	171	0.	7.1	50.5
1 OCT 0054	10	0.	7.4	50.7	1 OCT 0900	91	0.	7.3	50.6	1 OCT 1706	172	0.	7.1	50.5
1 OCT 0100	11	0.	7.4	50.7	1 OCT 0906	92	0.	7.3	50.6	1 OCT 1712	173	0.	7.1	50.5
1 OCT 0106	12	0.	7.4	50.7	1 OCT 0912	93	0.	7.3	50.6	1 OCT 1718	174	0.	7.1	50.5
1 OCT 0112	13	0.	7.4	50.7	1 OCT 0918	94	0.	7.3	50.6	1 OCT 1724	175	0.	7.1	50.5
1 OCT 0118	14	0.	7.4	50.7	1 OCT 0924	95	0.	7.3	50.6	1 OCT 1730	176	0.	7.1	50.5
1 OCT 0124	15	0.	7.4	50.7	1 OCT 0930	96	0.	7.2	50.6	1 OCT 1736	177	0.	7.1	50.5
1 OCT 0130	16	0.	7.4	50.7	1 OCT 0936	97	0.	7.2	50.6	1 OCT 1742	178	0.	7.1	50.5
1 OCT 0136	17	0.	7.4	50.7	1 OCT 0942	98	0.	7.2	50.6	1 OCT 1748	179	0.	7.1	50.5
1 OCT 0142	18	0.	7.4	50.7	1 OCT 0948	99	0.	7.2	50.6	1 OCT 1754	180	0.	7.1	50.5
1 OCT 0148	19	0.	7.4	50.7	1 OCT 0954	100	0.	7.2	50.6	1 OCT 1800	181	0.	7.1	50.5
1 OCT 0154	20	0.	7.4	50.7	1 OCT 1000	101	0.	7.2	50.6	1 OCT 1806	182	0.	7.1	50.5
1 OCT 0200	21	0.	7.4	50.7	1 OCT 1006	102	0.	7.2	50.6	1 OCT 1812	183	0.	7.1	50.5
1 OCT 0206	22	0.	7.4	50.7	1 OCT 1012	103	0.	7.2	50.6	1 OCT 1818	184	0.	7.1	50.5
1 OCT 0212	23	0.	7.4	50.7	1 OCT 1018	104	0.	7.2	50.6	1 OCT 1824	185	0.	7.1	50.5
1 OCT 0218	24	0.	7.4	50.7	1 OCT 1024	105	0.	7.2	50.6	1 OCT 1830	186	0.	7.1	50.5
1 OCT 0224	25	0.	7.4	50.7	1 OCT 1030	106	0.	7.2	50.6	1 OCT 1836	187	0.	7.1	50.5
1 OCT 0230	26	0.	7.4	50.7	1 OCT 1036	107	0.	7.2	50.6	1 OCT 1842	188	0.	7.1	50.5
1 OCT 0236	27	0.	7.4	50.7	1 OCT 1042	108	0.	7.2	50.6	1 OCT 1848	189	0.	7.1	50.5
1 OCT 0242	28	0.	7.4	50.7	1 OCT 1048	109	0.	7.2	50.6	1 OCT 1854	190	0.	7.1	50.5
1 OCT 0248	29	0.	7.4	50.7	1 OCT 1054	110	0.	7.2	50.6	1 OCT 1900	191	0.	7.1	50.5
1 OCT 0254	30	0.	7.4	50.7	1 OCT 1100	111	0.	7.2	50.6	1 OCT 1906	192	0.	7.1	50.5
1 OCT 0300	31	0.	7.4	50.7	1 OCT 1106	112	0.	7.2	50.6	1 OCT 1912	193	0.	7.1	50.5
1 OCT 0306	32	0.	7.4	50.7	1 OCT 1112	113	0.	7.2	50.6	1 OCT 1918	194	0.	7.1	50.5

1 OCT 0312	33	0.	7.4	50.7	*	1 OCT 1118	114	0.	7.2	50.6	*	1 OCT 1924	195	0.	7.1	50.5
1 OCT 0318	34	0.	7.4	50.7	*	1 OCT 1124	115	0.	7.2	50.6	*	1 OCT 1930	196	0.	7.1	50.5
1 OCT 0324	35	0.	7.4	50.7	*	1 OCT 1130	116	0.	7.2	50.6	*	1 OCT 1936	197	0.	7.1	50.5
1 OCT 0330	36	0.	7.3	50.7	*	1 OCT 1136	117	0.	7.2	50.6	*	1 OCT 1942	198	0.	7.1	50.5
1 OCT 0336	37	0.	7.3	50.7	*	1 OCT 1142	118	0.	7.2	50.6	*	1 OCT 1948	199	0.	7.1	50.5
1 OCT 0342	38	0.	7.3	50.7	*	1 OCT 1148	119	0.	7.2	50.6	*	1 OCT 1954	200	0.	7.1	50.5
1 OCT 0348	39	0.	7.3	50.7	*	1 OCT 1154	120	0.	7.2	50.6	*	1 OCT 2000	201	0.	7.1	50.5
1 OCT 0354	40	0.	7.3	50.7	*	1 OCT 1200	121	0.	7.2	50.6	*	1 OCT 2006	202	0.	7.1	50.5
1 OCT 0400	41	0.	7.3	50.7	*	1 OCT 1206	122	0.	7.2	50.6	*	1 OCT 2012	203	0.	7.1	50.5
1 OCT 0406	42	0.	7.3	50.6	*	1 OCT 1212	123	0.	7.2	50.6	*	1 OCT 2018	204	0.	7.1	50.5
1 OCT 0412	43	0.	7.3	50.6	*	1 OCT 1218	124	0.	7.2	50.6	*	1 OCT 2024	205	0.	7.1	50.5
1 OCT 0418	44	0.	7.3	50.6	*	1 OCT 1224	125	0.	7.2	50.6	*	1 OCT 2030	206	0.	7.1	50.5
1 OCT 0424	45	0.	7.3	50.6	*	1 OCT 1230	126	0.	7.2	50.6	*	1 OCT 2036	207	0.	7.1	50.5
1 OCT 0430	46	0.	7.3	50.6	*	1 OCT 1236	127	0.	7.2	50.5	*	1 OCT 2042	208	0.	7.1	50.5
1 OCT 0436	47	0.	7.3	50.6	*	1 OCT 1242	128	0.	7.2	50.5	*	1 OCT 2048	209	0.	7.1	50.5
1 OCT 0442	48	0.	7.3	50.6	*	1 OCT 1248	129	0.	7.2	50.5	*	1 OCT 2054	210	0.	7.1	50.5
1 OCT 0448	49	0.	7.3	50.6	*	1 OCT 1254	130	0.	7.2	50.5	*	1 OCT 2100	211	0.	7.1	50.5
1 OCT 0454	50	0.	7.3	50.6	*	1 OCT 1300	131	0.	7.2	50.5	*	1 OCT 2106	212	0.	7.1	50.5
1 OCT 0500	51	0.	7.3	50.6	*	1 OCT 1306	132	0.	7.2	50.5	*	1 OCT 2112	213	0.	7.1	50.5
1 OCT 0506	52	0.	7.3	50.6	*	1 OCT 1312	133	0.	7.2	50.5	*	1 OCT 2118	214	0.	7.1	50.5
1 OCT 0512	53	0.	7.3	50.6	*	1 OCT 1318	134	0.	7.2	50.5	*	1 OCT 2124	215	0.	7.1	50.5
1 OCT 0518	54	0.	7.3	50.6	*	1 OCT 1324	135	0.	7.2	50.5	*	1 OCT 2130	216	0.	7.1	50.5
1 OCT 0524	55	0.	7.3	50.6	*	1 OCT 1330	136	0.	7.2	50.5	*	1 OCT 2136	217	0.	7.1	50.5
1 OCT 0530	56	0.	7.3	50.6	*	1 OCT 1336	137	0.	7.2	50.5	*	1 OCT 2142	218	0.	7.1	50.5
1 OCT 0536	57	0.	7.3	50.6	*	1 OCT 1342	138	0.	7.2	50.5	*	1 OCT 2148	219	0.	7.1	50.5
1 OCT 0542	58	0.	7.3	50.6	*	1 OCT 1348	139	0.	7.2	50.5	*	1 OCT 2154	220	0.	7.1	50.5
1 OCT 0548	59	0.	7.3	50.6	*	1 OCT 1354	140	0.	7.2	50.5	*	1 OCT 2200	221	0.	7.1	50.4
1 OCT 0554	60	0.	7.3	50.6	*	1 OCT 1400	141	0.	7.2	50.5	*	1 OCT 2206	222	0.	7.1	50.4
1 OCT 0600	61	0.	7.3	50.6	*	1 OCT 1406	142	0.	7.2	50.5	*	1 OCT 2212	223	0.	7.1	50.4
1 OCT 0606	62	0.	7.3	50.6	*	1 OCT 1412	143	0.	7.2	50.5	*	1 OCT 2218	224	0.	7.1	50.4
1 OCT 0612	63	0.	7.3	50.6	*	1 OCT 1418	144	0.	7.2	50.5	*	1 OCT 2224	225	0.	7.1	50.4
1 OCT 0618	64	0.	7.3	50.6	*	1 OCT 1424	145	0.	7.2	50.5	*	1 OCT 2230	226	0.	7.1	50.4
1 OCT 0624	65	0.	7.3	50.6	*	1 OCT 1430	146	0.	7.2	50.5	*	1 OCT 2236	227	0.	7.1	50.4
1 OCT 0630	66	0.	7.3	50.6	*	1 OCT 1436	147	0.	7.2	50.5	*	1 OCT 2242	228	0.	7.1	50.4
1 OCT 0636	67	0.	7.3	50.6	*	1 OCT 1442	148	0.	7.2	50.5	*	1 OCT 2248	229	0.	7.0	50.4
1 OCT 0642	68	0.	7.3	50.6	*	1 OCT 1448	149	0.	7.2	50.5	*	1 OCT 2254	230	0.	7.0	50.4
1 OCT 0648	69	0.	7.3	50.6	*	1 OCT 1454	150	0.	7.2	50.5	*	1 OCT 2300	231	0.	7.0	50.4
1 OCT 0654	70	0.	7.3	50.6	*	1 OCT 1500	151	0.	7.2	50.5	*	1 OCT 2306	232	0.	7.0	50.4
1 OCT 0700	71	0.	7.3	50.6	*	1 OCT 1506	152	0.	7.2	50.5	*	1 OCT 2312	233	0.	7.0	50.4
1 OCT 0706	72	0.	7.3	50.6	*	1 OCT 1512	153	0.	7.2	50.5	*	1 OCT 2318	234	0.	7.0	50.4
1 OCT 0712	73	0.	7.3	50.6	*	1 OCT 1518	154	0.	7.2	50.5	*	1 OCT 2324	235	0.	7.0	50.4
1 OCT 0718	74	0.	7.3	50.6	*	1 OCT 1524	155	0.	7.2	50.5	*	1 OCT 2330	236	0.	7.0	50.4
1 OCT 0724	75	0.	7.3	50.6	*	1 OCT 1530	156	0.	7.2	50.5	*	1 OCT 2336	237	0.	7.0	50.4
1 OCT 0730	76	0.	7.3	50.6	*	1 OCT 1536	157	0.	7.2	50.5	*	1 OCT 2342	238	0.	7.0	50.4
1 OCT 0736	77	0.	7.3	50.6	*	1 OCT 1542	158	0.	7.2	50.5	*	1 OCT 2348	239	0.	7.0	50.4
1 OCT 0742	78	0.	7.3	50.6	*	1 OCT 1548	159	0.	7.2	50.5	*	1 OCT 2354	240	0.	7.0	50.4
1 OCT 0748	79	0.	7.3	50.6	*	1 OCT 1554	160	0.	7.1	50.5	*	2 OCT 0000	241	0.	7.0	50.4
1 OCT 0754	80	0.	7.3	50.6	*	1 OCT 1600	161	0.	7.1	50.5	*					
1 OCT 0800	81	0.	7.3	50.6	*	1 OCT 1606	162	0.	7.1	50.5	*					

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)	(CFS)				
0.	.10		0.	0.	0.	0.
		(INCHES)	.051	.184	.184	.184
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.00-HR
(AC-FT)	(HR)				
7.	.10	7.	7.	7.	7.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.00-HR
(FEET)	(HR)				
50.70	.00	50.66	50.56	50.56	50.56

CUMULATIVE AREA = .04 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	Day	0.	.10	0.	0.	0.	.04		
ROUTED TO	SOUTH_PO	0.	.10	0.	0.	0.	.04	50.70	.00

*** NORMAL END OF HEC-1 ***

BLACK & VEATCH

Calculation Record

____ Nuclear Safety Related
_x_ Not Nuclear Safety Related

Client Name: Florida Power & Light Page 1 of 31

Project Name: Manatee Power Plant Unit:

Project Number: 130770 File Number:

Calculation Title: HEC-RAS ANALYSIS FOR CHANNEL 1 AREA 1 ALONG RAILROAD

Calculation Is: ☐ Preliminary ☒ Final ☐ Other

Quality Record: ☐ Yes ☐ No

Objective HYDRAULIC ANALYSIS FOR CHANNEL 1

Unverified Assumptions Requiring Subsequent Verification			
No.	Assumption	Verified By	Date

See Page____ of this calculation for additional assumptions.

Verification Method

☐ Detailed Review
☐ Alternate Calculation
☐ Conform Against Similar Previously Verified Calculations
☐ Other

This Section Used for Computer Generated Calculations

Program Number/Name: HEC-RAS Version: 3.0
Run Date: 01/15/02 Run Time:
Number of Pages: 31

Review and Approval							
Rev	Revised Pages	Prepared By	Date	Verified By	Date	Project Engineer Approval	Date
		SEBASTIAN KULESZA	01/15/02				

HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X     X
X     X  X        X           X   X     X    X   X
XXXXXXX  XXXX     X       XXX XXXX      XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
```

PROJECT DATA
Project Title: areal
Project File : rail_ditch.prj
Run Date and Time: 01/15/2002 8:33:52 AM

Project in English units

PLAN DATA

Plan Title: Plan 02
Plan File : d:\manatee\rail_ditch.p02

Geometry Title: areal
Geometry File : d:\manatee\rail_ditch.g01

Flow Title : areal
Flow File : d:\manatee\rail_ditch.f01

Plan Summary Information:
Number of: Cross Sections = 14 Mulitple Openings = 0
Culverts = 1 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: areal
Flow File : d:\manatee\rail_ditch.f01

Flow Data (cfs)

River	Reach	RS	PF 1
rail-ditch	rail-ditch	1000	117

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
rail-ditch	rail-ditch	PF 1	Critical	Critical

GEOMETRY DATA

Geometry Title: areal
Geometry File : d:\manatee\rail_ditch.g01

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 1000

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	52.71	9.3	52.76	10.02	52.76	12.88	52.74	23.99	53
35.92	53.62	42.4	54	50	54	59	51	79	51
84.35	52.78	150	53.03						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	59	.03	79	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
59	79	98.66	97.23	95.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	52.66	Element	Left OB	Channel Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.030	0.030 0.030
W.S. Elev (ft)	52.49	Reach Len. (ft)	98.66	97.23 95.80
Crit W.S. (ft)	51.98	Flow Area (sq ft)	3.35	29.88 3.35
E.G. Slope (ft/ft)	0.002834	Area (sq ft)	3.35	29.88 3.35
Q Total (cfs)	117.00	Flow (cfs)	7.02	102.95 7.03
Top Width (ft)	28.97	Top Width (ft)	4.48	20.00 4.49
Vel Total (ft/s)	3.20	Avg. Vel. (ft/s)	2.10	3.45 2.10
Max Chl Dpth (ft)	1.49	Hydr. Depth (ft)	0.75	1.49 0.75
Conv. Total (cfs)	2197.9	Conv. (cfs)	131.8	1934.0 132.1
Length Wtd. (ft)	97.23	Wetted Per. (ft)	4.72	20.00 4.73
Min Ch El (ft)	51.00	Shear (lb/sq ft)	0.13	0.26 0.13
Alpha	1.07	Stream Power (lb/ft s)	0.26	0.91 0.26
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	0.16	0.93 0.78
C & E Loss (ft)	0.00	Cum SA (acres)	0.14	0.45 0.83

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 900

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	51.87	4.93	52	18.04	52.32	36.72	53	48.71	53.94
50	53.89	59.53	50.71	79.53	50.71	85.75	52.78	100.53	52.8
108.06	53	150	53						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	59.53	.03	79.53	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
59.53	79.53	99.11	98.14	97.17	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	36.72	53	150	150	51.87

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	52.40	Element	Left OB	Channel Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.030	0.030 0.030
W.S. Elev (ft)	52.23	Reach Len. (ft)	99.11	98.14 97.17
Crit W.S. (ft)		Flow Area (sq ft)	3.48	30.46 3.48
E.G. Slope (ft/ft)	0.002646	Area (sq ft)	3.48	30.46 3.48
Q Total (cfs)	117.00	Flow (cfs)	7.13	102.72 7.15
Top Width (ft)	29.14	Top Width (ft)	4.56	20.00 4.58
Vel Total (ft/s)	3.13	Avg. Vel. (ft/s)	2.05	3.37 2.05
Max Chl Dpth (ft)	1.52	Hydr. Depth (ft)	0.76	1.52 0.76
Conv. Total (cfs)	2274.6	Conv. (cfs)	138.6	1997.1 139.0
Length Wtd. (ft)	98.14	Wetted Per. (ft)	4.81	20.00 4.82
Min Ch El (ft)	50.71	Shear (lb/sq ft)	0.12	0.25 0.12
Alpha	1.07	Stream Power (lb/ft s)	0.24	0.85 0.24
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	0.15	0.86 0.77
C & E Loss (ft)	0.00	Cum SA (acres)	0.13	0.40 0.82

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 800

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	51.67	8.66	52	39.79	53	46.14	53.33	49.85	53.28
58.42	50.43	78.42	50.43	83.14	52	104.12	52	105.12	52.16
113.34	52.39	124.25	52.57	131.36	52.8	139.88	52.47	144.97	52.21
147.49	52	150	52						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	58.42	.03	78.42	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
58.42	78.42	98.92	97.62	96.33	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	39.79	53	150	150	51.67

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	52.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.99	Reach Len. (ft)	98.92	97.62	96.33
Crit W.S. (ft)		Flow Area (sq ft)	3.66	31.22	3.66
E.G. Slope (ft/ft)	0.002420	Area (sq ft)	3.66	31.22	3.66
Q Total (cfs)	117.00	Flow (cfs)	7.31	102.38	7.31
Top Width (ft)	29.39	Top Width (ft)	4.69	20.00	4.69
Vel Total (ft/s)	3.03	Avg. Vel. (ft/s)	1.99	3.28	1.99
Max Chl Dpth (ft)	1.56	Hydr. Depth (ft)	0.78	1.56	0.78
Conv. Total (cfs)	2378.6	Conv. (cfs)	148.6	2081.4	148.6
Length Wtd. (ft)	97.62	Wetted Per. (ft)	4.95	20.00	4.95
Min Ch El (ft)	50.43	Shear (lb/sq ft)	0.11	0.24	0.11
Alpha	1.08	Stream Power (lb/ft s)	0.22	0.77	0.22
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	0.14	0.79	0.76
C & E Loss (ft)	0.01	Cum SA (acres)	0.12	0.36	0.81

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 700

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	51.46	5.1	51.63	15.28	52	40.32	53	50	53
58.59	50.14	78.59	50.14	84.17	52	111.83	52	114.03	52.13
118.71	52.26	139.16	52.16	140.87	52	150	52		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	58.59	.03	78.59	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
58.59	78.59	98.82	97.49	96.17	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	40.32	53	150	150	51.46

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	51.93	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.14	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	51.79	Reach Len. (ft)	98.82
97.49	96.17		
Crit W.S. (ft)		Flow Area (sq ft)	4.09
33.02	4.09		
E.G. Slope (ft/ft)	0.001980	Area (sq ft)	4.09
33.02	4.09		
Q Total (cfs)	117.00	Flow (cfs)	7.67
101.67	7.66		
Top Width (ft)	29.91	Top Width (ft)	4.96
20.00	4.95		
Vel Total (ft/s)	2.84	Avg. Vel. (ft/s)	1.87
3.08	1.87		
Max Chl Dpth (ft)	1.65	Hydr. Depth (ft)	0.83
1.65	0.83		
Conv. Total (cfs)	2629.6	Conv. (cfs)	172.3
2285.2	172.1		
Length Wtd. (ft)	97.49	Wetted Per. (ft)	5.23
20.00	5.22		
Min Ch El (ft)	50.14	Shear (lb/sq ft)	0.10
0.20	0.10		
Alpha	1.08	Stream Power (lb/ft s)	0.18
0.63	0.18		
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	0.13
0.72	0.75		
C & E Loss (ft)	0.01	Cum SA (acres)	0.11
0.31	0.80		

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 600

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	50.9	3.03	51	19.48	51.72	25.24	52	33.02	52.45
41.43	53	51.17	53	60.62	49.85	80.62	49.85	86.71	51.88
104.28	51.86	105.98	52	134.62	52	135.05	51.98	139.95	51.76
141.14	51.69	150	51.83						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	60.62	.03	80.62	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
60.62	80.62	99.09	98.15	97.22	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	41.43	53	150	150	50.9

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	51.75	Element	Left OB	Channel Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.030	0.030 0.030
W.S. Elev (ft)	51.64	Reach Len. (ft)	99.09	98.15 97.22
Crit W.S. (ft)		Flow Area (sq ft)	4.82	35.84 4.82
E.G. Slope (ft/ft)	0.001474	Area (sq ft)	4.82	35.84 4.82
Q Total (cfs)	117.00	Flow (cfs)	8.22	100.56 8.22
Top Width (ft)	30.75	Top Width (ft)	5.38	20.00 5.38
Vel Total (ft/s)	2.57	Avg. Vel. (ft/s)	1.71	2.81 1.71
Max Chl Dpth (ft)	1.79	Hydr. Depth (ft)	0.90	1.79 0.90
Conv. Total (cfs)	3047.2	Conv. (cfs)	214.1	2619.0 214.1
Length Wtd. (ft)	98.10	Wetted Per. (ft)	5.67	20.00 5.67
Min Ch El (ft)	49.85	Shear (lb/sq ft)	0.08	0.16 0.08
Alpha	1.08	Stream Power (lb/ft s)	0.13	0.46 0.13
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	0.12	0.64 0.74
C & E Loss (ft)	0.02	Cum SA (acres)	0.10	0.27 0.79

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 500

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	50.94	3.07	51.26	34.81	52.79	50	53	60.31	49.56
80.31	49.56	84.62	51	90.17	51	94.27	51.26	98.07	51.26
124.26	51.26	129.85	51.26	134.13	51.26	139.53	51.26	144.55	51.27
150	51.33								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	60.31	.03	80.31	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
60.31	80.31	98.82	97.28	95.75	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	34.81	52.79	150	150	50.94

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	51.64	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.06	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	51.58	Reach Len. (ft)	98.82
97.28	95.75		
Crit W.S. (ft)		Flow Area (sq ft)	6.10
40.35	28.08		
E.G. Slope (ft/ft)	0.000762	Area (sq ft)	6.10
40.35	28.08		
Q Total (cfs)	117.00	Flow (cfs)	8.10
88.06	20.84		
Top Width (ft)	95.74	Top Width (ft)	6.05
20.00	69.69		
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.33
2.18	0.74		
Max Chl Dpth (ft)	2.02	Hydr. Depth (ft)	1.01
2.02	0.40		
Conv. Total (cfs)	4239.4	Conv. (cfs)	293.3
3190.8	755.2		
Length Wtd. (ft)	97.06	Wetted Per. (ft)	6.37
20.00	70.18		
Min Ch El (ft)	49.56	Shear (lb/sq ft)	0.05
0.10	0.02		
Alpha	1.54	Stream Power (lb/ft s)	0.06
0.21	0.01		
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.11
0.56	0.71		
C & E Loss (ft)	0.01	Cum SA (acres)	0.08
0.22	0.71		

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 400

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	50.11	11.02	50.54	23.93	51	39.53	52	50	52
58.18	49.28	78.18	49.28	84.09	51	90.91	51	110.58	51
119.13	51	121.02	51	132.43	51	146.1	51.27	150	51.34

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	58.18	.03	78.18	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
58.18	78.18	98.77	97.36	95.96	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	39.53	52	150	150	50.11

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	51.58	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.04	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	51.54	Reach Len. (ft)	98.77
97.36	95.96		
Crit W.S. (ft)		Flow Area (sq ft)	7.67
45.17	40.72		
E.G. Slope (ft/ft)	0.000433	Area (sq ft)	7.67
45.17	40.72		
Q Total (cfs)	117.00	Flow (cfs)	8.27
80.10	28.62		
Top Width (ft)	98.61	Top Width (ft)	6.79
20.00	71.82		
Vel Total (ft/s)	1.25	Avg. Vel. (ft/s)	1.08
1.77	0.70		
Max Chl Dpth (ft)	2.26	Hydr. Depth (ft)	1.13
2.26	0.57		
Conv. Total (cfs)	5625.4	Conv. (cfs)	397.8
3851.4	1376.2		
Length Wtd. (ft)	96.95	Wetted Per. (ft)	7.16
20.00	72.27		
Min Ch El (ft)	49.28	Shear (lb/sq ft)	0.03
0.06	0.02		
Alpha	1.51	Stream Power (lb/ft s)	0.03
0.11	0.01		
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.09
0.46	0.63		
C & E Loss (ft)	0.01	Cum SA (acres)	0.07
0.18	0.55		

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 300

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	50.09	13.16	51	41.86	52	50.43	52	59.46	48.99
79.46	48.99	82.55	50.02	123.44	50.36	123.67	50.39	126.16	50.5
131.08	50.61	136.97	50.73	150	50.97				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	59.46	.03	79.46	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
59.46	79.46	98.92	97.77	96.62	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	41.86	52	150	150	50.09

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	51.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.53	Reach Len. (ft)	98.92	97.77	96.62
Crit W.S. (ft)		Flow Area (sq ft)	9.68	50.81	82.76
E.G. Slope (ft/ft)	0.000144	Area (sq ft)	9.68	50.81	82.76
Q Total (cfs)	117.00	Flow (cfs)	6.51	56.18	54.31
Top Width (ft)	98.16	Top Width (ft)	7.62	20.00	70.54
Vel Total (ft/s)	0.82	Avg. Vel. (ft/s)	0.67	1.11	0.66
Max Chl Dpth (ft)	2.54	Hydr. Depth (ft)	1.27	2.54	1.17
Conv. Total (cfs)	9756.2	Conv. (cfs)	542.9	4685.0	4528.3
Length Wtd. (ft)	97.30	Wetted Per. (ft)	8.03	20.00	71.28
Min Ch El (ft)	48.99	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.22	Stream Power (lb/ft s)	0.01	0.03	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.08	0.35	0.50
C & E Loss (ft)	0.00	Cum SA (acres)	0.05	0.14	0.40

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 200

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	48.87	8.149994	49.39	20.71001	51	38.53	52	50	52
59.9	48.7	79.9	48.7	83.79	50	111.23	50	150	50.83

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	59.9	.03	79.9	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
59.9	79.9	55.4	53.92	52.45	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	38.53	52	150	150	48.87

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	51.53	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.01	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	51.52	Reach Len. (ft)	55.40
53.92	52.45		
Crit W.S. (ft)		Flow Area (sq ft)	11.95
56.44	93.13		
E.G. Slope (ft/ft)	0.000098	Area (sq ft)	11.95
56.44	93.13		
Q Total (cfs)	117.00	Flow (cfs)	7.11
55.22	54.67		
Top Width (ft)	98.57	Top Width (ft)	8.47
20.00	70.10		
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.60
0.98	0.59		
Max Chl Dpth (ft)	2.82	Hydr. Depth (ft)	1.41
2.82	1.33		
Conv. Total (cfs)	11828.4	Conv. (cfs)	718.7
5582.7	5527.1		
Length Wtd. (ft)	53.35	Wetted Per. (ft)	8.92
20.00	71.01		
Min Ch El (ft)	48.70	Shear (lb/sq ft)	0.01
0.02	0.01		
Alpha	1.21	Stream Power (lb/ft s)	0.00
0.02	0.00		
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.05
0.23	0.30		
C & E Loss (ft)	0.00	Cum SA (acres)	0.04
0.09	0.24		

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 143.08

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	48.66	20.82001	50	27.81001	51	30.7	51.54	33.69	52
49.95	52	60.46	48.54	80.46	48.54	84.85	50	108.5	50
118.29	50.19	151.08	50.79						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	60.46	.03	80.46	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
60.46	80.46	43.26	42.56	41.87	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	33.69	52	150	151.08	48.66

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	51.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.52	Reach Len. (ft)	43.26	42.56	41.87
Crit W.S. (ft)		Flow Area (sq ft)	13.46	59.53	93.32
E.G. Slope (ft/ft)	0.000088	Area (sq ft)	13.46	59.53	93.32
Q Total (cfs)	117.00	Flow (cfs)	7.89	57.31	51.80
Top Width (ft)	99.66	Top Width (ft)	9.04	20.00	70.62
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)	0.59	0.96	0.56
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)	1.49	2.98	1.32
Conv. Total (cfs)	12456.6	Conv. (cfs)	839.6	6101.8	5515.2
Length Wtd. (ft)	42.31	Wetted Per. (ft)	9.52	20.00	71.59
Min Ch El (ft)	48.54	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.24	Stream Power (lb/ft s)	0.00	0.02	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.03	0.16	0.19
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	0.07	0.15

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 100

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	48.75	12.93	49	21.2	50	28.46	51	32.95	52
50	52	60.76	48.41	80.76	48.41	85.11	49.86	108.52	50.17
114.91	50.25	119.37	50.29	125.68	50.36	137.26	50.51	150	50.72

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	60.76	.03	80.76	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
60.76	80.76	50	50	50	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	32.95	52	150	150	48.75

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	51.52	Element	Left OB	Channel Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030 0.030
W.S. Elev (ft)	51.51	Reach Len. (ft)	50.00	50.00 50.00
Crit W.S. (ft)		Flow Area (sq ft)	14.41	62.03 90.59
E.G. Slope (ft/ft)	0.000084	Area (sq ft)	14.41	62.03 90.59
Q Total (cfs)	117.00	Flow (cfs)	8.46	59.85 48.69
Top Width (ft)	98.54	Top Width (ft)	9.30	20.00 69.24
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)	0.59	0.96 0.54
Max Chl Dpth (ft)	3.10	Hydr. Depth (ft)	1.55	3.10 1.31
Conv. Total (cfs)	12771.5	Conv. (cfs)	923.4	6533.6 5314.5
Length Wtd. (ft)	50.00	Wetted Per. (ft)	9.80	20.00 70.27
Min Ch El (ft)	48.41	Shear (lb/sq ft)	0.01	0.02 0.01
Alpha	1.27	Stream Power (lb/ft s)	0.00	0.02 0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.02	0.10 0.10
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	0.05 0.09

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 50

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	48.88	7.76	49	15.7	50	21.78	51	30.62	52
41.73	52	48.65	51.79	50	51.73	60.39	48.27	80.39	48.27
86.07	50.17	115.12	50.59	124.07	50.65	137.5	50.79	150	50.95

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	60.39	.03	80.39	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
60.39	80.39	5	5	5	.1 .3

Blocked Obstructions num= 2

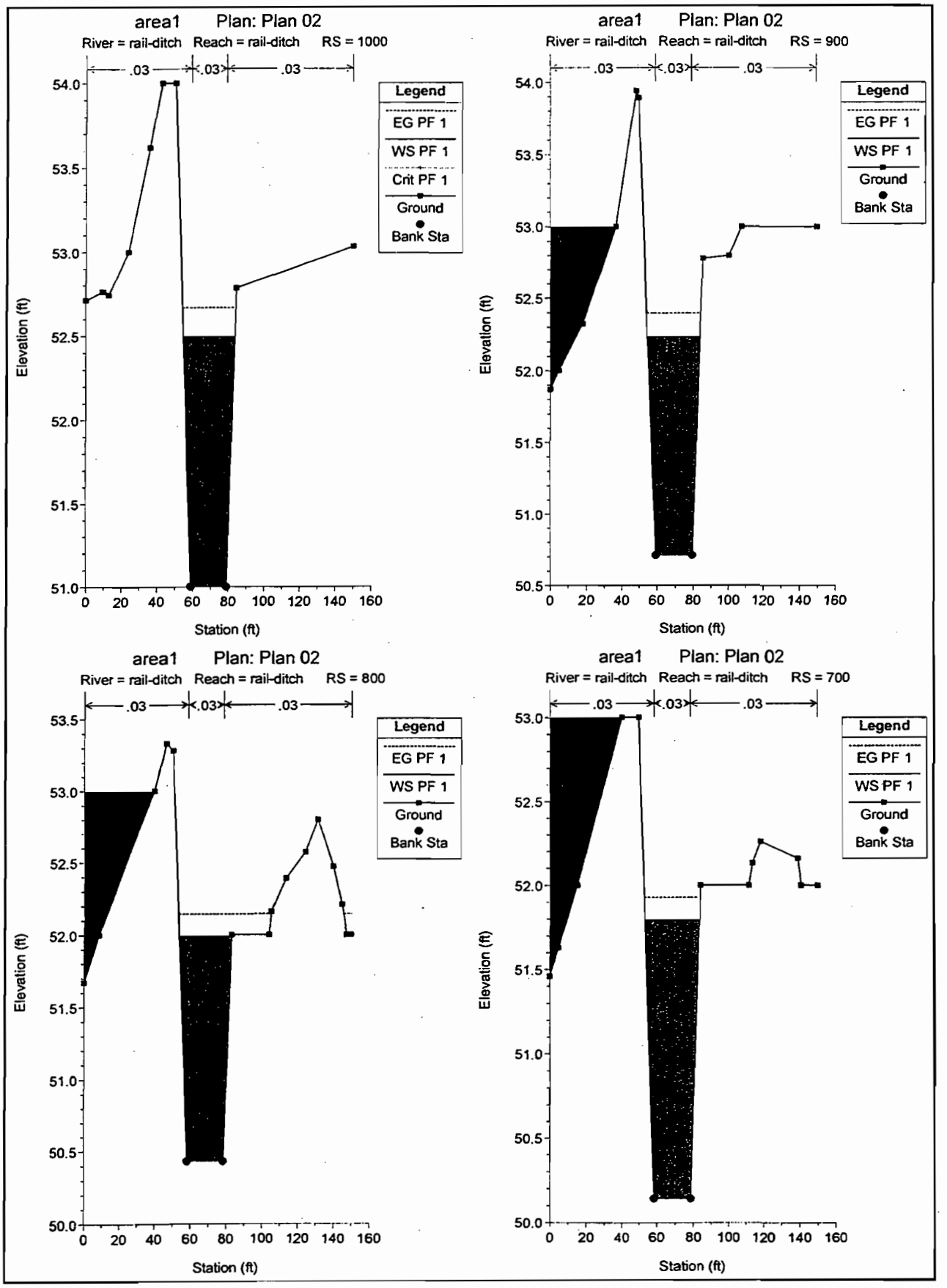
Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	41.73	52	150	150	50.95

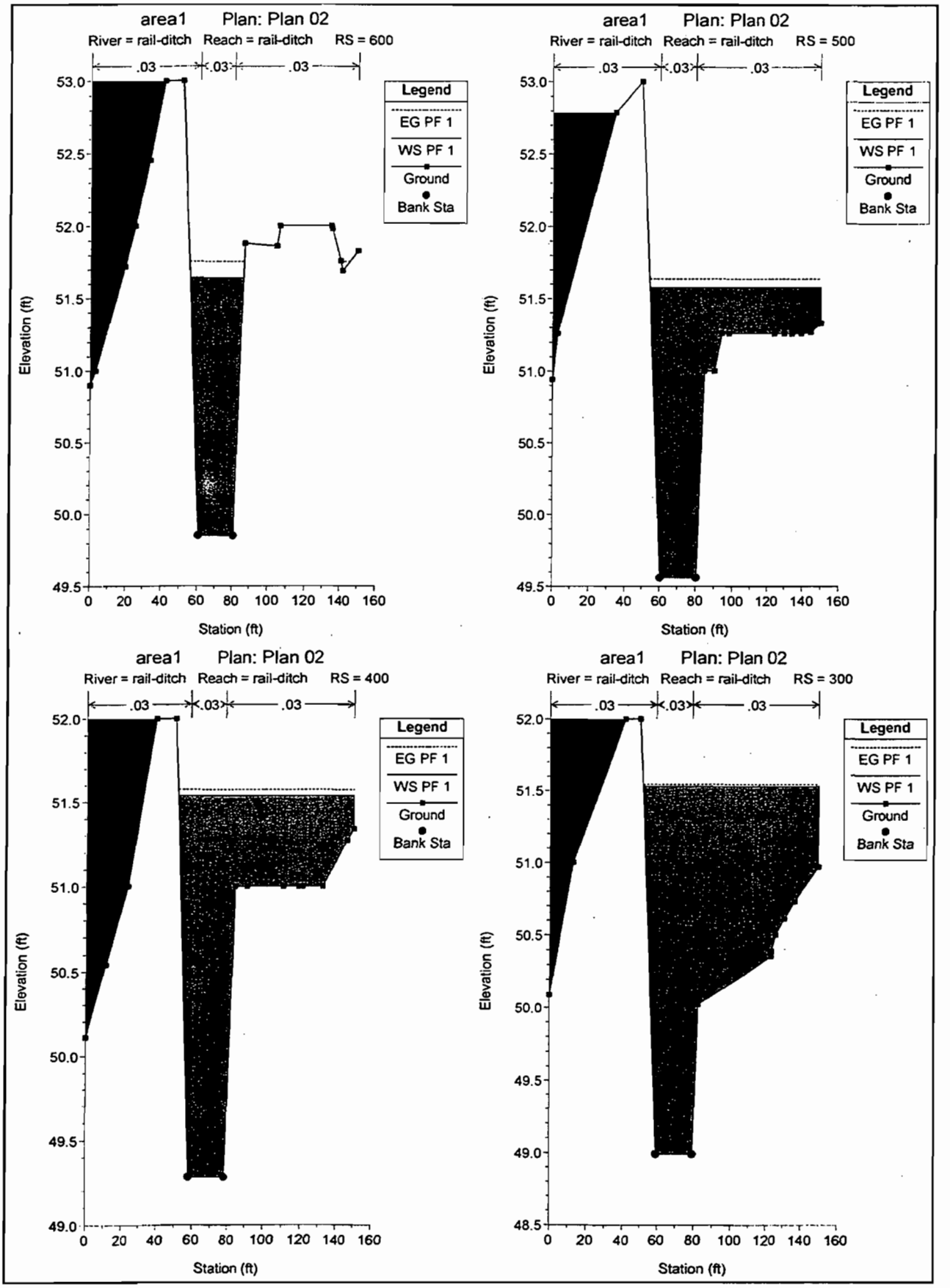
Plan: Plan 02 rail-ditch rail-ditch RS: 45 Profile: PF 1

E.G. Elev (ft)	49.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	49.65	Reach Len. (ft)	45.00	45.00	45.00
Crit W.S. (ft)	49.24	Flow Area (sq ft)	2.92	27.89	2.93
E.G. Slope (ft/ft)	0.003622	Area (sq ft)	2.92	27.89	2.93
Q Total (cfs)	117.00	Flow (cfs)	6.61	103.76	6.62
Top Width (ft)	28.39	Top Width (ft)	4.19	20.00	4.20
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)	2.26	3.72	2.26
Max Chl Dpth (ft)	1.39	Hydr. Depth (ft)	0.70	1.39	0.70
Conv. Total (cfs)	1944.2	Conv. (cfs)	109.9	1724.2	110.1
Length Wtd. (ft)	45.00	Wetted Per. (ft)	4.42	20.00	4.42
Min Ch El (ft)	48.26	Shear (lb/sq ft)	0.15	0.32	0.15
Alpha	1.07	Stream Power (lb/ft s)	0.34	1.17	0.34
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	0.00	0.02	0.00
C & E Loss (ft)	0.02	Cum SA (acres)	0.00	0.02	0.00

Plan: Plan 02 rail-ditch rail-ditch RS: 0 Profile: PF 1

E.G. Elev (ft)	49.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	49.11	Reach Len. (ft)			
Crit W.S. (ft)	49.11	Flow Area (sq ft)	1.43	19.52	1.43
E.G. Slope (ft/ft)	0.012749	Area (sq ft)	1.43	19.52	1.43
Q Total (cfs)	117.00	Flow (cfs)	4.79	107.43	4.78
Top Width (ft)	25.86	Top Width (ft)	2.93	20.00	2.93
Vel Total (ft/s)	5.23	Avg. Vel. (ft/s)	3.35	5.50	3.35
Max Chl Dpth (ft)	0.98	Hydr. Depth (ft)	0.49	0.98	0.49
Conv. Total (cfs)	1036.2	Conv. (cfs)	42.4	951.4	42.4
Length Wtd. (ft)		Wetted Per. (ft)	3.09	20.00	3.09
Min Ch El (ft)	48.13	Shear (lb/sq ft)	0.37	0.78	0.37
Alpha	1.05	Stream Power (lb/ft s)	1.23	4.28	1.23
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			


area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 1000
.03 .03 .03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 900
.03 .03 .03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 800
.03 .03 .03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 700
.03 .03 .03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 600
.03 .03 .03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 500
.03 .03 .03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 400
.03 .03 .03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 300
.03 .03 .03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	51.52	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.01	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	51.50	Reach Len. (ft)	5.00
5.00	5.00		
Crit W.S. (ft)	49.25	Flow Area (sq ft)	15.69
64.65	71.88		
E.G. Slope (ft/ft)	0.000101	Area (sq ft)	15.69
64.65	71.88		
Q Total (cfs)	117.00	Flow (cfs)	10.39
70.36	36.26		
Top Width (ft)	99.32	Top Width (ft)	9.71
20.00	69.61		
Vel Total (ft/s)	0.77	Avg. Vel. (ft/s)	0.66
1.09	0.50		
Max Chl Dpth (ft)	3.23	Hydr. Depth (ft)	1.62
3.23	1.03		
Conv. Total (cfs)	11640.9	Conv. (cfs)	1033.3
7000.3	3607.4		
Length Wtd. (ft)	5.00	Wetted Per. (ft)	10.23
20.00	70.48		
Min Ch El (ft)	48.27	Shear (lb/sq ft)	0.01
0.02	0.01		
Alpha	1.40	Stream Power (lb/ft s)	0.01
0.02	0.00		
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00
0.03	0.01		
C & E Loss (ft)		Cum SA (acres)	0.00
0.02	0.01		

CULVERT RIVER: rail-ditch
REACH: rail-ditch RS: 49.8

INPUT
Description:
Distance from Upstream XS = .1
Deck/Roadway Width = 4.8
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 14

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	52	48.27	7.76	52	48.27	15.7	52	48.27
30.62	52	48.27	41.73	52	48.27	48.65	52	48.27
50	52	48.27	60.39	52	48.27	80.39	52	48.27
86.07	52	48.27	115.12	52	48.27	124.07	52	48.27
137.5	52	48.27	150	52	48.27			

Upstream Bridge Cross Section Data
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	48.88	7.76	49	15.7	50	21.78	51	30.62	52
41.73	52	48.65	51.79	50	51.73	60.39	48.27	80.39	48.27
86.07	50.17	115.12	50.59	124.07	50.65	137.5	50.79	150	50.95

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	60.39	.03	80.39	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
60.39	80.39	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	41.73	52	150	150	50.95

Downstream Deck/Roadway Coordinates

num= 17

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	52	48.26	7.53	52	48.26	13.63	52	48.26
15.38	52	48.26	18.97	52	48.26	21.99	52	48.26
29.79	52	48.26	30.17	52	48.26	39.31	52	48.26
50	52	48.26	60.25	52	48.26	80.25	52	48.26
86.21	52	48.26	116.12	52	48.26	125.74	52	48.26
140.17	52	48.26	150	52	48.26			

Downstream Bridge Cross Section Data

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	48.88	7.53	49	13.63	49.79	15.38	50	18.97	50.54
21.99	51	29.79	51.95	30.17	52	39.31	52	50	51.67
60.25	48.26	80.25	48.26	86.21	50.24	116.12	50.64	125.74	50.7
140.17	50.85	150	50.97						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	60.25	.03	80.25	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
60.25	80.25	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	30.17	52	150	150	50.97

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Box	3	4

FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	n Value	Entrance Loss Coef	Exit Loss Coef
	.2	4.8	.013	.5	1

Number of Barrels = 2

Upstream Elevation = 48.27
Centerline Stations
Sta. Sta.
67.89 72.89
Downstream Elevation = 48.26
Centerline Stations
Sta. Sta.
67.75 72.75

CULVERT OUTPUT Profile #PF 1
Culvert ID : Culvert #1

Culv Q (cfs)	117.00	Culv Ful Lngh (ft)	
# Barrels	2	Culv Vel US (ft/s)	7.31
Q Barrel (cfs)	58.50	Culv Vel DS (ft/s)	7.78
E.G. US. (ft)	51.52	Culv Inv El Up (ft)	48.27
W.S. US. (ft)	51.50	Culv Inv El Dn (ft)	48.26
E.G. DS (ft)	49.85	Culv Frctn Ls (ft)	0.02
W.S. DS (ft)	49.65	Culv Ext Lss (ft)	1.23
Delta EG (ft)	1.66	Culv Ent Lss (ft)	0.41
Delta WS (ft)	1.85	Q Weir (cfs)	
E.G. IC (ft)	51.31	Weir Sta Lft (ft)	
E.G. OC (ft)	51.52	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	50.27	Weir Max Depth (ft)	
Culv WS Outlet (ft)	50.14	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.58	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	1.88	Min El Weir Flow (ft)	52.01

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 45

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	48.88	7.53	49	13.63	49.79	15.38	50	18.97	50.54
21.99	51	29.79	51.95	30.17	52	39.31	52	50	51.67
60.25	48.26	80.25	48.26	86.21	50.24	116.12	50.64	125.74	50.7
140.17	50.85	150	50.97						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	60.25	.03	80.25	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
60.25	80.25	45	45	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	30.17	52	150	150	50.97

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	49.85	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.20	Wt. n-Val.	0.030
0.030 0.030			
W.S. Elev (ft)	49.65	Reach Len. (ft)	45.00
45.00 45.00			
Crit W.S. (ft)	49.24	Flow Area (sq ft)	2.92
27.89 2.93			
E.G. Slope (ft/ft)	0.003622	Area (sq ft)	2.92
27.89 2.93			
Q Total (cfs)	117.00	Flow (cfs)	6.61
103.76 6.62			
Top Width (ft)	28.39	Top Width (ft)	4.19
20.00 4.20			
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)	2.26
3.72 2.26			
Max Chl Dpth (ft)	1.39	Hydr. Depth (ft)	0.70
1.39 0.70			
Conv. Total (cfs)	1944.2	Conv. (cfs)	109.9
1724.2 110.1			
Length Wtd. (ft)	45.00	Wetted Per. (ft)	4.42
20.00 4.42			
Min Ch El (ft)	48.26	Shear (lb/sq ft)	0.15
0.32 0.15			
Alpha	1.07	Stream Power (lb/ft s)	0.34
1.17 0.34			
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	0.00
0.02 0.00			
C & E Loss (ft)	0.02	Cum SA (acres)	0.00
0.02 0.00			

CROSS SECTION RIVER: rail-ditch
REACH: rail-ditch RS: 0

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	48.93	4.570007	49	13.45	49.91	4.32001	50	23	51
50	51	58.62	48.13	78.62	48.13	85.64	50.47	120.2	50.97
122.35	51	126.12	51.03	134.14	51.08	150	51.16		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	58.62	.03	78.62	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
58.62	78.62	0	0	0	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	23	51	150	150	51.16

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	49.55	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.45	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	49.11	Reach Len. (ft)	
Crit W.S. (ft)	49.11	Flow Area (sq ft)	1.43
19.52	1.43		
E.G. Slope (ft/ft)	0.012749	Area (sq ft)	1.43
19.52	1.43		
Q Total (cfs)	117.00	Flow (cfs)	4.79
107.43	4.78		
Top Width (ft)	25.86	Top Width (ft)	2.93
20.00	2.93		
Vel Total (ft/s)	5.23	Avg. Vel. (ft/s)	3.35
5.50	3.35		
Max Chl Dpth (ft)	0.98	Hydr. Depth (ft)	0.49
0.98	0.49		
Conv. Total (cfs)	1036.2	Conv. (cfs)	42.4
951.4	42.4		
Length Wtd. (ft)		Wetted Per. (ft)	3.09
20.00	3.09		
Min Ch El (ft)	48.13	Shear (lb/sq ft)	0.37
0.78	0.37		
Alpha	1.05	Stream Power (lb/ft s)	1.23
4.28	1.23		
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

SUMMARY OF MANNING'S N VALUES

River:rail-ditch

Reach	River Sta.	n1	n2	n3
rail-ditch	1000	.03	.03	.03
rail-ditch	900	.03	.03	.03
rail-ditch	800	.03	.03	.03
rail-ditch	700	.03	.03	.03
rail-ditch	600	.03	.03	.03
rail-ditch	500	.03	.03	.03
rail-ditch	400	.03	.03	.03
rail-ditch	300	.03	.03	.03
rail-ditch	200	.03	.03	.03
rail-ditch	143.08	.03	.03	.03
rail-ditch	100	.03	.03	.03
rail-ditch	50	.03	.03	.03
rail-ditch	49.8	Culvert		
rail-ditch	45	.03	.03	.03
rail-ditch	0	.03	.03	.03

SUMMARY OF REACH LENGTHS

River: rail-ditch

Reach	River Sta.	Left	Channel	Right
rail-ditch	1000	98.66	97.23	95.8
rail-ditch	900	99.11	98.14	97.17
rail-ditch	800	98.92	97.62	96.33
rail-ditch	700	98.82	97.49	96.17
rail-ditch	600	99.09	98.15	97.22
rail-ditch	500	98.82	97.28	95.75
rail-ditch	400	98.77	97.36	95.96
rail-ditch	300	98.92	97.77	96.62
rail-ditch	200	55.4	53.92	52.45
rail-ditch	143.08	43.26	42.56	41.87
rail-ditch	100	50	50	50
rail-ditch	50	5	5	5
rail-ditch	49.8	Culvert		
rail-ditch	45	45	45	45
rail-ditch	0	0	0	0

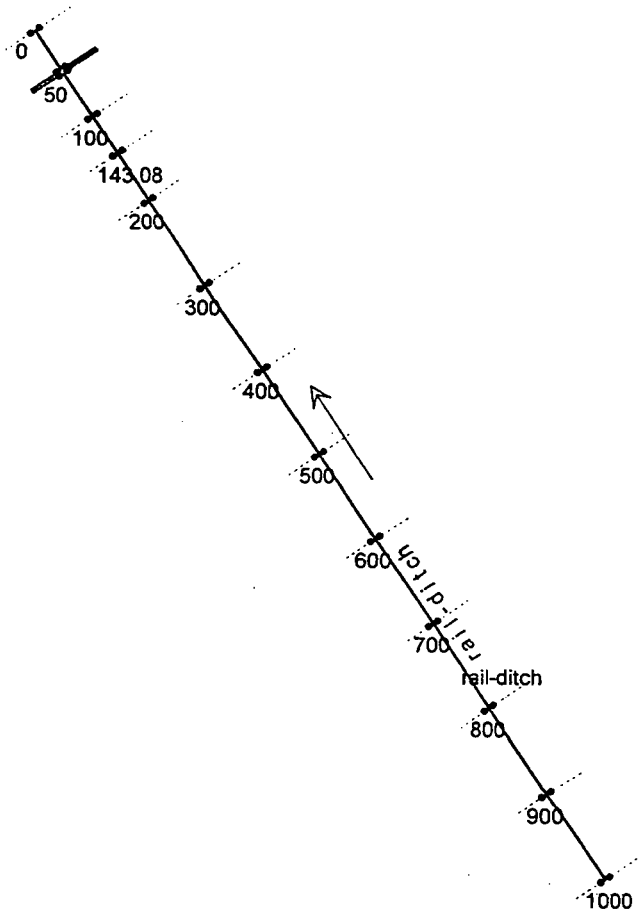
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: rail-ditch

Reach	River Sta.	Contr.	Expan.
rail-ditch	1000	.1	.3
rail-ditch	900	.1	.3
rail-ditch	800	.1	.3
rail-ditch	700	.1	.3
rail-ditch	600	.1	.3
rail-ditch	500	.1	.3
rail-ditch	400	.1	.3
rail-ditch	300	.1	.3
rail-ditch	200	.1	.3
rail-ditch	143.08	.1	.3
rail-ditch	100	.1	.3
rail-ditch	50	.1	.3
rail-ditch	49.8	Culvert	
rail-ditch	45	.1	.3
rail-ditch	0	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)		(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
rail-ditch	1000	117.00	51.00	52.49	51.98	52.66	0.002834	3.45	36.58	28.97	0.50
rail-ditch	900	117.00	50.71	52.23		52.40	0.002646	3.37	37.42	29.14	0.48
rail-ditch	800	117.00	50.43	51.99		52.15	0.002420	3.28	38.55	29.39	0.46
rail-ditch	700	117.00	50.14	51.79		51.93	0.001980	3.08	41.21	29.91	0.42
rail-ditch	600	117.00	49.85	51.64		51.75	0.001474	2.81	45.47	30.75	0.37
rail-ditch	500	117.00	49.56	51.58		51.64	0.000762	2.18	74.53	95.74	0.27
rail-ditch	400	117.00	49.28	51.54		51.58	0.000433	1.77	93.57	98.61	0.21
rail-ditch	300	117.00	48.99	51.53		51.54	0.000144	1.11	143.24	98.16	0.12
rail-ditch	200	117.00	48.70	51.52		51.53	0.000098	0.98	161.52	98.57	0.10
rail-ditch	143.08	117.00	48.54	51.52		51.53	0.000088	0.96	166.31	99.66	0.10
rail-ditch	100	117.00	48.41	51.51		51.52	0.000084	0.96	167.03	98.54	0.10
rail-ditch	50	117.00	48.27	51.50	49.25	51.52	0.000101	1.09	152.22	99.32	0.11
rail-ditch	49.8	Culvert									
rail-ditch	45	117.00	48.26	49.65	49.24	49.85	0.003622	3.72	33.74	28.39	0.56
rail-ditch	0	117.00	48.13	49.11	49.11	49.55	0.012749	5.50	22.38	25.86	0.98


0
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rail-ditch

HEC-RAS Plan: Plan 02 River: rail-ditch Reach: rail-ditch Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
rail-ditch	1000	117.00	51.00	52.49	51.98	52.66	0.002834	3.45	36.58	28.97	0.50
rail-ditch	900	117.00	50.71	52.23		52.40	0.002646	3.37	37.42	29.14	0.48
rail-ditch	800	117.00	50.43	51.99		52.15	0.002420	3.28	38.55	29.39	0.46
rail-ditch	700	117.00	50.14	51.79		51.93	0.001980	3.08	41.21	29.91	0.42
rail-ditch	600	117.00	49.85	51.64		51.75	0.001474	2.81	45.47	30.75	0.37
rail-ditch	500	117.00	49.56	51.58		51.64	0.000762	2.18	74.53	95.74	0.27
rail-ditch	400	117.00	49.28	51.54		51.58	0.000433	1.77	93.57	98.61	0.21
rail-ditch	300	117.00	48.99	51.53		51.54	0.000144	1.11	143.24	98.16	0.12
rail-ditch	200	117.00	48.70	51.52		51.53	0.000098	0.98	161.52	98.57	0.10
rail-ditch	143.08	117.00	48.54	51.52		51.53	0.000088	0.96	166.31	99.66	0.10
rail-ditch	100	117.00	48.41	51.51		51.52	0.000084	0.96	167.03	98.54	0.10
rail-ditch	50	117.00	48.27	51.50	49.25	51.52	0.000101	1.09	152.22	99.32	0.11
rail-ditch	49.8	Culvert									
rail-ditch	45	117.00	48.26	49.65	49.24	49.85	0.003622	3.72	33.74	28.39	0.56
rail-ditch	0	117.00	48.13	49.11	49.11	49.55	0.012749	5.50	22.38	25.86	0.98

Plan: Plan 02 rail-ditch rail-ditch RS: 1000 Profile: PF 1

E.G. Elev (ft)	52.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	52.49	Reach Len. (ft)	98.66	97.23	95.80
Crit W.S. (ft)	51.98	Flow Area (sq ft)	3.35	29.88	3.35
E.G. Slope (ft/ft)	0.002834	Area (sq ft)	3.35	29.88	3.35
Q Total (cfs)	117.00	Flow (cfs)	7.02	102.95	7.03
Top Width (ft)	28.97	Top Width (ft)	4.48	20.00	4.49
Vel Total (ft/s)	3.20	Avg. Vel. (ft/s)	2.10	3.45	2.10
Max Chl Dpth (ft)	1.49	Hydr. Depth (ft)	0.75	1.49	0.75
Conv. Total (cfs)	2197.9	Conv. (cfs)	131.8	1934.0	132.1
Length Wtd. (ft)	97.23	Wetted Per. (ft)	4.72	20.00	4.73
Min Ch El (ft)	51.00	Shear (lb/sq ft)	0.13	0.26	0.13
Alpha	1.07	Stream Power (lb/ft s)	0.26	0.91	0.26
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	0.16	0.93	0.78
C & E Loss (ft)	0.00	Cum SA (acres)	0.14	0.45	0.83

Plan: Plan 02 rail-ditch rail-ditch RS: 900 Profile: PF 1

E.G. Elev (ft)	52.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	52.23	Reach Len. (ft)	99.11	98.14	97.17
Crit W.S. (ft)		Flow Area (sq ft)	3.48	30.46	3.48
E.G. Slope (ft/ft)	0.002646	Area (sq ft)	3.48	30.46	3.48
Q Total (cfs)	117.00	Flow (cfs)	7.13	102.72	7.15
Top Width (ft)	29.14	Top Width (ft)	4.56	20.00	4.58
Vel Total (ft/s)	3.13	Avg. Vel. (ft/s)	2.05	3.37	2.05
Max Chl Dpth (ft)	1.52	Hydr. Depth (ft)	0.76	1.52	0.76
Conv. Total (cfs)	2274.6	Conv. (cfs)	138.6	1997.1	139.0
Length Wtd. (ft)	98.14	Wetted Per. (ft)	4.81	20.00	4.82
Min Ch El (ft)	50.71	Shear (lb/sq ft)	0.12	0.25	0.12
Alpha	1.07	Stream Power (lb/ft s)	0.24	0.85	0.24
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	0.15	0.86	0.77
C & E Loss (ft)	0.00	Cum SA (acres)	0.13	0.40	0.82

Plan: Plan 02 rail-ditch rail-ditch RS: 800 Profile: PF 1

E.G. Elev (ft)	52.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.99	Reach Len. (ft)	98.92	97.62	96.33
Crit W.S. (ft)		Flow Area (sq ft)	3.66	31.22	3.66
E.G. Slope (ft/ft)	0.002420	Area (sq ft)	3.66	31.22	3.66
Q Total (cfs)	117.00	Flow (cfs)	7.31	102.38	7.31
Top Width (ft)	29.39	Top Width (ft)	4.69	20.00	4.69
Vel Total (ft/s)	3.03	Avg. Vel. (ft/s)	1.99	3.28	1.99
Max Chl Dpth (ft)	1.56	Hydr. Depth (ft)	0.78	1.56	0.78
Conv. Total (cfs)	2378.6	Conv. (cfs)	148.6	2081.4	148.6
Length Wtd. (ft)	97.62	Wetted Per. (ft)	4.95	20.00	4.95
Min Ch El (ft)	50.43	Shear (lb/sq ft)	0.11	0.24	0.11
Alpha	1.08	Stream Power (lb/ft s)	0.22	0.77	0.22
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	0.14	0.79	0.76
C & E Loss (ft)	0.01	Cum SA (acres)	0.12	0.36	0.81

Plan: Plan 02 rail-ditch rail-ditch RS: 700 Profile: PF 1

E.G. Elev (ft)	51.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.79	Reach Len. (ft)	98.82	97.49	96.17
Crit W.S. (ft)		Flow Area (sq ft)	4.09	33.02	4.09
E.G. Slope (ft/ft)	0.001980	Area (sq ft)	4.09	33.02	4.09
Q Total (cfs)	117.00	Flow (cfs)	7.67	101.67	7.66
Top Width (ft)	29.91	Top Width (ft)	4.96	20.00	4.95
Vel Total (ft/s)	2.84	Avg. Vel. (ft/s)	1.87	3.08	1.87
Max Chl Dpth (ft)	1.65	Hydr. Depth (ft)	0.83	1.65	0.83
Conv. Total (cfs)	2629.6	Conv. (cfs)	172.3	2285.2	172.1
Length Wtd. (ft)	97.49	Wetted Per. (ft)	5.23	20.00	5.22
Min Ch El (ft)	50.14	Shear (lb/sq ft)	0.10	0.20	0.10
Alpha	1.08	Stream Power (lb/ft s)	0.18	0.63	0.18
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	0.13	0.72	0.75
C & E Loss (ft)	0.01	Cum SA (acres)	0.11	0.31	0.80

Plan: Plan 02 rail-ditch rail-ditch RS: 600 Profile: PF 1

E.G. Elev (ft)	51.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.64	Reach Len. (ft)	99.09	98.15	97.22
Crit W.S. (ft)		Flow Area (sq ft)	4.82	35.84	4.82
E.G. Slope (ft/ft)	0.001474	Area (sq ft)	4.82	35.84	4.82
Q Total (cfs)	117.00	Flow (cfs)	8.22	100.56	8.22
Top Width (ft)	30.75	Top Width (ft)	5.38	20.00	5.38
Vel Total (ft/s)	2.57	Avg. Vel. (ft/s)	1.71	2.81	1.71
Max Chl Dpth (ft)	1.79	Hydr. Depth (ft)	0.90	1.79	0.90
Conv. Total (cfs)	3047.2	Conv. (cfs)	214.1	2619.0	214.1
Length Wtd. (ft)	98.10	Wetted Per. (ft)	5.67	20.00	5.67
Min Ch El (ft)	49.85	Shear (lb/sq ft)	0.08	0.16	0.08
Alpha	1.08	Stream Power (lb/ft s)	0.13	0.46	0.13
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	0.12	0.64	0.74
C & E Loss (ft)	0.02	Cum SA (acres)	0.10	0.27	0.79

Plan: Plan 02 rail-ditch rail-ditch RS: 500 Profile: PF 1

E.G. Elev (ft)	51.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.58	Reach Len. (ft)	98.82	97.28	95.75
Crit W.S. (ft)		Flow Area (sq ft)	6.10	40.35	28.08
E.G. Slope (ft/ft)	0.000762	Area (sq ft)	6.10	40.35	28.08
Q Total (cfs)	117.00	Flow (cfs)	8.10	88.06	20.84
Top Width (ft)	95.74	Top Width (ft)	6.05	20.00	69.69
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.33	2.18	0.74
Max Chl Dpth (ft)	2.02	Hydr. Depth (ft)	1.01	2.02	0.40
Conv. Total (cfs)	4239.4	Conv. (cfs)	293.3	3190.8	755.2
Length Wtd. (ft)	97.06	Wetted Per. (ft)	6.37	20.00	70.18
Min Ch El (ft)	49.56	Shear (lb/sq ft)	0.05	0.10	0.02
Alpha	1.54	Stream Power (lb/ft s)	0.06	0.21	0.01
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.11	0.56	0.71
C & E Loss (ft)	0.01	Cum SA (acres)	0.08	0.22	0.71

Plan: Plan 02 rail-ditch rail-ditch RS: 400 Profile: PF 1

E.G. Elev (ft)	51.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.54	Reach Len. (ft)	98.77	97.36	95.96
Crit W.S. (ft)		Flow Area (sq ft)	7.67	45.17	40.72
E.G. Slope (ft/ft)	0.000433	Area (sq ft)	7.67	45.17	40.72
Q Total (cfs)	117.00	Flow (cfs)	8.27	80.10	28.62
Top Width (ft)	98.61	Top Width (ft)	6.79	20.00	71.82
Vel Total (ft/s)	1.25	Avg. Vel. (ft/s)	1.08	1.77	0.70
Max Chl Dpth (ft)	2.26	Hydr. Depth (ft)	1.13	2.26	0.57
Conv. Total (cfs)	5625.4	Conv. (cfs)	397.8	3851.4	1376.2
Length Wtd. (ft)	96.95	Wetted Per. (ft)	7.16	20.00	72.27
Min Ch El (ft)	49.28	Shear (lb/sq ft)	0.03	0.06	0.02
Alpha	1.51	Stream Power (lb/ft s)	0.03	0.11	0.01
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.09	0.46	0.63
C & E Loss (ft)	0.01	Cum SA (acres)	0.07	0.18	0.55

Plan: Plan 02 rail-ditch rail-ditch RS: 300 Profile: PF 1

E.G. Elev (ft)	51.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.53	Reach Len. (ft)	98.92	97.77	96.62
Crit W.S. (ft)		Flow Area (sq ft)	9.68	50.81	82.76
E.G. Slope (ft/ft)	0.000144	Area (sq ft)	9.68	50.81	82.76
Q Total (cfs)	117.00	Flow (cfs)	6.51	56.18	54.31
Top Width (ft)	98.16	Top Width (ft)	7.62	20.00	70.54
Vel Total (ft/s)	0.82	Avg. Vel. (ft/s)	0.67	1.11	0.66
Max Chl Dpth (ft)	2.54	Hydr. Depth (ft)	1.27	2.54	1.17
Conv. Total (cfs)	9756.2	Conv. (cfs)	542.9	4685.0	4528.3
Length Wtd. (ft)	97.30	Wetted Per. (ft)	8.03	20.00	71.28
Min Ch El (ft)	48.99	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.22	Stream Power (lb/ft s)	0.01	0.03	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.08	0.35	0.50
C & E Loss (ft)	0.00	Cum SA (acres)	0.05	0.14	0.40

Plan: Plan 02 rail-ditch rail-ditch RS: 200 Profile: PF 1

E.G. Elev (ft)	51.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.52	Reach Len. (ft)	55.40	53.92	52.45
Crit W.S. (ft)		Flow Area (sq ft)	11.95	56.44	93.13
E.G. Slope (ft/ft)	0.000098	Area (sq ft)	11.95	56.44	93.13
Q Total (cfs)	117.00	Flow (cfs)	7.11	55.22	54.67
Top Width (ft)	98.57	Top Width (ft)	8.47	20.00	70.10
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.60	0.98	0.59
Max Chl Dpth (ft)	2.82	Hydr. Depth (ft)	1.41	2.82	1.33
Conv. Total (cfs)	11828.4	Conv. (cfs)	718.7	5582.7	5527.1
Length Wtd. (ft)	53.35	Wetted Per. (ft)	8.92	20.00	71.01
Min Ch El (ft)	48.70	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.21	Stream Power (lb/ft s)	0.00	0.02	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.05	0.23	0.30
C & E Loss (ft)	0.00	Cum SA (acres)	0.04	0.09	0.24

Plan: Plan 02 rail-ditch rail-ditch RS: 143.08 Profile: PF 1

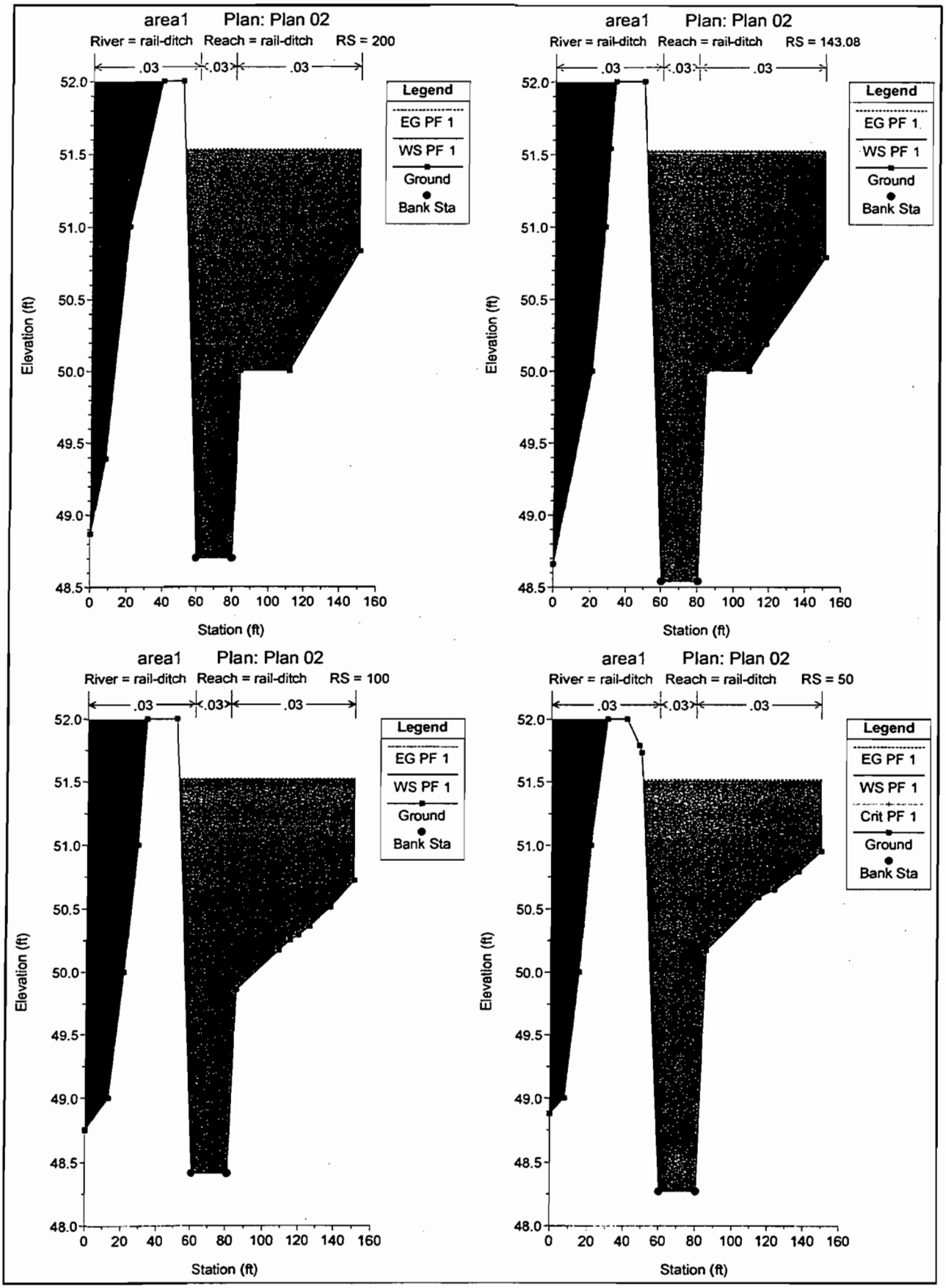
E.G. Elev (ft)	51.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.52	Reach Len. (ft)	43.26	42.56	41.87
Crit W.S. (ft)		Flow Area (sq ft)	13.46	59.53	93.32
E.G. Slope (ft/ft)	0.000088	Area (sq ft)	13.46	59.53	93.32
Q Total (cfs)	117.00	Flow (cfs)	7.89	57.31	51.80
Top Width (ft)	99.66	Top Width (ft)	9.04	20.00	70.62
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)	0.59	0.96	0.56
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)	1.49	2.98	1.32
Conv. Total (cfs)	12456.6	Conv. (cfs)	839.6	6101.8	5515.2
Length Wtd. (ft)	42.31	Wetted Per. (ft)	9.52	20.00	71.59
Min Ch El (ft)	48.54	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.24	Stream Power (lb/ft s)	0.00	0.02	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.03	0.16	0.19
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	0.07	0.15

Plan: Plan 02 rail-ditch rail-ditch RS: 100 Profile: PF 1

E.G. Elev (ft)	51.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.51	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	14.41	62.03	90.59
E.G. Slope (ft/ft)	0.000084	Area (sq ft)	14.41	62.03	90.59
Q Total (cfs)	117.00	Flow (cfs)	8.46	59.85	48.69
Top Width (ft)	98.54	Top Width (ft)	9.30	20.00	69.24
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)	0.59	0.96	0.54
Max Chl Dpth (ft)	3.10	Hydr. Depth (ft)	1.55	3.10	1.31
Conv. Total (cfs)	12771.5	Conv. (cfs)	923.4	6533.6	5314.5
Length Wtd. (ft)	50.00	Wetted Per. (ft)	9.80	20.00	70.27
Min Ch El (ft)	48.41	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.27	Stream Power (lb/ft s)	0.00	0.02	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.02	0.10	0.10
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	0.05	0.09

Plan: Plan 02 rail-ditch rail-ditch RS: 50 Profile: PF 1

E.G. Elev (ft)	51.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	51.50	Reach Len. (ft)	5.00	5.00	5.00
Crit W.S. (ft)	49.25	Flow Area (sq ft)	15.69	64.65	71.88
E.G. Slope (ft/ft)	0.000101	Area (sq ft)	15.69	64.65	71.88
Q Total (cfs)	117.00	Flow (cfs)	10.39	70.36	36.26
Top Width (ft)	99.32	Top Width (ft)	9.71	20.00	69.61
Vel Total (ft/s)	0.77	Avg. Vel. (ft/s)	0.66	1.09	0.50
Max Chl Dpth (ft)	3.23	Hydr. Depth (ft)	1.62	3.23	1.03
Conv. Total (cfs)	11640.9	Conv. (cfs)	1033.3	7000.3	3607.4
Length Wtd. (ft)	5.00	Wetted Per. (ft)	10.23	20.00	70.48
Min Ch El (ft)	48.27	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.40	Stream Power (lb/ft s)	0.01	0.02	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	0.03	0.01
C & E Loss (ft)		Cum SA (acres)	0.00	0.02	0.01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River = rail-ditch Reach = rail-ditch RS = 200
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Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 143.08
.03 .03 .03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 100
.03 .03 .03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 50
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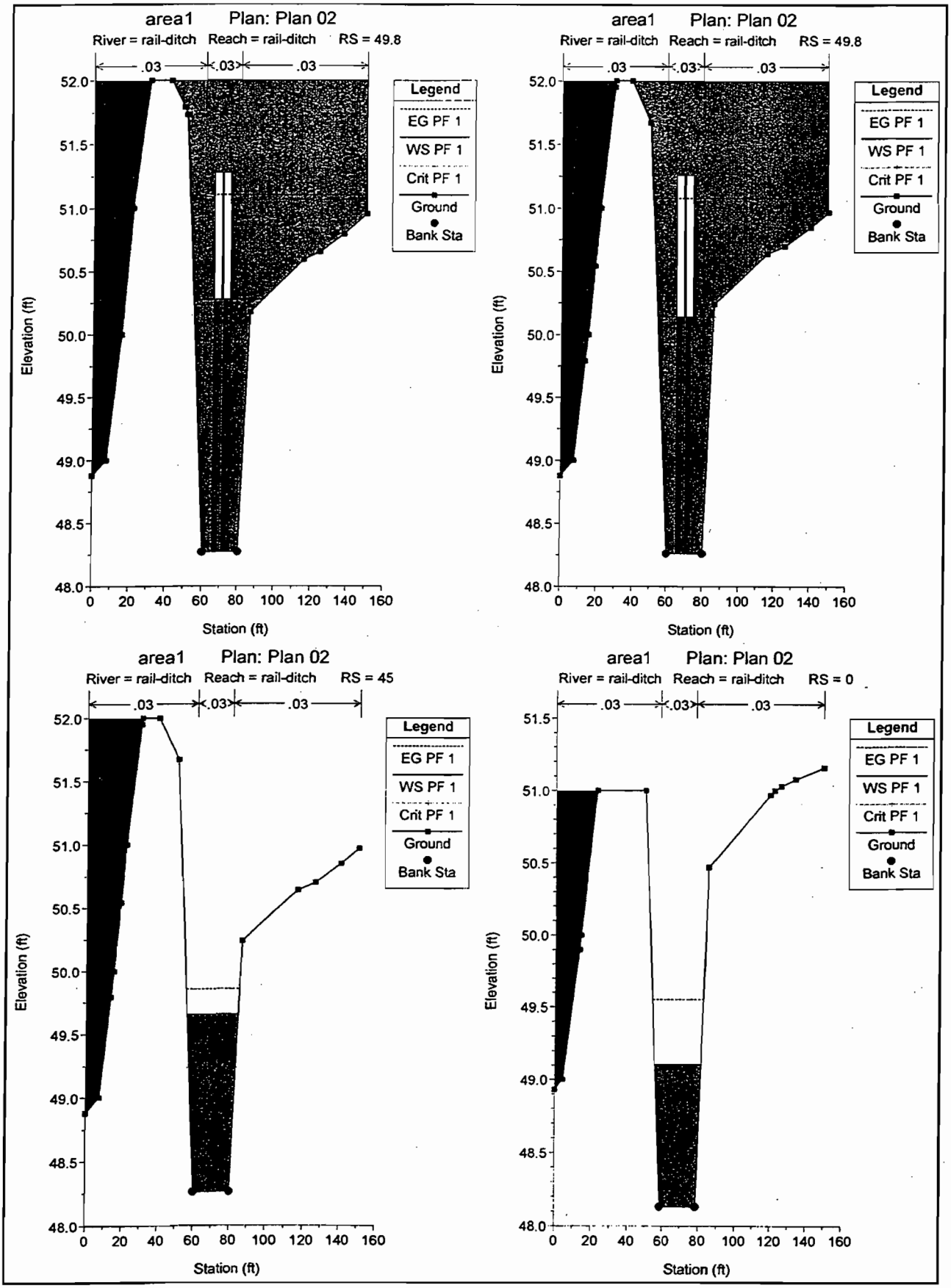
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 49.8
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EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 49.8
.03 .03 .03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 45
.03 .03 .03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
area1 Plan: Plan 02
River = rail-ditch Reach = rail-ditch RS = 0
.03 .03 .03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

BLACK & VEATCH

Calculation Record

_____ Nuclear Safety Related
x Not Nuclear Safety Related

Client Name: Florida Power & Light Page 1 of 41

Project Name: Manatee Power Plant Unit:

Project Number: 130770 File Number:

Calculation Title: HEC-RAS ANALYSIS FOR CHANNEL 2 AREA 6.1 ALONG ACCESS ROAD

Calculation Is: ☐ Preliminary ☒ Final ☐ Other

Quality Record: ☐ Yes ☐ No

Objective HYDRAULIC ANALYSIS FOR CHANNEL 1

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date

See Page____ of this calculation for additional assumptions.

Verification Method

- ☐ Detailed Review
- ☐ Alternate Calculation
- ☐ Conform Against Similar Previously Verified Calculations
- ☐ Other

This Section Used for Computer Generated Calculations

Program Number/Name: HEC-RAS Version: 3.0
Run Date: 01/15/02 Run Time:
Number of Pages: 41

Review and Approval

Rev	Revised Pages	Prepared By	Date	Verified By	Date	Project Engineer Approval	Date
		SEBASTIAN KULESZA	01/15/02				

HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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X     X  XXXXXX    XXXX        XXXX       XX      XXXX
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PROJECT DATA
Project Title: area16
Project File : area16.prj
Run Date and Time: 01/14/2002 9:21:11 AM

Project in English units

Project Description:

Trapezoidal Channel in Area 6
along western access road

PLAN DATA

Plan Title: Plan 05
Plan File : d:\manatee\area16.p05

Geometry Title: channel
Geometry File : d:\manatee\area16.g01

Flow Title : Flow 04
Flow File : d:\manatee\area16.f04

Plan Summary Information:
Number of: Cross Sections = 19 Mulitple Openings = 0
Culverts = 1 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options

Critical depth computed only where necessary

Conveyance Calculation Method: At breaks in n values only

Friction Slope Method: Average Conveyance

Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Flow 04

Flow File : d:\manatee\area16.f04

Flow Data (cfs)

River	Reach	RS	PF 1
channel16	channel16	1400	106

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
channel16	channel16	PF 1	Critical	Critical

GEOMETRY DATA

Geometry Title: channel

Geometry File : d:\manatee\area16.g01

CROSS SECTION RIVER: channel16

REACH: channel16 RS: 1400

INPUT

Description:

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	50.14	-43.3	50	-36.99	49.84	-25.68	49.47	-17.05	49
5.64	49	14.01	46.21	34.01	46.21	40	48.21	50	48.41
60	48.21	65.01	48.11	70.09	48.02	80	48.1		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	14.01	.03	34.01	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
14.01	34.01	100	100	100	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	50.14	40	80	48.21

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	48.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.90	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	47.13	Flow Area (sq ft)	4.26	33.71	4.25
E.G. Slope (ft/ft)	0.001510	Area (sq ft)	4.26	33.71	4.25
Q Total (cfs)	106.00	Flow (cfs)	7.06	91.88	7.05
Top Width (ft)	30.10	Top Width (ft)	5.06	20.00	5.05
Vel Total (ft/s)	2.51	Avg. Vel. (ft/s)	1.66	2.73	1.66
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)	0.84	1.69	0.84
Conv. Total (cfs)	2728.2	Conv. (cfs)	181.8	2364.8	181.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	5.33	20.00	5.32
Min Ch El (ft)	46.21	Shear (lb/sq ft)	0.08	0.16	0.08
Alpha	1.08	Stream Power (lb/ft s)	0.12	0.43	0.12
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.75	1.46	0.25
C & E Loss (ft)	0.00	Cum SA (acres)	0.75	0.68	0.21

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 1300

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	49	-26.32	49	-8.22	48.45	-2.5	48.35	5.76	48.22
13.61	46.05	33.61	46.05	40	48.18	50	48.38	60	48.18
66.47	47	74.26	47	80	47.16				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	13.61	.03	33.61	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
13.61	33.61	76.24	76.24	76.24	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	49	40	80	48.18

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.75	Reach Len. (ft)	76.24	76.24	76.24
Crit W.S. (ft)		Flow Area (sq ft)	5.25	34.09	4.36
E.G. Slope (ft/ft)	0.001409	Area (sq ft)	5.25	34.09	4.36
Q Total (cfs)	106.00	Flow (cfs)	8.57	90.41	7.03
Top Width (ft)	31.28	Top Width (ft)	6.17	20.00	5.11
Vel Total (ft/s)	2.43	Avg. Vel. (ft/s)	1.63	2.65	1.61
Max Chl Dpth (ft)	1.70	Hydr. Depth (ft)	0.85	1.70	0.85
Conv. Total (cfs)	2824.4	Conv. (cfs)	228.2	2408.9	187.3
Length Wtd. (ft)	76.24	Wetted Per. (ft)	6.40	20.00	5.39
Min Ch El (ft)	46.05	Shear (lb/sq ft)	0.07	0.15	0.07
Alpha	1.09	Stream Power (lb/ft s)	0.12	0.40	0.11
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.74	1.38	0.24
C & E Loss (ft)	0.00	Cum SA (acres)	0.73	0.63	0.20

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 1223.76

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	48	-13.62	48	7.72	47.79	13.33	45.92	33.32	45.92
40.01	48.15	50.01	48.35	60	48.15	63.56	46.97	80	46.64

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	13.33	.03	33.32	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
13.33	33.32	123.76	123.76	123.76	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	48	40.01	80	48.15

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.75	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.10	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	47.65	Reach Len. (ft)	123.76
123.76	123.76		
Crit W.S. (ft)		Flow Area (sq ft)	4.47
34.52	4.47		
E.G. Slope (ft/ft)	0.001384	Area (sq ft)	4.47
34.52	4.47		
Q Total (cfs)	106.00	Flow (cfs)	7.22
91.57	7.22		
Top Width (ft)	30.35	Top Width (ft)	5.18
19.99	5.18		
Vel Total (ft/s)	2.44	Avg. Vel. (ft/s)	1.61
2.65	1.61		
Max Chl Dpth (ft)	1.73	Hydr. Depth (ft)	0.86
1.73	0.86		
Conv. Total (cfs)	2849.5	Conv. (cfs)	194.0
2461.4	194.0		
Length Wtd. (ft)	123.76	Wetted Per. (ft)	5.46
19.99	5.46		
Min Ch El (ft)	45.92	Shear (lb/sq ft)	0.07
0.15	0.07		
Alpha	1.08	Stream Power (lb/ft s)	0.11
0.40	0.11		
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.73
1.32	0.23		
C & E Loss (ft)	0.00	Cum SA (acres)	0.72
0.60	0.19		

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 1100

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	48.49	-29.84	48.24	-11.2	48	6.9	47.7	12.82	45.72
32.82	45.72	40	48.12	50	48.32	60	48.12	64.36	46.67
80	46.33								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	12.82	.03	32.82	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
12.82	32.82	100	100	100	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	48.49	40	80	48.12

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.49	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	4.66	35.32	4.67
E.G. Slope (ft/ft)	0.001276	Area (sq ft)	4.66	35.32	4.67
Q Total (cfs)	106.00	Flow (cfs)	7.33	91.33	7.34
Top Width (ft)	30.56	Top Width (ft)	5.28	20.00	5.28
Vel Total (ft/s)	2.37	Avg. Vel. (ft/s)	1.57	2.59	1.57
Max Chl Dpth (ft)	1.77	Hydr. Depth (ft)	0.88	1.77	0.88
Conv. Total (cfs)	2967.0	Conv. (cfs)	205.2	2556.5	205.4
Length Wtd. (ft)	100.00	Wetted Per. (ft)	5.57	20.00	5.57
Min Ch El (ft)	45.72	Shear (lb/sq ft)	0.07	0.14	0.07
Alpha	1.08	Stream Power (lb/ft s)	0.10	0.36	0.10
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	0.72	1.22	0.22
C & E Loss (ft)	0.00	Cum SA (acres)	0.71	0.54	0.18

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 1000

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	47.96	-45.94	47.89	-25.14	47.54	-12.05	47.34	-.71	47.2
7.96	47.05	12.42	45.56	32.42	45.56	40	48.09	50	48.29
60	48.09	67.45	46.31	80	46.14				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	12.42	.03	32.42	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
12.42	32.42	100	100	100	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	47.96	40	80	48.09

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.36	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	7.87	36.07	4.87
E.G. Slope (ft/ft)	0.001216	Area (sq ft)	7.87	36.07	4.87
Q Total (cfs)	106.00	Flow (cfs)	6.09	92.33	7.59
Top Width (ft)	51.42	Top Width (ft)	26.02	20.00	5.40
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)	0.77	2.56	1.56
Max Chl Dpth (ft)	1.80	Hydr. Depth (ft)	0.30	1.80	0.90
Conv. Total (cfs)	3039.5	Conv. (cfs)	174.6	2647.4	217.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	26.26	20.00	5.70
Min Ch El (ft)	45.56	Shear (lb/sq ft)	0.02	0.14	0.06
Alpha	1.25	Stream Power (lb/ft s)	0.02	0.35	0.10
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.71	1.14	0.21
C & E Loss (ft)	0.02	Cum SA (acres)	0.67	0.49	0.17

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 900

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	47.3	-33.93	47	-8.93	46.56	-4.93	46.5	9.47	46.25
12.03	45.4	32.03	45.4	40	48.06	50	48.26	60	48.06
67.12	45.69	80	45.53						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	12.03	.03	32.03	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
12.03	32.03	100	100	100	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	47.3	40	80	48.06

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.36	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.04	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	47.33	Reach Len. (ft)	100.00
100.00	100.00		
Crit W.S. (ft)		Flow Area (sq ft)	37.17
38.51	5.55		
E.G. Slope (ft/ft)	0.000550	Area (sq ft)	37.17
38.51	5.55		
Q Total (cfs)	106.00	Flow (cfs)	30.65
69.27	6.08		
Top Width (ft)	87.80	Top Width (ft)	62.03
20.00	5.77		
Vel Total (ft/s)	1.30	Avg. Vel. (ft/s)	0.82
1.80	1.09		
Max Chl Dpth (ft)	1.93	Hydr. Depth (ft)	0.60
1.93	0.96		
Conv. Total (cfs)	4517.9	Conv. (cfs)	1306.4
2952.4	259.0		
Length Wtd. (ft)	100.00	Wetted Per. (ft)	62.20
20.00	6.08		
Min Ch El (ft)	45.40	Shear (lb/sq ft)	0.02
0.07	0.03		
Alpha	1.40	Stream Power (lb/ft s)	0.02
0.12	0.03		
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.66
1.05	0.20		
C & E Loss (ft)	0.00	Cum SA (acres)	0.57
0.45	0.15		

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 800

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	46.96	-40.09	46.8	-25.75	46.59	9.13	46.07	11.63	45.24
31.63	45.24	40	48.03	50	48.23	60	48.03	67.78	45.44
76.6	45.36	80	45.31						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	11.63	.03	31.63	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
11.63	31.63	107.21	107.21	107.21	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	46.96	40	80	48.03

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.29	Reach Len. (ft)	107.21	107.21	107.21
Crit W.S. (ft)		Flow Area (sq ft)	50.32	41.05	6.32
E.G. Slope (ft/ft)	0.000339	Area (sq ft)	50.32	41.05	6.32
Q Total (cfs)	106.00	Flow (cfs)	39.88	60.46	5.66
Top Width (ft)	87.79	Top Width (ft)	61.63	20.00	6.16
Vel Total (ft/s)	1.09	Avg. Vel. (ft/s)	0.79	1.47	0.90
Max Chl Dpth (ft)	2.05	Hydr. Depth (ft)	0.82	2.05	1.03
Conv. Total (cfs)	5756.8	Conv. (cfs)	2165.9	3283.5	307.4
Length Wtd. (ft)	107.21	Wetted Per. (ft)	62.10	20.00	6.49
Min Ch El (ft)	45.24	Shear (lb/sq ft)	0.02	0.04	0.02
Alpha	1.29	Stream Power (lb/ft s)	0.01	0.06	0.02
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.56	0.96	0.18
C & E Loss (ft)	0.00	Cum SA (acres)	0.43	0.40	0.14

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 692.79

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	46.33	-32.69	46	-12.41	45.65	-5.7	45.56	.73	45.49
6.59	45.44	9.47	45.41	11.28	45.07	31.28	45.07	40.07	48
50.07	48.2	60.07	48	69.59	44.82	71.02	44.8	76.24	44.7
80	44.63								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	11.28	.03	31.28	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
11.28	31.28	38.45	44.74	51.04	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	46.33	40.07	80	48

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.29	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.01	Wt. n-Val.	0.030
0.030 0.030			
W.S. Elev (ft)	47.29	Reach Len. (ft)	38.45
44.74 51.04			
Crit W.S. (ft)		Flow Area (sq ft)	91.33
44.31 7.36			
E.G. Slope (ft/ft)	0.000114	Area (sq ft)	91.33
44.31 7.36			
Q Total (cfs)	106.00	Flow (cfs)	62.24
39.75 4.02			
Top Width (ft)	87.93	Top Width (ft)	61.28
20.00 6.65			
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.68
0.90 0.55			
Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)	1.49
2.22 1.11			
Conv. Total (cfs)	9945.6	Conv. (cfs)	5839.3
3729.4 376.9			
Length Wtd. (ft)	41.44	Wetted Per. (ft)	62.27
20.00 7.01			
Min Ch El (ft)	45.07	Shear (lb/sq ft)	0.01
0.02 0.01			
Alpha	1.07	Stream Power (lb/ft s)	0.01
0.01 0.00			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.38
0.86 0.17			
C & E Loss (ft)	0.00	Cum SA (acres)	0.28
0.35 0.12			

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 639.72

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	46.33	-26.26	46	-18.91	45.9	-10.68	45.79	-1.85	45.65
1.67	45.6	10.99	44.96	30.99	44.96	40	47.98	50	48.18
60	47.98	70.79	44.39	80	44.22				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	10.99	.03	30.99	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10.99	30.99	38.29	44.58	50.88	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	46.33	40.03	80	47.98

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.29	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.01	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	47.28	Reach Len. (ft)	38.29
44.58	50.88		
Crit W.S. (ft)		Flow Area (sq ft)	86.19
46.37	8.02		
E.G. Slope (ft/ft)	0.000118	Area (sq ft)	86.19
46.37	8.02		
Q Total (cfs)	106.00	Flow (cfs)	57.74
43.67	4.59		
Top Width (ft)	87.91	Top Width (ft)	60.99
20.00	6.92		
Vel Total (ft/s)	0.75	Avg. Vel. (ft/s)	0.67
0.94	0.57		
Max Chl Dpth (ft)	2.32	Hydr. Depth (ft)	1.41
2.32	1.16		
Conv. Total (cfs)	9765.4	Conv. (cfs)	5319.8
4022.8	422.9		
Length Wtd. (ft)	41.66	Wetted Per. (ft)	61.97
20.00	7.29		
Min Ch El (ft)	44.96	Shear (lb/sq ft)	0.01
0.02	0.01		
Alpha	1.10	Stream Power (lb/ft s)	0.01
0.02	0.00		
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.30
0.81	0.16		
C & E Loss (ft)	0.00	Cum SA (acres)	0.23
0.33	0.12		

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 566.88

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	46.33	-36.42	46.28	-31.89	46.25	-22.88	46.18	-11.58	46
-5.02	45.88	2.17	45.75	10.78	44.86	30.78	44.86	40.07	47.96
50.07	48.16	60.07	47.96	70.97	44.6	73.71	45	80	45

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	10.78	.03	30.78	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10.78	30.78	105.52	105.52	105.52	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	46.33	40.07	80	47.96

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.28	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.01	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	47.27	Reach Len. (ft)	105.52
105.52	105.52		
Crit W.S. (ft)		Flow Area (sq ft)	76.68
48.23	8.71		
E.G. Slope (ft/ft)	0.000134	Area (sq ft)	76.68
48.23	8.71		
Q Total (cfs)	106.00	Flow (cfs)	50.80
49.74	5.46		
Top Width (ft)	88.01	Top Width (ft)	60.78
20.00	7.23		
Vel Total (ft/s)	0.79	Avg. Vel. (ft/s)	0.66
1.03	0.63		
Max Chl Dpth (ft)	2.41	Hydr. Depth (ft)	1.26
2.41	1.21		
Conv. Total (cfs)	9153.8	Conv. (cfs)	4386.7
4295.2	471.9		
Length Wtd. (ft)	105.52	Wetted Per. (ft)	61.77
20.00	7.62		
Min Ch El (ft)	44.86	Shear (lb/sq ft)	0.01
0.02	0.01		
Alpha	1.16	Stream Power (lb/ft s)	0.01
0.02	0.01		
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.23
0.76	0.15		
C & E Loss (ft)	0.00	Cum SA (acres)	0.17
0.31	0.11		

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 461.36

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	47.61	-40.26	47.51	-35.15	47.46	-30.83	47.39	-25.72	47.32
-13.97	47.25	.11	47.25	2.4	47.25	10.3	44.69	30.3	44.69
40.01	47.93	50.01	48.13	60.01	47.93	65.79	46	80	46

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	10.3	.03	30.3	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10.3	30.3	44.55	40.67	36.79	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	47.61	40	80	47.93

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.22	Reach Len. (ft)	44.55	40.67	36.79
Crit W.S. (ft)		Flow Area (sq ft)	9.87	50.58	9.58
E.G. Slope (ft/ft)	0.000341	Area (sq ft)	9.87	50.58	9.58
Q Total (cfs)	106.00	Flow (cfs)	10.21	85.89	9.90
Top Width (ft)	35.38	Top Width (ft)	7.80	20.00	7.58
Vel Total (ft/s)	1.51	Avg. Vel. (ft/s)	1.03	1.70	1.03
Max Chl Dpth (ft)	2.53	Hydr. Depth (ft)	1.26	2.53	1.26
Conv. Total (cfs)	5739.0	Conv. (cfs)	552.9	4650.3	535.9
Length Wtd. (ft)	40.68	Wetted Per. (ft)	8.20	20.00	7.99
Min Ch El (ft)	44.69	Shear (lb/sq ft)	0.03	0.05	0.03
Alpha	1.11	Stream Power (lb/ft s)	0.03	0.09	0.03
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.13	0.64	0.13
C & E Loss (ft)	0.00	Cum SA (acres)	0.09	0.26	0.09

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 433.80

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	48.19	-43.24	48	-31.88	47.88	-18.63	47.77	-4.68	47.65
1.33	47.6	10.2	44.64	30.2	44.64	40	47.92	50	48.12
60	47.92	65.75	46	73.4	46	80	46.04		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	10.2	.03	30.2	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
10.2	30.2	44.6	40.71	36.83	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	48.19	40.01	80	47.92

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.24	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.04	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	47.21	Reach Len. (ft)	44.60
40.71	36.83		
Crit W.S. (ft)		Flow Area (sq ft)	9.86
51.31	9.83		
E.G. Slope (ft/ft)	0.000326	Area (sq ft)	9.86
51.31	9.83		
Q Total (cfs)	106.00	Flow (cfs)	10.04
85.94	10.01		
Top Width (ft)	35.35	Top Width (ft)	7.69
20.00	7.66		
Vel Total (ft/s)	1.49	Avg. Vel. (ft/s)	1.02
1.68	1.02		
Max Chl Dpth (ft)	2.57	Hydr. Depth (ft)	1.28
2.57	1.28		
Conv. Total (cfs)	5873.7	Conv. (cfs)	556.6
4762.3	554.9		
Length Wtd. (ft)	40.71	Wetted Per. (ft)	8.10
20.00	8.08		
Min Ch El (ft)	44.64	Shear (lb/sq ft)	0.02
0.05	0.02		
Alpha	1.11	Stream Power (lb/ft s)	0.03
0.09	0.03		
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.12
0.59	0.12		
C & E Loss (ft)	0.00	Cum SA (acres)	0.08
0.24	0.08		

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 403.12

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	48.46	-46.49	48.4	-35.37	48.32	-26.62	48.25	-14.61	48.18
-6.55	48	.15	48	10.06	44.6	30.06	44.6	40	47.91
50	48.11	60	47.91	63.04	46.9	69.73	46.67	73.51	46.57
77.92	46.52	80	46.47						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	10.06	.03	30.06	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10.06	30.06	103.12	103.12	103.12	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	48.46	40	80	47.91

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.23	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.04	Wt. n-Val.	0.030
0.030	0.030		
W.S. Elev (ft)	47.19	Reach Len. (ft)	103.12
103.12	103.12		
Crit W.S. (ft)		Flow Area (sq ft)	9.79
51.83	10.09		
E.G. Slope (ft/ft)	0.000315	Area (sq ft)	9.79
51.83	10.09		
Q Total (cfs)	106.00	Flow (cfs)	9.86
85.97	10.17		
Top Width (ft)	35.34	Top Width (ft)	7.55
20.00	7.78		
Vel Total (ft/s)	1.48	Avg. Vel. (ft/s)	1.01
1.66	1.01		
Max Chl Dpth (ft)	2.59	Hydr. Depth (ft)	1.30
2.59	1.30		
Conv. Total (cfs)	5972.7	Conv. (cfs)	555.3
4844.1	573.3		
Length Wtd. (ft)	103.12	Wetted Per. (ft)	7.99
20.00	8.20		
Min Ch El (ft)	44.60	Shear (lb/sq ft)	0.02
0.05	0.02		
Alpha	1.11	Stream Power (lb/ft s)	0.02
0.08	0.02		
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.11
0.55	0.11		
C & E Loss (ft)	0.00	Cum SA (acres)	0.07
0.23	0.08		

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 300

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	49.03	-42.53	48.83	-28.84	48.42	-10.45	48	.55	47.83
9.65	44.43	29.65	44.43	40	47.88	50	48.08	60	47.88
62.64	47	80	47						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	9.65	.03	29.65	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9.65	29.65	100	100	100	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	49.03	40	80	47.88

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.20	Element	Left OB	Channel Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.030 0.030
W.S. Elev (ft)	47.17	Reach Len. (ft)	100.00	100.00 100.00
Crit W.S. (ft)		Flow Area (sq ft)	10.03	54.75 11.24
E.G. Slope (ft/ft)	0.000261	Area (sq ft)	10.03	54.75 11.24
Q Total (cfs)	106.00	Flow (cfs)	9.48	85.81 10.71
Top Width (ft)	35.54	Top Width (ft)	7.33	20.00 8.21
Vel Total (ft/s)	1.39	Avg. Vel. (ft/s)	0.95	1.57 0.95
Max Chl Dpth (ft)	2.74	Hydr. Depth (ft)	1.37	2.74 1.37
Conv. Total (cfs)	6555.5	Conv. (cfs)	586.2	5306.6 662.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)	7.82	20.00 8.66
Min Ch El (ft)	44.43	Shear (lb/sq ft)	0.02	0.04 0.02
Alpha	1.11	Stream Power (lb/ft s)	0.02	0.07 0.02
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.08	0.42 0.09
C & E Loss (ft)	0.00	Cum SA (acres)	0.06	0.18 0.06

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 200

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	48.62	-36.14	48.45	-29.62	48.39	-18.05	48.31	-6.95	48.21
-2.02	48.16	9.25	44.27	29.25	44.27	40	47.85	50	48.05
60	47.85	62.55	47	80	47				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	9.25	.03	29.25	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9.25	29.25	100	100	100	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	48.62	40	80	47.85

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.15	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	12.01	57.58	12.44
E.G. Slope (ft/ft)	0.000213	Area (sq ft)	12.01	57.58	12.44
Q Total (cfs)	106.00	Flow (cfs)	10.66	84.26	11.08
Top Width (ft)	36.98	Top Width (ft)	8.34	20.00	8.64
Vel Total (ft/s)	1.29	Avg. Vel. (ft/s)	0.89	1.46	0.89
Max Chl Dpth (ft)	2.88	Hydr. Depth (ft)	1.44	2.88	1.44
Conv. Total (cfs)	7259.9	Conv. (cfs)	730.1	5771.2	758.6
Length Wtd. (ft)	100.00	Wetted Per. (ft)	8.82	20.00	9.11
Min Ch El (ft)	44.27	Shear (lb/sq ft)	0.02	0.04	0.02
Alpha	1.12	Stream Power (lb/ft s)	0.02	0.06	0.02
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.06	0.29	0.06
C & E Loss (ft)	0.00	Cum SA (acres)	0.04	0.13	0.04

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 100

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	49	-5.82	49	8.86	44.11	28.86	44.11	40	47.82
50	48.02	60	47.82	62.46	47	80	47		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	8.86	.03	28.86	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
8.86	28.86	70	70	70	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-50	-50	49	40	80	47.82

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.16	Element	Left OB	Channel Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.030 0.030
W.S. Elev (ft)	47.13	Reach Len. (ft)	70.00	70.00 70.00
Crit W.S. (ft)		Flow Area (sq ft)	13.73	60.48 13.73
E.G. Slope (ft/ft)	0.000176	Area (sq ft)	13.73	60.48 13.73
Q Total (cfs)	106.00	Flow (cfs)	11.47	83.06 11.47
Top Width (ft)	38.16	Top Width (ft)	9.08	20.00 9.08
Vel Total (ft/s)	1.21	Avg. Vel. (ft/s)	0.84	1.37 0.84
Max Chl Dpth (ft)	3.02	Hydr. Depth (ft)	1.51	3.02 1.51
Conv. Total (cfs)	7994.5	Conv. (cfs)	864.8	6264.7 865.0
Length Wtd. (ft)	70.00	Wetted Per. (ft)	9.57	20.00 9.57
Min Ch El (ft)	44.11	Shear (lb/sq ft)	0.02	0.03 0.02
Alpha	1.12	Stream Power (lb/ft s)	0.01	0.05 0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.03	0.16 0.03
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	0.09 0.02

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 30

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	49.19	-33.87	49	-4.85	48.48	8.6	44	28.6	44
40	47.8	50	48	60	47.8	68.33	47.94	70.55	47.88
80	47.73								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	8.6	.03	28.6	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
8.6	28.6	30.09	30.09	30.09	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	47.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.12	Reach Len. (ft)	30.09	30.09	30.09
Crit W.S. (ft)	44.92	Flow Area (sq ft)	14.65	62.48	14.64
E.G. Slope (ft/ft)	0.000156	Area (sq ft)	14.65	62.48	14.64
Q Total (cfs)	106.00	Flow (cfs)	11.76	82.48	11.75
Top Width (ft)	38.75	Top Width (ft)	9.38	20.00	9.37
Vel Total (ft/s)	1.16	Avg. Vel. (ft/s)	0.80	1.32	0.80
Max Chl Dpth (ft)	3.12	Hydr. Depth (ft)	1.56	3.12	1.56
Conv. Total (cfs)	8499.1	Conv. (cfs)	943.2	6613.4	942.5
Length Wtd. (ft)	30.09	Wetted Per. (ft)	9.89	20.00	9.88
Min Ch El (ft)	44.00	Shear (lb/sq ft)	0.01	0.03	0.01
Alpha	1.12	Stream Power (lb/ft s)	0.01	0.04	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)	0.01	0.06	0.01
C & E Loss (ft)		Cum SA (acres)	0.00	0.05	0.00

CULVERT RIVER: channel16
REACH: channel16 RS: 29.9

INPUT
Description:
Distance from Upstream XS = .1
Deck/Roadway Width = 29.9
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 11

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-50	48	44	-33.87	48	44	-4.85	48	44
8.6	48	44	28.6	48	44	40	48	44
50	48	44	60	48	44	66.39	48	44
70.55	48	44	80	48	44			

Upstream Bridge Cross Section Data
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	49.19	-33.87	49	-4.85	48.48	8.6	44	28.6	44
40	47.8	50	48	60	47.8	68.33	47.94	70.55	47.88
80	47.73								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	8.6	.03	28.6	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
8.6	28.6	.1	.3

Downstream Deck/Roadway Coordinates

num= 12

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-50	48	43.85	-30.96	48	43.85	-25.41	48	43.85
-4.67	48	43.85	15.79	48	43.85	23.73	48	43.85
40	48	43.85	50	48	43.85	60	48	43.85
60.58	48	43.85	70	48	43.85	80	48	43.85

Downstream Bridge Cross Section Data

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	49.22	-30.96	49	-25.41	48.91	-4.67	48.56	-4.67	43.85
15.79	43.85	15.79	48.32	23.73	48.25	40	47.81	50	48.01
60	47.81	80	48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	-4.67	.03	15.79	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
-4.67	15.79	.1	.3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	2	

FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	n Value	Entrance Loss Coef	Exit Loss Coef
.1	29.9	.013	.4	1

Number of Barrels = 5
Upstream Elevation = 44
Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.
12.6	15.6	18.6	21.6	24.6

Downstream Elevation = 43.85
Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.
-.67	2.33	5.33	8.33	11.33

CULVERT OUTPUT Profile #PF 1
Culvert ID : Culvert #1

Culv Q (cfs)	106.00	Culv Ful Lngh (ft)	
# Barrels	5	Culv Vel US (ft/s)	6.75
Q Barrel (cfs)	21.20	Culv Vel DS (ft/s)	8.60
E.G. US. (ft)	47.15	Culv Inv El Up (ft)	44.00
W.S. US. (ft)	47.12	Culv Inv El Dn (ft)	43.85
E.G. DS (ft)	45.29	Culv Frctn Ls (ft)	0.40
W.S. DS (ft)	44.93	Culv Ext Lss (ft)	1.18
Delta EG (ft)	1.86	Culv Ent Lss (ft)	0.28
Delta WS (ft)	2.20	Q Weir (cfs)	
E.G. IC (ft)	47.15	Weir Sta Lft (ft)	
E.G. OC (ft)	46.93	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	46.00	Weir Max Depth (ft)	
Culv WS Outlet (ft)	45.31	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.00	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	1.65	Min El Weir Flow (ft)	48.01

Note: During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Note: The normal depth exceeds the height of the culvert. The program assumes that the normal
depth is equal to the height of the culvert.
Note: The flow in the culvert is entirely supercritical.

CROSS SECTION RIVER: channel16
REACH: channel16 RS: 8

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	49.22	-30.96	49	-25.41	48.91	-4.67	48.56	-4.67	43.85
15.79	43.85	15.79	48.32	23.73	48.25	40	47.81	50	48.01
60	47.81	80	48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	-4.67	.03	15.79	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-4.67	15.79	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	45.29	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.36	Wt. n-Val.	
0.030			
W.S. Elev (ft)	44.93	Reach Len. (ft)	50.00
50.00	50.00		
Crit W.S. (ft)	44.79	Flow Area (sq ft)	
22.07			
E.G. Slope (ft/ft)	0.009709	Area (sq ft)	
22.07			
Q Total (cfs)	106.00	Flow (cfs)	
106.00			
Top Width (ft)	20.46	Top Width (ft)	
20.46			
Vel Total (ft/s)	4.80	Avg. Vel. (ft/s)	
4.80			
Max Chl Dpth (ft)	1.08	Hydr. Depth (ft)	
1.08			
Conv. Total (cfs)	1075.8	Conv. (cfs)	
1075.8			
Length Wtd. (ft)	50.00	Wetted Per. (ft)	
22.62			
Min Ch El (ft)	43.85	Shear (lb/sq ft)	
0.59			
Alpha	1.00	Stream Power (lb/ft s)	
2.84			
Frctn Loss (ft)	0.63	Cum Volume (acre-ft)	
0.03			
C & E Loss (ft)	0.03	Cum SA (acres)	
0.04			

CROSS SECTION RIVER: channel16
REACH: channel16 RS: -62.02

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	49.32	-29.58	49.14	-27.85	49.13	-27.85	43.85	22.15	43.85
22.15	48.58	35.22	48.5	54.23	48.33	66.67	48.22		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-50	.03	-27.85	.03	22.15	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-27.85	22.15	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	44.63	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.26	Wt. n-Val.	
0.030			
W.S. Elev (ft)	44.37	Reach Len. (ft)	
Crit W.S. (ft)	44.37	Flow Area (sq ft)	
25.86			
E.G. Slope (ft/ft)	0.016954	Area (sq ft)	
25.86			
Q Total (cfs)	106.00	Flow (cfs)	
106.00			
Top Width (ft)	50.00	Top Width (ft)	
50.00			
Vel Total (ft/s)	4.10	Avg. Vel. (ft/s)	
4.10			
Max Chl Dpth (ft)	0.52	Hydr. Depth (ft)	
0.52			
Conv. Total (cfs)	814.1	Conv. (cfs)	
814.1			
Length Wtd. (ft)		Wetted Per. (ft)	
51.03			
Min Ch El (ft)	43.85	Shear (lb/sq ft)	
0.54			
Alpha	1.00	Stream Power (lb/ft s)	
2.20			
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

SUMMARY OF MANNING'S N VALUES

River:channel16

Reach	River Sta.	n1	n2	n3
channel16	1400	.03	.03	.03
channel16	1300	.03	.03	.03
channel16	1223.76	.03	.03	.03
channel16	1100	.03	.03	.03
channel16	1000	.03	.03	.03
channel16	900	.03	.03	.03
channel16	800	.03	.03	.03
channel16	692.79	.03	.03	.03
channel16	639.72	.03	.03	.03
channel16	566.88	.03	.03	.03
channel16	461.36	.03	.03	.03
channel16	433.80	.03	.03	.03
channel16	403.12	.03	.03	.03
channel16	300	.03	.03	.03
channel16	200	.03	.03	.03
channel16	100	.03	.03	.03
channel16	30	.03	.03	.03
channel16	29.9	Culvert		
channel16	8	.03	.03	.03
channel16	-62.02	.03	.03	.03

SUMMARY OF REACH LENGTHS

River: channel16

Reach	River Sta.	Left	Channel	Right
channel16	1400	100	100	100
channel16	1300	76.24	76.24	76.24
channel16	1223.76	123.76	123.76	123.76
channel16	1100	100	100	100
channel16	1000	100	100	100
channel16	900	100	100	100
channel16	800	107.21	107.21	107.21
channel16	692.79	38.45	44.74	51.04
channel16	639.72	38.29	44.58	50.88
channel16	566.88	105.52	105.52	105.52
channel16	461.36	44.55	40.67	36.79
channel16	433.80	44.6	40.71	36.83
channel16	403.12	103.12	103.12	103.12
channel16	300	100	100	100
channel16	200	100	100	100
channel16	100	70	70	70
channel16	30	30.09	30.09	30.09
channel16	29.9	Culvert		
channel16	8	50	50	50
channel16	-62.02	0	0	0

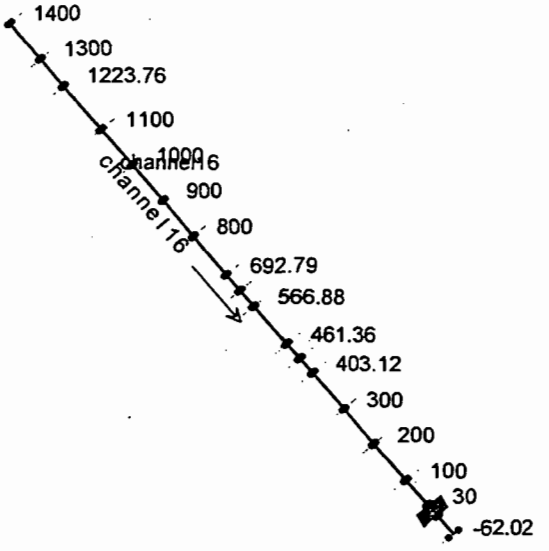
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: channel16

Reach	River Sta.	Contr.	Expan.
channel16	1400	.1	.3
channel16	1300	.1	.3
channel16	1223.76	.1	.3
channel16	1100	.1	.3
channel16	1000	.1	.3
channel16	900	.1	.3
channel16	800	.1	.3
channel16	692.79	.1	.3
channel16	639.72	.1	.3
channel16	566.88	.1	.3
channel16	461.36	.1	.3
channel16	433.80	.1	.3
channel16	403.12	.1	.3
channel16	300	.1	.3
channel16	200	.1	.3
channel16	100	.1	.3
channel16	30	.1	.3
channel16	29.9	Culvert	
channel16	8	.1	.3
channel16	-62.02	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
channel16	1400	106.00	46.21	47.90	47.13	48.00	0.001510	2.73	42.23	30.10	0.37
channel16	1300	106.00	46.05	47.75		47.85	0.001409	2.65	43.70	31.28	0.36
channel16	1223.76	106.00	45.92	47.65		47.75	0.001384	2.65	43.47	30.35	0.36
channel16	1100	106.00	45.72	47.49		47.58	0.001276	2.59	44.65	30.56	0.34
channel16	1000	106.00	45.56	47.36		47.46	0.001216	2.56	48.82	51.42	0.34
channel16	900	106.00	45.40	47.33		47.36	0.000550	1.80	81.24	87.80	0.23
channel16	800	106.00	45.24	47.29		47.32	0.000339	1.47	97.68	87.79	0.18
channel16	692.79	106.00	45.07	47.29		47.29	0.000114	0.90	143.00	87.93	0.11
channel16	639.72	106.00	44.96	47.28		47.29	0.000118	0.94	140.58	87.91	0.11

channel16	566.88		106.00	44.86	47.27		
47.28	0.000134	1.03	133.62	88.01	0.12		
channel16	461.36		106.00	44.69	47.22		
47.26	0.000341	1.70	70.03	35.38	0.19		
channel16	433.80		106.00	44.64	47.21		
47.24	0.000326	1.68	71.00	35.35	0.18		
channel16	403.12		106.00	44.60	47.19		
47.23	0.000315	1.66	71.71	35.34	0.18		
channel16	300		106.00	44.43	47.17		
47.20	0.000261	1.57	76.02	35.54	0.17		
channel16	200		106.00	44.27	47.15		
47.18	0.000213	1.46	82.02	36.98	0.15		
channel16	100		106.00	44.11	47.13		
47.16	0.000176	1.37	87.94	38.16	0.14		
channel16	30		106.00	44.00	47.12	44.92	
47.15	0.000156	1.32	91.77	38.75	0.13		
channel16	29.9		Culvert				
channel16	8		106.00	43.85	44.93	44.79	
45.29	0.009709	4.80	22.07	20.46	0.81		
channel16	-62.02		106.00	43.85	44.37	44.37	
44.63	0.016954	4.10	25.86	50.00	1.00		


1400
1300
1223.76
1100
1000
channel6
900
800
channel16
692.79
566.88
461.36
403.12
300
200
100
30
-62.02

HEC-RAS Plan: Plan 05 River: channel16 Reach: channel16 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
channel16	1400	106.00	46.21	47.90	47.13	48.00	0.001510	2.73	42.23	30.10	0.37
channel16	1300	106.00	46.05	47.75		47.85	0.001409	2.65	43.70	31.28	0.36
channel16	1223.76	106.00	45.92	47.65		47.75	0.001384	2.65	43.47	30.35	0.36
channel16	1100	106.00	45.72	47.49		47.58	0.001276	2.59	44.65	30.56	0.34
channel16	1000	106.00	45.56	47.36		47.46	0.001216	2.56	48.82	51.42	0.34
channel16	900	106.00	45.40	47.33		47.36	0.000550	1.80	81.24	87.80	0.23
channel16	800	106.00	45.24	47.29		47.32	0.000339	1.47	97.68	87.79	0.18
channel16	692.79	106.00	45.07	47.29		47.29	0.000114	0.90	143.00	87.93	0.11
channel16	639.72	106.00	44.96	47.28		47.29	0.000118	0.94	140.58	87.91	0.11
channel16	566.88	106.00	44.86	47.27		47.28	0.000134	1.03	133.62	88.01	0.12
channel16	461.36	106.00	44.69	47.22		47.26	0.000341	1.70	70.03	35.38	0.19
channel16	433.80	106.00	44.64	47.21		47.24	0.000326	1.68	71.00	35.35	0.18
channel16	403.12	106.00	44.60	47.19		47.23	0.000315	1.66	71.71	35.34	0.18
channel16	300	106.00	44.43	47.17		47.20	0.000261	1.57	76.02	35.54	0.17
channel16	200	106.00	44.27	47.15		47.18	0.000213	1.46	82.02	36.98	0.15
channel16	100	106.00	44.11	47.13		47.16	0.000176	1.37	87.94	38.16	0.14
channel16	30	106.00	44.00	47.12	44.92	47.15	0.000156	1.32	91.77	38.75	0.13
channel16	29.9	Culvert									
channel16	8	106.00	43.85	44.93	44.79	45.29	0.009709	4.80	22.07	20.46	0.81
channel16	-62.02	106.00	43.85	44.37	44.37	44.63	0.016954	4.10	25.86	50.00	1.00

Plan: Plan 05 channel16 channel16 RS: 1400 Profile: PF 1

E.G. Elev (ft)	48.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.90	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	47.13	Flow Area (sq ft)	4.26	33.71	4.25
E.G. Slope (ft/ft)	0.001510	Area (sq ft)	4.26	33.71	4.25
Q Total (cfs)	106.00	Flow (cfs)	7.06	91.88	7.05
Top Width (ft)	30.10	Top Width (ft)	5.06	20.00	5.05
Vel Total (ft/s)	2.51	Avg. Vel. (ft/s)	1.66	2.73	1.66
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)	0.84	1.69	0.84
Conv. Total (cfs)	2728.2	Conv. (cfs)	181.8	2364.8	181.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	5.33	20.00	5.32
Min Ch El (ft)	46.21	Shear (lb/sq ft)	0.08	0.16	0.08
Alpha	1.08	Stream Power (lb/ft s)	0.12	0.43	0.12
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.75	1.46	0.25
C & E Loss (ft)	0.00	Cum SA (acres)	0.75	0.68	0.21

Plan: Plan 05 channel16 channel16 RS: 1300 Profile: PF 1

E.G. Elev (ft)	47.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.75	Reach Len. (ft)	76.24	76.24	76.24
Crit W.S. (ft)		Flow Area (sq ft)	5.25	34.09	4.36
E.G. Slope (ft/ft)	0.001409	Area (sq ft)	5.25	34.09	4.36
Q Total (cfs)	106.00	Flow (cfs)	8.57	90.41	7.03
Top Width (ft)	31.28	Top Width (ft)	6.17	20.00	5.11
Vel Total (ft/s)	2.43	Avg. Vel. (ft/s)	1.63	2.65	1.61
Max Chl Dpth (ft)	1.70	Hydr. Depth (ft)	0.85	1.70	0.85
Conv. Total (cfs)	2824.4	Conv. (cfs)	228.2	2408.9	187.3
Length Wtd. (ft)	76.24	Wetted Per. (ft)	6.40	20.00	5.39
Min Ch El (ft)	46.05	Shear (lb/sq ft)	0.07	0.15	0.07
Alpha	1.09	Stream Power (lb/ft s)	0.12	0.40	0.11
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.74	1.38	0.24
C & E Loss (ft)	0.00	Cum SA (acres)	0.73	0.63	0.20

Plan: Plan 05 channel16 channel16 RS: 1223.76 Profile: PF 1

E.G. Elev (ft)	47.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.65	Reach Len. (ft)	123.76	123.76	123.76
Crit W.S. (ft)		Flow Area (sq ft)	4.47	34.52	4.47
E.G. Slope (ft/ft)	0.001384	Area (sq ft)	4.47	34.52	4.47
Q Total (cfs)	106.00	Flow (cfs)	7.22	91.57	7.22
Top Width (ft)	30.35	Top Width (ft)	5.18	19.99	5.18
Vel Total (ft/s)	2.44	Avg. Vel. (ft/s)	1.61	2.65	1.61
Max Chl Dpth (ft)	1.73	Hydr. Depth (ft)	0.86	1.73	0.86
Conv. Total (cfs)	2849.5	Conv. (cfs)	194.0	2461.4	194.0
Length Wtd. (ft)	123.76	Wetted Per. (ft)	5.46	19.99	5.46
Min Ch El (ft)	45.92	Shear (lb/sq ft)	0.07	0.15	0.07
Alpha	1.08	Stream Power (lb/ft s)	0.11	0.40	0.11
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.73	1.32	0.23
C & E Loss (ft)	0.00	Cum SA (acres)	0.72	0.60	0.19

Plan: Plan 05 channel16 channel16 RS: 1100 Profile: PF 1

E.G. Elev (ft)	47.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.49	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	4.66	35.32	4.67
E.G. Slope (ft/ft)	0.001276	Area (sq ft)	4.66	35.32	4.67
Q Total (cfs)	106.00	Flow (cfs)	7.33	91.33	7.34
Top Width (ft)	30.56	Top Width (ft)	5.28	20.00	5.28
Vel Total (ft/s)	2.37	Avg. Vel. (ft/s)	1.57	2.59	1.57
Max Chl Dpth (ft)	1.77	Hydr. Depth (ft)	0.88	1.77	0.88
Conv. Total (cfs)	2967.0	Conv. (cfs)	205.2	2556.5	205.4
Length Wtd. (ft)	100.00	Wetted Per. (ft)	5.57	20.00	5.57
Min Ch El (ft)	45.72	Shear (lb/sq ft)	0.07	0.14	0.07
Alpha	1.08	Stream Power (lb/ft s)	0.10	0.36	0.10
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	0.72	1.22	0.22
C & E Loss (ft)	0.00	Cum SA (acres)	0.71	0.54	0.18

Plan: Plan 05 channel16 channel16 RS: 1000 Profile: PF 1

E.G. Elev (ft)	47.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.36	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	7.87	36.07	4.87
E.G. Slope (ft/ft)	0.001216	Area (sq ft)	7.87	36.07	4.87
Q Total (cfs)	106.00	Flow (cfs)	6.09	92.33	7.59
Top Width (ft)	51.42	Top Width (ft)	26.02	20.00	5.40
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)	0.77	2.56	1.56
Max Chl Dpth (ft)	1.80	Hydr. Depth (ft)	0.30	1.80	0.90
Conv. Total (cfs)	3039.5	Conv. (cfs)	174.6	2647.4	217.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	26.26	20.00	5.70
Min Ch El (ft)	45.56	Shear (lb/sq ft)	0.02	0.14	0.06
Alpha	1.25	Stream Power (lb/ft s)	0.02	0.35	0.10
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.71	1.14	0.21
C & E Loss (ft)	0.02	Cum SA (acres)	0.67	0.49	0.17

Plan: Plan 05 channel16 channel16 RS: 900 Profile: PF 1

E.G. Elev (ft)	47.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.33	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	37.17	38.51	5.55
E.G. Slope (ft/ft)	0.000550	Area (sq ft)	37.17	38.51	5.55
Q Total (cfs)	106.00	Flow (cfs)	30.65	69.27	6.08
Top Width (ft)	87.80	Top Width (ft)	62.03	20.00	5.77
Vel Total (ft/s)	1.30	Avg. Vel. (ft/s)	0.82	1.80	1.09
Max Chl Dpth (ft)	1.93	Hydr. Depth (ft)	0.60	1.93	0.96
Conv. Total (cfs)	4517.9	Conv. (cfs)	1306.4	2952.4	259.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)	62.20	20.00	6.08
Min Ch El (ft)	45.40	Shear (lb/sq ft)	0.02	0.07	0.03
Alpha	1.40	Stream Power (lb/ft s)	0.02	0.12	0.03
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.66	1.05	0.20
C & E Loss (ft)	0.00	Cum SA (acres)	0.57	0.45	0.15

Plan: Plan 05 channel16 channel16 RS: 800 Profile: PF 1

E.G. Elev (ft)	47.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.29	Reach Len. (ft)	107.21	107.21	107.21
Crit W.S. (ft)		Flow Area (sq ft)	50.32	41.05	6.32
E.G. Slope (ft/ft)	0.000339	Area (sq ft)	50.32	41.05	6.32
Q Total (cfs)	106.00	Flow (cfs)	39.88	60.46	5.66
Top Width (ft)	87.79	Top Width (ft)	61.63	20.00	6.16
Vel Total (ft/s)	1.09	Avg. Vel. (ft/s)	0.79	1.47	0.90
Max Chl Dpth (ft)	2.05	Hydr. Depth (ft)	0.82	2.05	1.03
Conv. Total (cfs)	5756.8	Conv. (cfs)	2165.9	3283.5	307.4
Length Wtd. (ft)	107.21	Wetted Per. (ft)	62.10	20.00	6.49
Min Ch El (ft)	45.24	Shear (lb/sq ft)	0.02	0.04	0.02
Alpha	1.29	Stream Power (lb/ft s)	0.01	0.06	0.02
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.56	0.96	0.18
C & E Loss (ft)	0.00	Cum SA (acres)	0.43	0.40	0.14

Plan: Plan 05 channel16 channel16 RS: 692.79 Profile: PF 1

E.G. Elev (ft)	47.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.29	Reach Len. (ft)	38.45	44.74	51.04
Crit W.S. (ft)		Flow Area (sq ft)	91.33	44.31	7.36
E.G. Slope (ft/ft)	0.000114	Area (sq ft)	91.33	44.31	7.36
Q Total (cfs)	106.00	Flow (cfs)	62.24	39.75	4.02
Top Width (ft)	87.93	Top Width (ft)	61.28	20.00	6.65
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.68	0.90	0.55
Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)	1.49	2.22	1.11
Conv. Total (cfs)	9945.6	Conv. (cfs)	5839.3	3729.4	376.9
Length Wtd. (ft)	41.44	Wetted Per. (ft)	62.27	20.00	7.01
Min Ch El (ft)	45.07	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.07	Stream Power (lb/ft s)	0.01	0.01	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.38	0.86	0.17
C & E Loss (ft)	0.00	Cum SA (acres)	0.28	0.35	0.12

Plan: Plan 05 channel16 channel16 RS: 639.72 Profile: PF 1

E.G. Elev (ft)	47.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.28	Reach Len. (ft)	38.29	44.58	50.88
Crit W.S. (ft)		Flow Area (sq ft)	86.19	46.37	8.02
E.G. Slope (ft/ft)	0.000118	Area (sq ft)	86.19	46.37	8.02
Q Total (cfs)	106.00	Flow (cfs)	57.74	43.67	4.59
Top Width (ft)	87.91	Top Width (ft)	60.99	20.00	6.92
Vel Total (ft/s)	0.75	Avg. Vel. (ft/s)	0.67	0.94	0.57
Max Chl Dpth (ft)	2.32	Hydr. Depth (ft)	1.41	2.32	1.16
Conv. Total (cfs)	9765.4	Conv. (cfs)	5319.8	4022.8	422.9
Length Wtd. (ft)	41.66	Wetted Per. (ft)	61.97	20.00	7.29
Min Ch El (ft)	44.96	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.10	Stream Power (lb/ft s)	0.01	0.02	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.30	0.81	0.16
C & E Loss (ft)	0.00	Cum SA (acres)	0.23	0.33	0.12

Plan: Plan 05 channel16 channel16 RS: 566.88 Profile: PF 1

E.G. Elev (ft)	47.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.27	Reach Len. (ft)	105.52	105.52	105.52
Crit W.S. (ft)		Flow Area (sq ft)	76.68	48.23	8.71
E.G. Slope (ft/ft)	0.000134	Area (sq ft)	76.68	48.23	8.71
Q Total (cfs)	106.00	Flow (cfs)	50.80	49.74	5.46
Top Width (ft)	88.01	Top Width (ft)	60.78	20.00	7.23
Vel Total (ft/s)	0.79	Avg. Vel. (ft/s)	0.66	1.03	0.63
Max Chl Dpth (ft)	2.41	Hydr. Depth (ft)	1.26	2.41	1.21
Conv. Total (cfs)	9153.8	Conv. (cfs)	4386.7	4295.2	471.9
Length Wtd. (ft)	105.52	Wetted Per. (ft)	61.77	20.00	7.62
Min Ch El (ft)	44.86	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.16	Stream Power (lb/ft s)	0.01	0.02	0.01
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.23	0.76	0.15
C & E Loss (ft)	0.00	Cum SA (acres)	0.17	0.31	0.11

Plan: Plan 05 channel16 channel16 RS: 461.36 Profile: PF 1

E.G. Elev (ft)	47.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.22	Reach Len. (ft)	44.55	40.67	36.79
Crit W.S. (ft)		Flow Area (sq ft)	9.87	50.58	9.58
E.G. Slope (ft/ft)	0.000341	Area (sq ft)	9.87	50.58	9.58
Q Total (cfs)	106.00	Flow (cfs)	10.21	85.89	9.90
Top Width (ft)	35.38	Top Width (ft)	7.80	20.00	7.58
Vel Total (ft/s)	1.51	Avg. Vel. (ft/s)	1.03	1.70	1.03
Max Chl Dpth (ft)	2.53	Hydr. Depth (ft)	1.26	2.53	1.26
Conv. Total (cfs)	5739.0	Conv. (cfs)	552.9	4650.3	535.9
Length Wtd. (ft)	40.68	Wetted Per. (ft)	8.20	20.00	7.99
Min Ch El (ft)	44.69	Shear (lb/sq ft)	0.03	0.05	0.03
Alpha	1.11	Stream Power (lb/ft s)	0.03	0.09	0.03
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.13	0.64	0.13
C & E Loss (ft)	0.00	Cum SA (acres)	0.09	0.26	0.09

Plan: Plan 05 channel16 channel16 RS: 433.80 Profile: PF 1

E.G. Elev (ft)	47.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.21	Reach Len. (ft)	44.60	40.71	36.83
Crit W.S. (ft)		Flow Area (sq ft)	9.86	51.31	9.83
E.G. Slope (ft/ft)	0.000326	Area (sq ft)	9.86	51.31	9.83
Q Total (cfs)	106.00	Flow (cfs)	10.04	85.94	10.01
Top Width (ft)	35.35	Top Width (ft)	7.69	20.00	7.66
Vel Total (ft/s)	1.49	Avg. Vel. (ft/s)	1.02	1.68	1.02
Max Chl Dpth (ft)	2.57	Hydr. Depth (ft)	1.28	2.57	1.28
Conv. Total (cfs)	5873.7	Conv. (cfs)	556.6	4762.3	554.9
Length Wtd. (ft)	40.71	Wetted Per. (ft)	8.10	20.00	8.08
Min Ch El (ft)	44.64	Shear (lb/sq ft)	0.02	0.05	0.02
Alpha	1.11	Stream Power (lb/ft s)	0.03	0.09	0.03
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.12	0.59	0.12
C & E Loss (ft)	0.00	Cum SA (acres)	0.08	0.24	0.08

Plan: Plan 05 channel16 channel16 RS: 403.12 Profile: PF 1

E.G. Elev (ft)	47.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.19	Reach Len. (ft)	103.12	103.12	103.12
Crit W.S. (ft)		Flow Area (sq ft)	9.79	51.83	10.09
E.G. Slope (ft/ft)	0.000315	Area (sq ft)	9.79	51.83	10.09
Q Total (cfs)	106.00	Flow (cfs)	9.86	85.97	10.17
Top Width (ft)	35.34	Top Width (ft)	7.55	20.00	7.78
Vel Total (ft/s)	1.48	Avg. Vel. (ft/s)	1.01	1.66	1.01
Max Chl Dpth (ft)	2.59	Hydr. Depth (ft)	1.30	2.59	1.30
Conv. Total (cfs)	5972.7	Conv. (cfs)	555.3	4844.1	573.3
Length Wtd. (ft)	103.12	Wetted Per. (ft)	7.99	20.00	8.20
Min Ch El (ft)	44.60	Shear (lb/sq ft)	0.02	0.05	0.02
Alpha	1.11	Stream Power (lb/ft s)	0.02	0.08	0.02
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.11	0.55	0.11
C & E Loss (ft)	0.00	Cum SA (acres)	0.07	0.23	0.08

Plan: Plan 05 channel16 channel16 RS: 300 Profile: PF 1

E.G. Elev (ft)	47.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.17	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	10.03	54.75	11.24
E.G. Slope (ft/ft)	0.000261	Area (sq ft)	10.03	54.75	11.24
Q Total (cfs)	106.00	Flow (cfs)	9.48	85.81	10.71
Top Width (ft)	35.54	Top Width (ft)	7.33	20.00	8.21
Vel Total (ft/s)	1.39	Avg. Vel. (ft/s)	0.95	1.57	0.95
Max Chl Dpth (ft)	2.74	Hydr. Depth (ft)	1.37	2.74	1.37
Conv. Total (cfs)	6555.5	Conv. (cfs)	586.2	5306.6	662.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)	7.82	20.00	8.66
Min Ch El (ft)	44.43	Shear (lb/sq ft)	0.02	0.04	0.02
Alpha	1.11	Stream Power (lb/ft s)	0.02	0.07	0.02
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.08	0.42	0.09
C & E Loss (ft)	0.00	Cum SA (acres)	0.06	0.18	0.06

Plan: Plan 05 channel16 channel16 RS: 200 Profile: PF 1

E.G. Elev (ft)	47.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.15	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	12.01	57.58	12.44
E.G. Slope (ft/ft)	0.000213	Area (sq ft)	12.01	57.58	12.44
Q Total (cfs)	106.00	Flow (cfs)	10.66	84.26	11.08
Top Width (ft)	36.98	Top Width (ft)	8.34	20.00	8.64
Vel Total (ft/s)	1.29	Avg. Vel. (ft/s)	0.89	1.46	0.89
Max Chl Dpth (ft)	2.88	Hydr. Depth (ft)	1.44	2.88	1.44
Conv. Total (cfs)	7259.9	Conv. (cfs)	730.1	5771.2	758.6
Length Wtd. (ft)	100.00	Wetted Per. (ft)	8.82	20.00	9.11
Min Ch El (ft)	44.27	Shear (lb/sq ft)	0.02	0.04	0.02
Alpha	1.12	Stream Power (lb/ft s)	0.02	0.06	0.02
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.06	0.29	0.06
C & E Loss (ft)	0.00	Cum SA (acres)	0.04	0.13	0.04

Plan: Plan 05 channel16 channel16 RS: 100 Profile: PF 1

E.G. Elev (ft)	47.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.13	Reach Len. (ft)	70.00	70.00	70.00
Crit W.S. (ft)		Flow Area (sq ft)	13.73	60.48	13.73
E.G. Slope (ft/ft)	0.000176	Area (sq ft)	13.73	60.48	13.73
Q Total (cfs)	106.00	Flow (cfs)	11.47	83.06	11.47
Top Width (ft)	38.16	Top Width (ft)	9.08	20.00	9.08
Vel Total (ft/s)	1.21	Avg. Vel. (ft/s)	0.84	1.37	0.84
Max Chl Dpth (ft)	3.02	Hydr. Depth (ft)	1.51	3.02	1.51
Conv. Total (cfs)	7994.5	Conv. (cfs)	864.8	6264.7	865.0
Length Wtd. (ft)	70.00	Wetted Per. (ft)	9.57	20.00	9.57
Min Ch El (ft)	44.11	Shear (lb/sq ft)	0.02	0.03	0.02
Alpha	1.12	Stream Power (lb/ft s)	0.01	0.05	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.03	0.16	0.03
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	0.09	0.02

Plan: Plan 05 channel16 channel16 RS: 30 Profile: PF 1

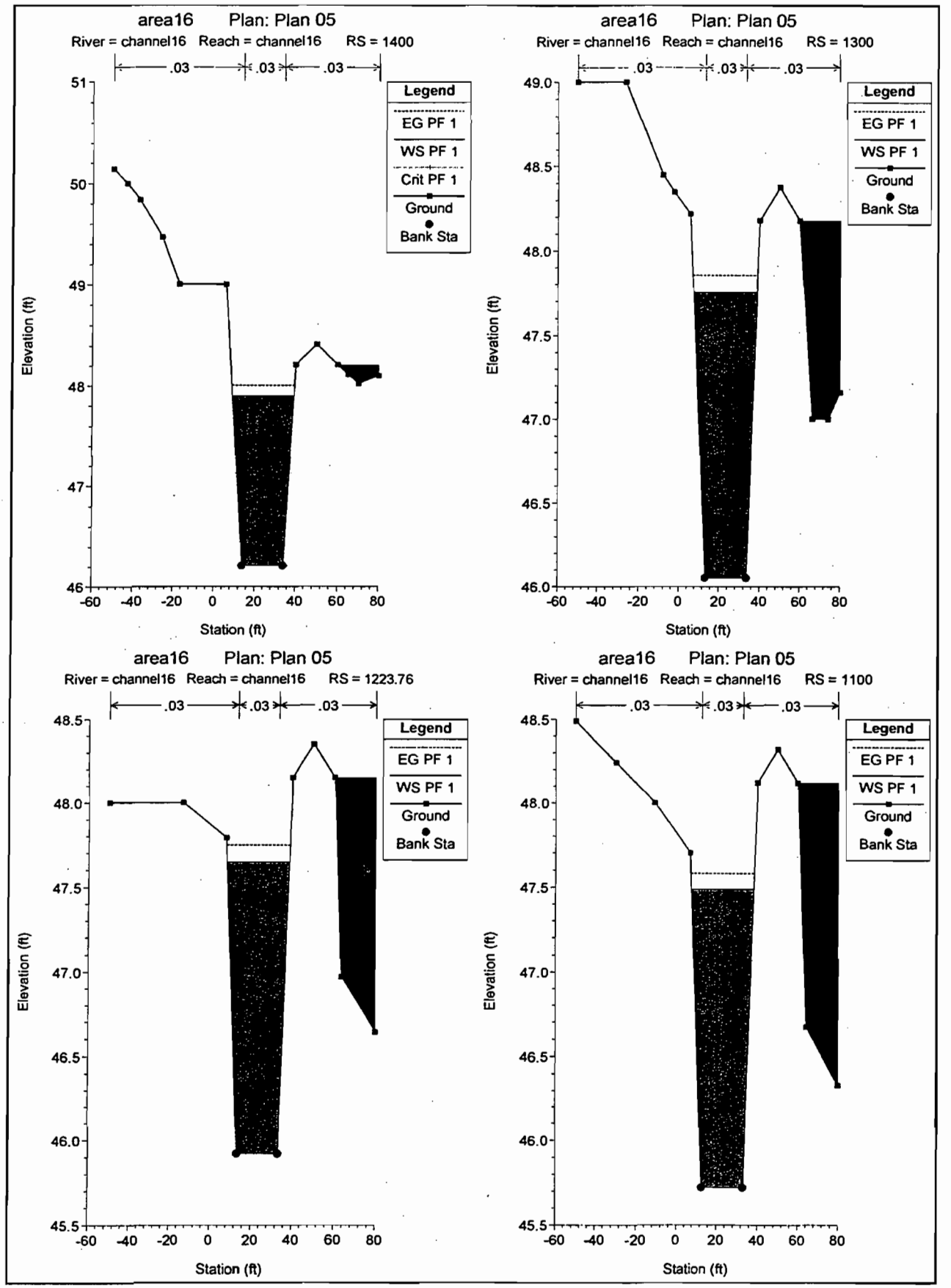
E.G. Elev (ft)	47.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	47.12	Reach Len. (ft)	30.09	30.09	30.09
Crit W.S. (ft)	44.92	Flow Area (sq ft)	14.65	62.48	14.64
E.G. Slope (ft/ft)	0.000156	Area (sq ft)	14.65	62.48	14.64
Q Total (cfs)	106.00	Flow (cfs)	11.76	82.48	11.75
Top Width (ft)	38.75	Top Width (ft)	9.38	20.00	9.37
Vel Total (ft/s)	1.16	Avg. Vel. (ft/s)	0.80	1.32	0.80
Max Chl Dpth (ft)	3.12	Hydr. Depth (ft)	1.56	3.12	1.56
Conv. Total (cfs)	8499.1	Conv. (cfs)	943.2	6613.4	942.5
Length Wtd. (ft)	30.09	Wetted Per. (ft)	9.89	20.00	9.88
Min Ch El (ft)	44.00	Shear (lb/sq ft)	0.01	0.03	0.01
Alpha	1.12	Stream Power (lb/ft s)	0.01	0.04	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)	0.01	0.06	0.01
C & E Loss (ft)		Cum SA (acres)	0.00	0.05	0.00

Plan: Plan 05 channel16 channel16 RS: 8 Profile: PF 1

E.G. Elev (ft)	45.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.		0.030	
W.S. Elev (ft)	44.93	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	44.79	Flow Area (sq ft)		22.07	
E.G. Slope (ft/ft)	0.009709	Area (sq ft)		22.07	
Q Total (cfs)	106.00	Flow (cfs)		106.00	
Top Width (ft)	20.46	Top Width (ft)		20.46	
Vel Total (ft/s)	4.80	Avg. Vel. (ft/s)		4.80	
Max Chl Dpth (ft)	1.08	Hydr. Depth (ft)		1.08	
Conv. Total (cfs)	1075.8	Conv. (cfs)		1075.8	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		22.62	
Min Ch El (ft)	43.85	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		2.84	
Frctn Loss (ft)	0.63	Cum Volume (acre-ft)		0.03	
C & E Loss (ft)	0.03	Cum SA (acres)		0.04	

Plan: Plan 05 channel16 channel16 RS: -62.02 Profile: PF 1

E.G. Elev (ft)	44.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.030	
W.S. Elev (ft)	44.37	Reach Len. (ft)			
Crit W.S. (ft)	44.37	Flow Area (sq ft)		25.86	
E.G. Slope (ft/ft)	0.016954	Area (sq ft)		25.86	
Q Total (cfs)	106.00	Flow (cfs)		106.00	
Top Width (ft)	50.00	Top Width (ft)		50.00	
Vel Total (ft/s)	4.10	Avg. Vel. (ft/s)		4.10	
Max Chl Dpth (ft)	0.52	Hydr. Depth (ft)		0.52	
Conv. Total (cfs)	814.1	Conv. (cfs)		814.1	
Length Wtd. (ft)		Wetted Per. (ft)		51.03	
Min Ch El (ft)	43.85	Shear (lb/sq ft)		0.54	
Alpha	1.00	Stream Power (lb/ft s)		2.20	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			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Station (ft)
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WS PF 1
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Bank Sta
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Station (ft)
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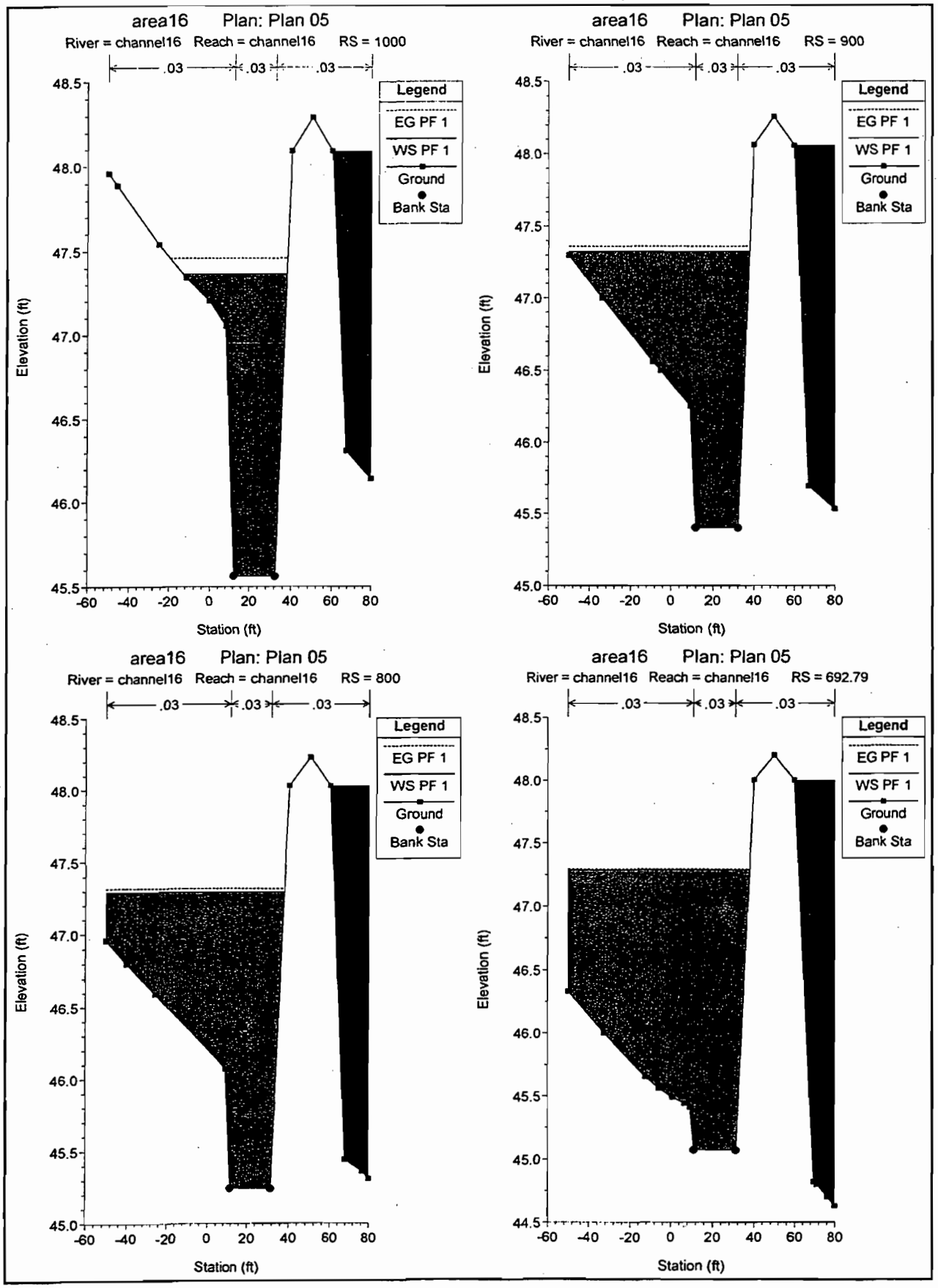
Bank Sta
Elevation (ft)
Station (ft)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Elevation (ft)
Station (ft)
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Bank Sta
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Station (ft)
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Legend
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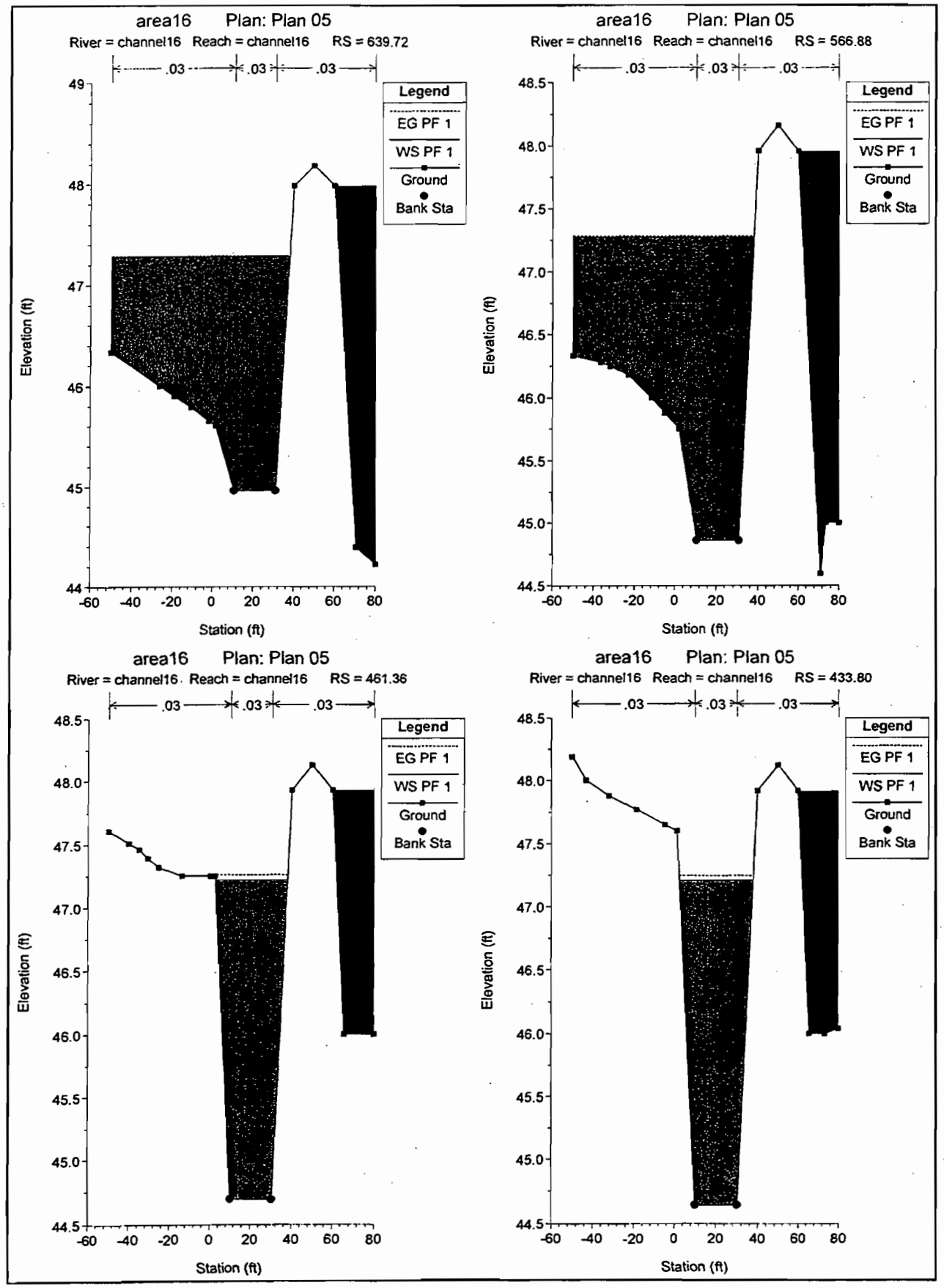
Bank Sta
Elevation (ft)
Station (ft)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Bank Sta
Elevation (ft)
Station (ft)
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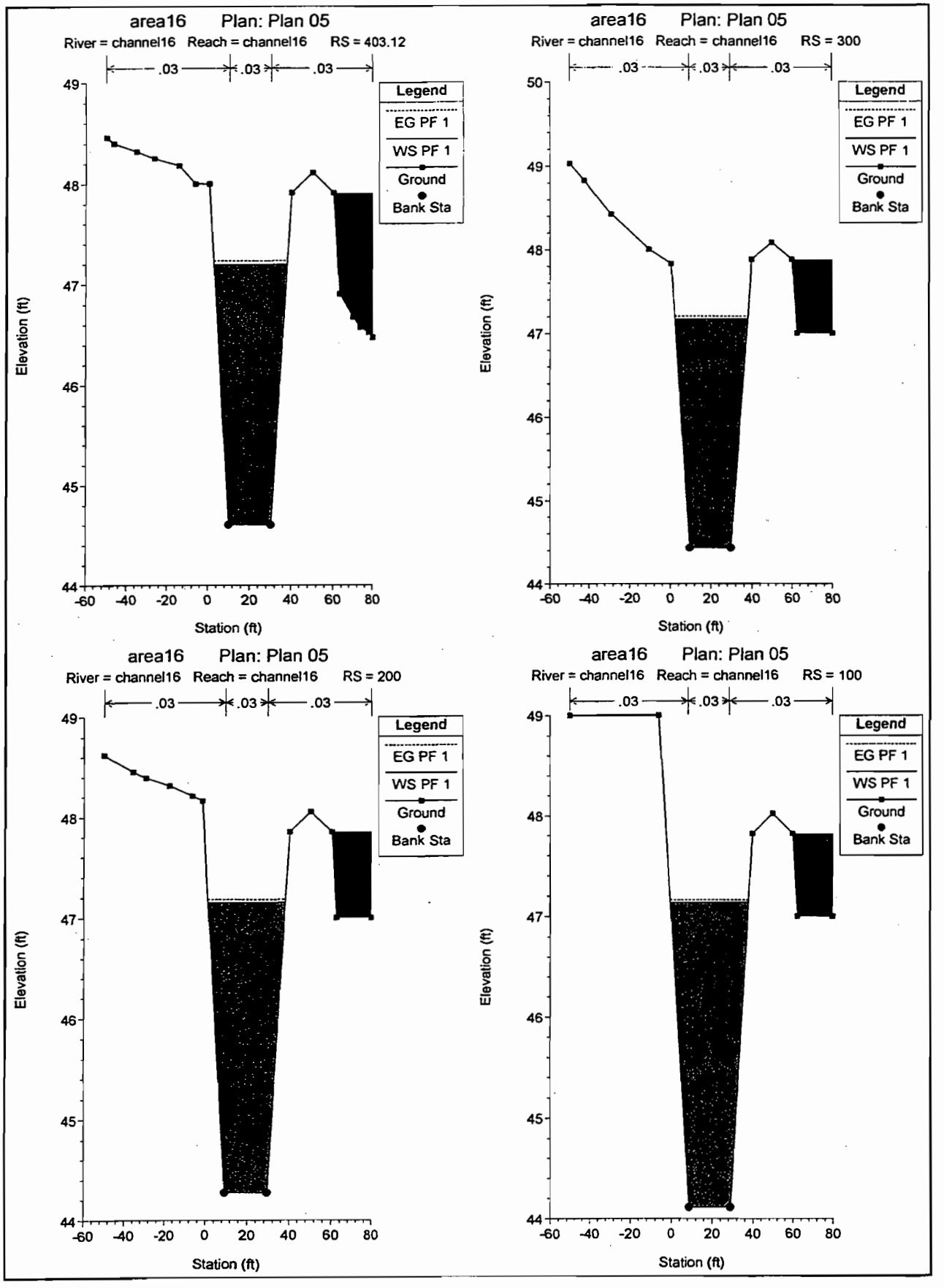
Station (ft)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Bank Sta
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Station (ft)
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Bank Sta
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Station (ft)
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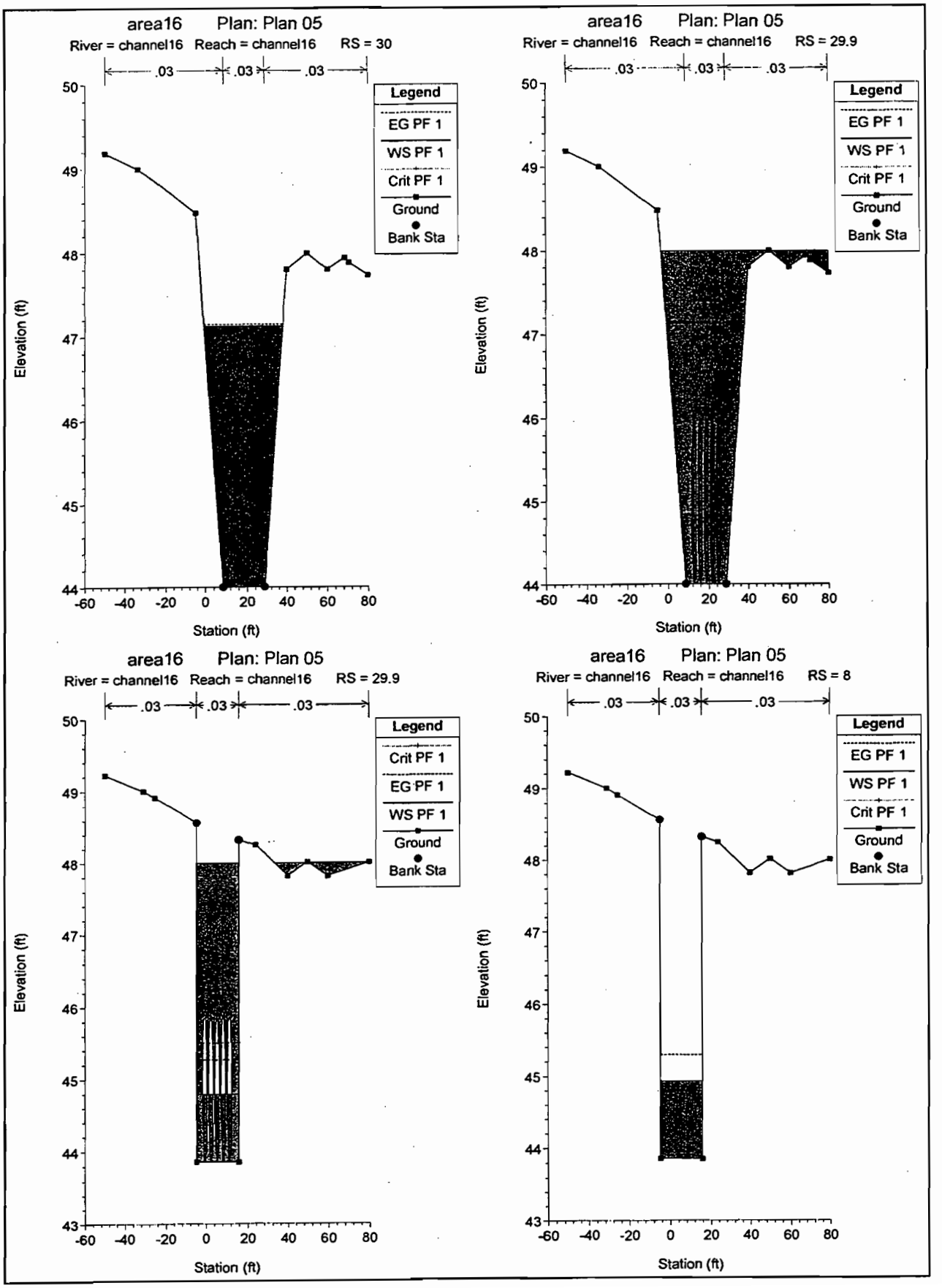
Ground
Bank Sta
Elevation (ft)
Station (ft)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Station (ft)
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Crit PF 1
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Bank Sta
Elevation (ft)
Station (ft)
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.03 .03 .03
Legend
Crit PF 1
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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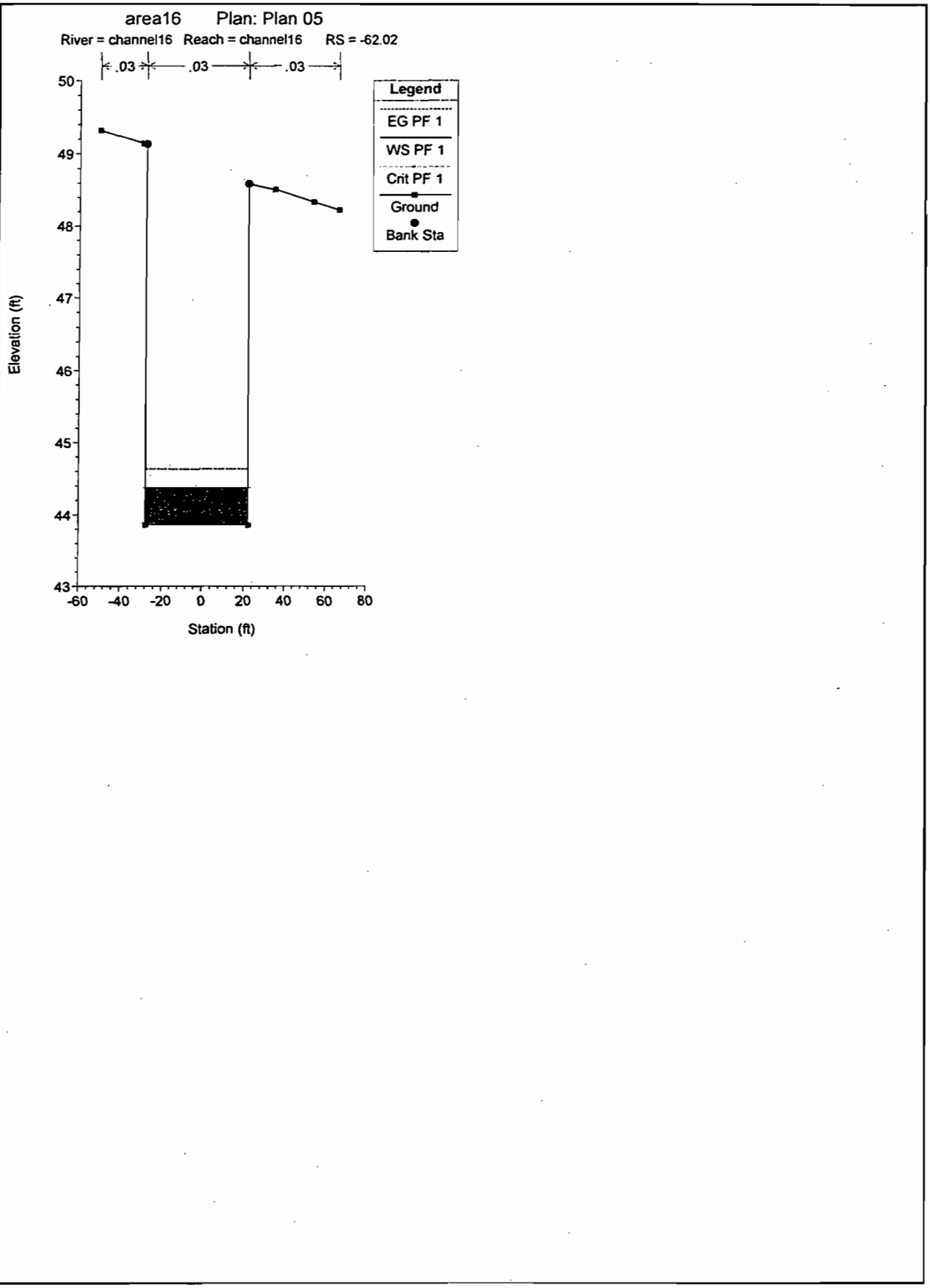
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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.03
.03
.03
Legend
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WS PF 1
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Ground
Bank Sta
Elevation (ft)
50
49
48
47
46
45
44
43
-60
-40
-20
0
20
40
60
80
Station (ft)

APPENDIX 10.9

GROUNDWATER IMPACT EVALUATION

BEST AVAILABLE COPY

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

November 15, 1995
File Number 95-153

Hopping, Green, Sams & Smith
123 South Calhoun Street
Tallahassee, Florida 32314

Attention: Ralph DeMeo, Esq.
Doug Roberts, Esq.

Subject: Groundwater Impact Evaluation, Cooling Pond Seepage, Orimulsion Project, Manatee Power Generation Plant, Florida Power & Light Company, Manatee County, Florida.

Gentlemen:

As requested by Florida Power & Light Company (FPL), the undersigned has completed an evaluation of potential groundwater quality impacts resulting from seepage of cooling pond water into the surficial and intermediate aquifer systems at the above subject site. This evaluation was completed as part of my preparation for the upcoming certification hearing on the FPL Orimulsion Project.

Introduction

As part of the Orimulsion Project, FPL will obtain reclaimed water from the Manatee County Wastewater Treatment Facility to supply a portion of the makeup water to the existing cooling pond. The reclaimed water has elevated total dissolved solids (TDS) concentrations. A mass balance analysis of the water stored in the cooling pond performed by Raytheon Engineers & Constructors indicates that over the 20-year expected life of the Orimulsion Project the concentration of dissolved solids in the pond water will increase from approximately 360 mg/l to approximately 1620 mg/l as a result of heat load evaporation from the cooling pond. A comparison of the concentrations of the constituents dissolved in the cooling pond at startup of the Orimulsion Project and predicted to be above the Florida primary and secondary drinking water standards in the cooling pond at the end of 20 years is presented in the following table:

Constituent	MCL/SMCL (mg/l)	Starting Concentration (mg/l)	Ending Concentration (mg/l)
Sodium	160/-	50	300
Chloride	-/250	40	470
Sulfate	-/250	180	640
Fluoride	4/2	0.6	3
Manganese	-/0.05	0.006	0.1
TDS	-/500	360	1620

Impact to Surficial Aquifer

The existing 4000-acre cooling pond is unlined and is constructed just above to partially within the surficial aquifer. Positive seepage control is provided by a perimeter drain constructed at the toe of the surrounding embankment. Seepage collected by the perimeter drain is pumped back into the pond. Because the elevation (approximately 42 feet, NGVD) of the water in the perimeter drain is generally above the elevation of the surrounding groundwater table, the potential exists for lateral seepage away from the cooling pond. The largest difference in elevations exists along a 4000-ft long section of the north wall of the cooling pond, where the Little Manatee River passes within 1300 feet of the perimeter drain. This is the area where the potential seepage velocities are highest and, therefore, was selected for performing the contaminant transport analyses.

The surficial aquifer system in this area consists of interbedded layers of slightly silty to silty sand extending from the ground surface, which varies from an elevation of 54 feet (NGVD) at the toe of the perimeter embankment to an elevation of approximately 35 feet (NGVD) at the edge of the Little Manatee River, to an approximate elevation of 0 feet (NGVD) at the top of the confining unit separating the surficial aquifer from the first producing zone (Tampa limestone) within the intermediate aquifer system. Based on information contained in a report prepared by Stone & Webster[1], the engineering firm that designed the perimeter drain and my own experience with the soils comprising the surficial aquifer in this area, the hydraulic conductivity (permeability) of these natural sandy deposits is approximately 2 feet per day.

Natural recharge to the surficial aquifer is limited to the difference between rainfall and evapotranspiration. In northwest Manatee County this difference is approximately 15 inches per year. Recharge to the deeper aquifer systems has been estimated by the U.S. Geological Survey[2] to be less than 2 inches per year, leaving a maximum net potential recharge to the surficial aquifer of approximately 13 inches per year. Direct surface runoff to the Little Manatee River is approximately 10 to 12 inches per year. Using a resulting net recharge to the surficial aquifer system between the perimeter drain and the banks of the Little Manatee River of 1 inch per year, the quantity of lateral seepage leaving the perimeter drain was calculated to be 0.1 ft^3/day/lineal ft (0.75 gal/day/lineal ft) of drain. Using the same assumptions, the total base flow to the Little Manatee River, including the net recharge, would be 0.4 ft^3/day/lineal ft (3.0 gal/day/lineal ft) of drain. If the net recharge increased to 1.25 inches per year, this would reduce to zero the quantity of water leaving the perimeter drain.

The average seepage velocity of the groundwater in the surficial aquifer between the perimeter drain and the Little Manatee River, based on the parameters given above and a soil porosity of 35 percent, is estimated at 0.03 ft/day. The dispersed concentration of the constituents in the groundwater discharge from the perimeter drain can be determined at any distance from the drain and as a function of time using the analytical solution of the one-dimensional advection-

---

[1]Stone & Webster Engineering Corporation (1980). "Cooling Pond Embankment Investigation, Manatee Power Plant, Florida Power & Light Company, Miami, Florida" Report dated November, 1980, J.O. No. 13550.01.

[2]Stewart, J.W. (1980). "Areas of Natural Recharge to the Floridan Aquifer in Florida", USGS Map Series No. 98, Tallahassee, FL.

dispersion equation given by Ogata (1970)[1]. This was done for the concentration versus time curve for sodium presented in Figure 1 by adding the concentrations obtained from the analytical solution for each of the increments shown. The results are summarized graphically for a distance of 1300 feet from the drain, i.e., at the edge of the Little Manatee River, in Figure 2. The coefficient of hydrodynamic dispersion used in the analytical solution was 4.0 ft^3/day.

Because the total flow at the edge of the Little Manatee River is comprised of both the flow from the perimeter drain and the natural recharge to the surficial aquifer between the drain and the edge of the river, the actual concentration of sodium in the groundwater at this location must be calculated from the concentrations of sodium in these two components. Using a concentration for sodium of 5 mg/l for the natural recharge component and the concentrations presented on Figure 2 for the perimeter drain component, the predicted concentrations of sodium at the edge of the river for the groundwater flow quantities described above were calculated as a function of time and are presented in Figure 3.

Impact at Base of Confining Unit

Because the elevation of the water in the cooling pond is higher than the elevation of the potentiometric surface in the producing zone of the intermediate aquifer system, there is also a potential for vertical seepage from the cooling pond. The difference in elevation is approximately 60 feet. Using a thickness for the confining layer of 275 feet and a hydraulic conductivity of 0.002 ft/day, based on the information provided in Atlanta Testing & Engineering[2] and my own experience, and using a confining layer porosity of 30 percent, the average vertical seepage velocity through the confining layer is estimated at 0.53 feet per year. Using a coefficient of hydrodynamic dispersion of 17 ft^2 per year and the same analytical procedure used above, the dispersed concentration of sodium at the base of the confining layer was determined and is plotted in Figure 4. The actual concentration, determined by adding the predicted impact from pond seepage to a background concentration of 12 mg/l, is shown in Figure 5.

Conclusions

The concentrations of the other constituents of concern can be computed similarly and are presented in the table presented at the top of the following page. As shown in the table, all of the constituents evaluated are well below their respective maximum contaminant level both at the edge of the Little Manatee River and at the base of the confining unit. Because the permitted horizontal and vertical zones of discharge are at or beyond the locations shown, the seepage from the cooling pond resulting from the proposed Orimulsion project will not result in groundwater impacts in violation of Florida groundwater standards.

---

[1] Ogata, Akio (1970). Theory of Dispersion in a Granular Medium. U.S. Geological Survey Professional Paper 411-I, p. 134.

[2]Atlanta Testing & Engineering (1989). "Hydrogeologic Report, Manatee Plant, Florida Power & Light Company", Report dated November 22, 1989, File No. 5015S.

Constituent	MCL/SMCL (mg/l)	At Edge of Little Manatee River (mg/l)	At Base of Confining Layer (mg/l)
Sodium	160/-	25	30
Chloride	-/250	40	45
Sulfate	-/250	50	55
Fluoride	4/2	0.6	0.8
Manganese	-/0.05	0.02	0.03
TDS	-/500	160	290

It has been a pleasure assisting you on this project. Please do not hesitate to contact the undersigned if there are any questions.

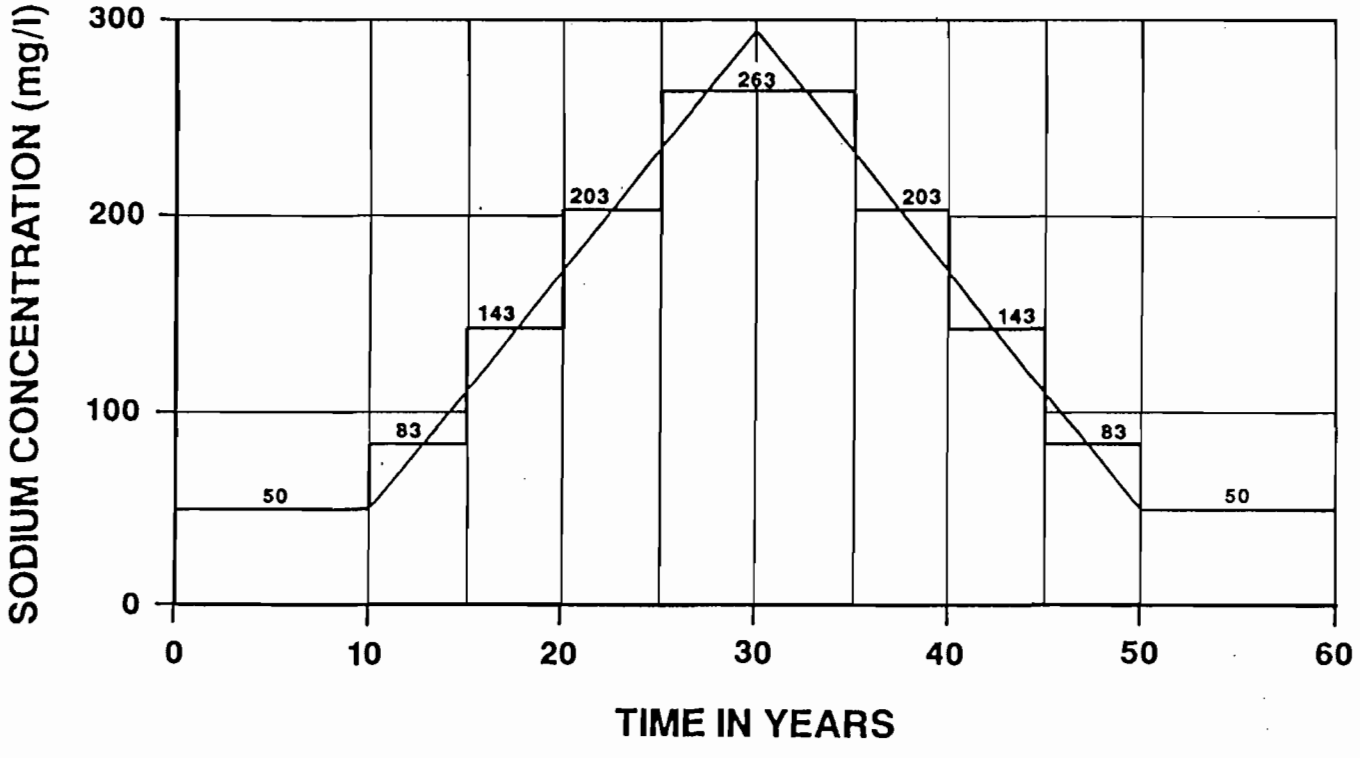
Very truly yours,
ARDAMAN & ASSOCIATES, INC.

John E. Garlanger, Ph.D., P.E.
Principal
Florida Registration 19782

JEG/jg

3-95153.01R

N957890



LOADING CURVE FOR SODIUM

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

GROUNDWATER IMPACT EVALUATION
FP&L COOLING POND
ORIMULSION PROJECT
MANATEE COUNTY, FLORIDA

DRAWN BY: JJN	CHECKED BY: JJC	DATE: 11/15/95
FILE NO.: 95-153	APPROVED BY:	FIGURE: 1

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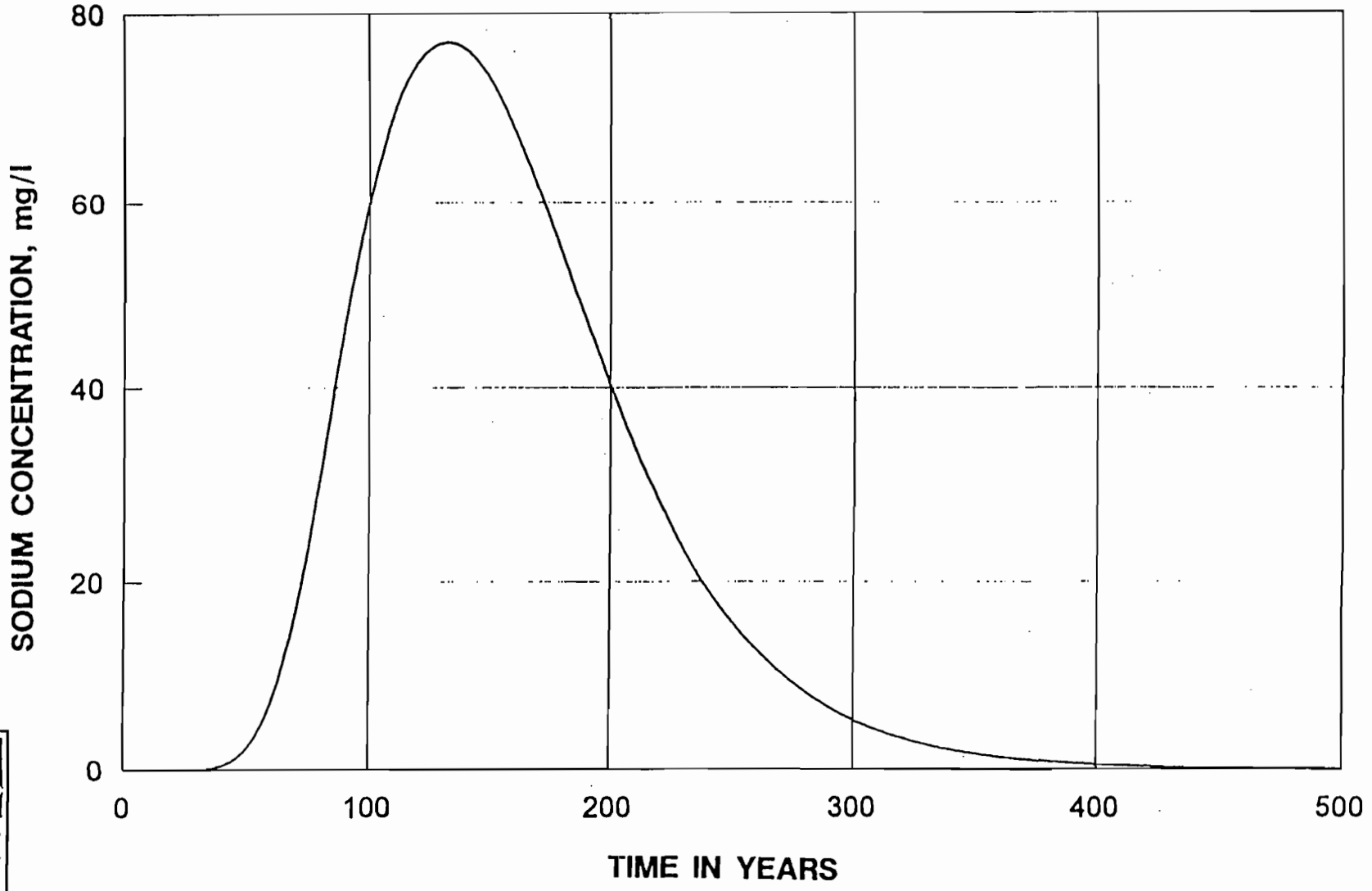

SODIUM CONCENTRATION AT EDGE OF MANATEE RIVER WITHOUT NATURAL RECHARGE

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

GROUNDWATER IMPACT EVALUATION
FP&L COOLING POND
ORIMULSION PROJECT
MANATEE COUNTY, FLORIDA

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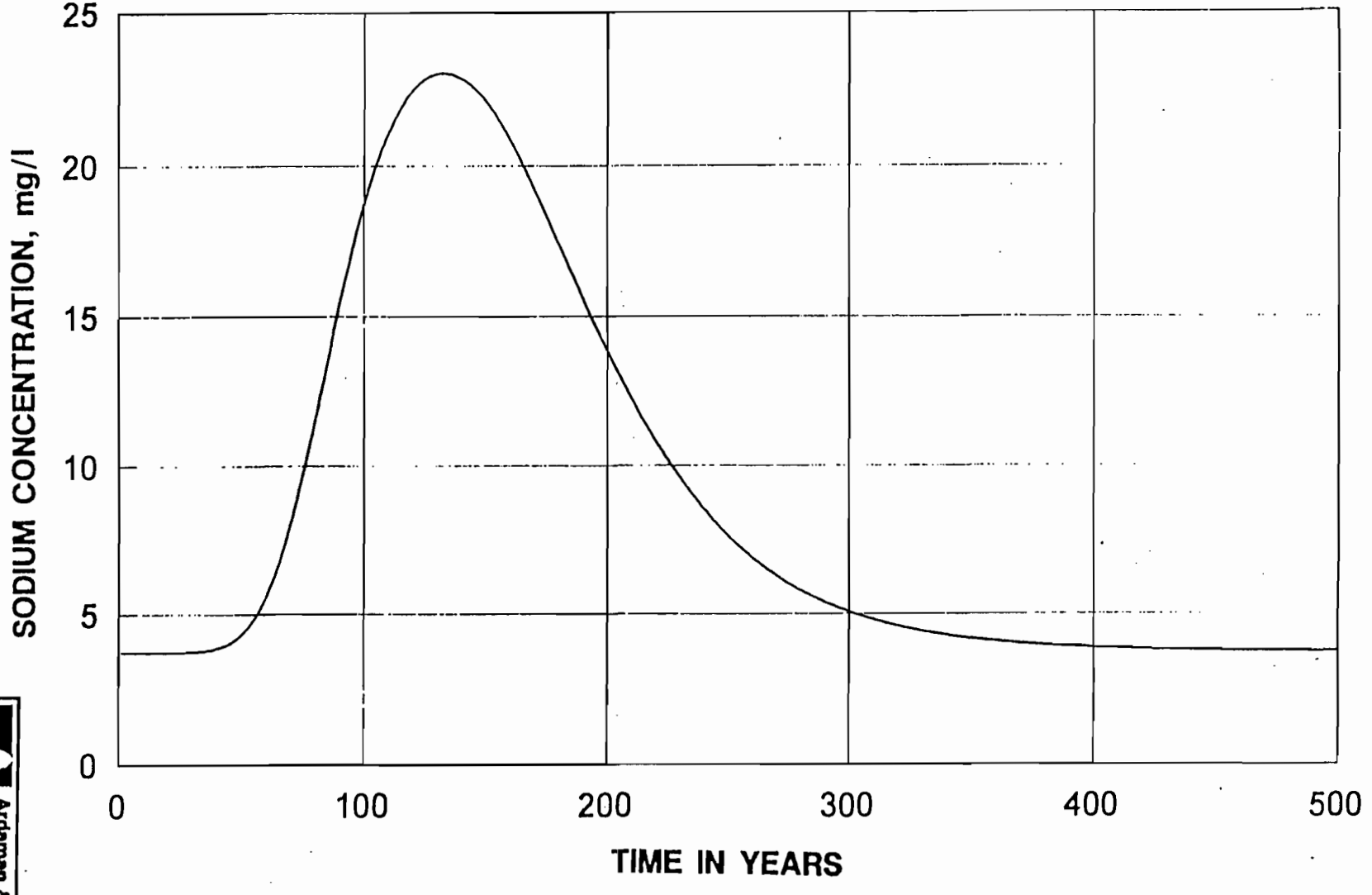


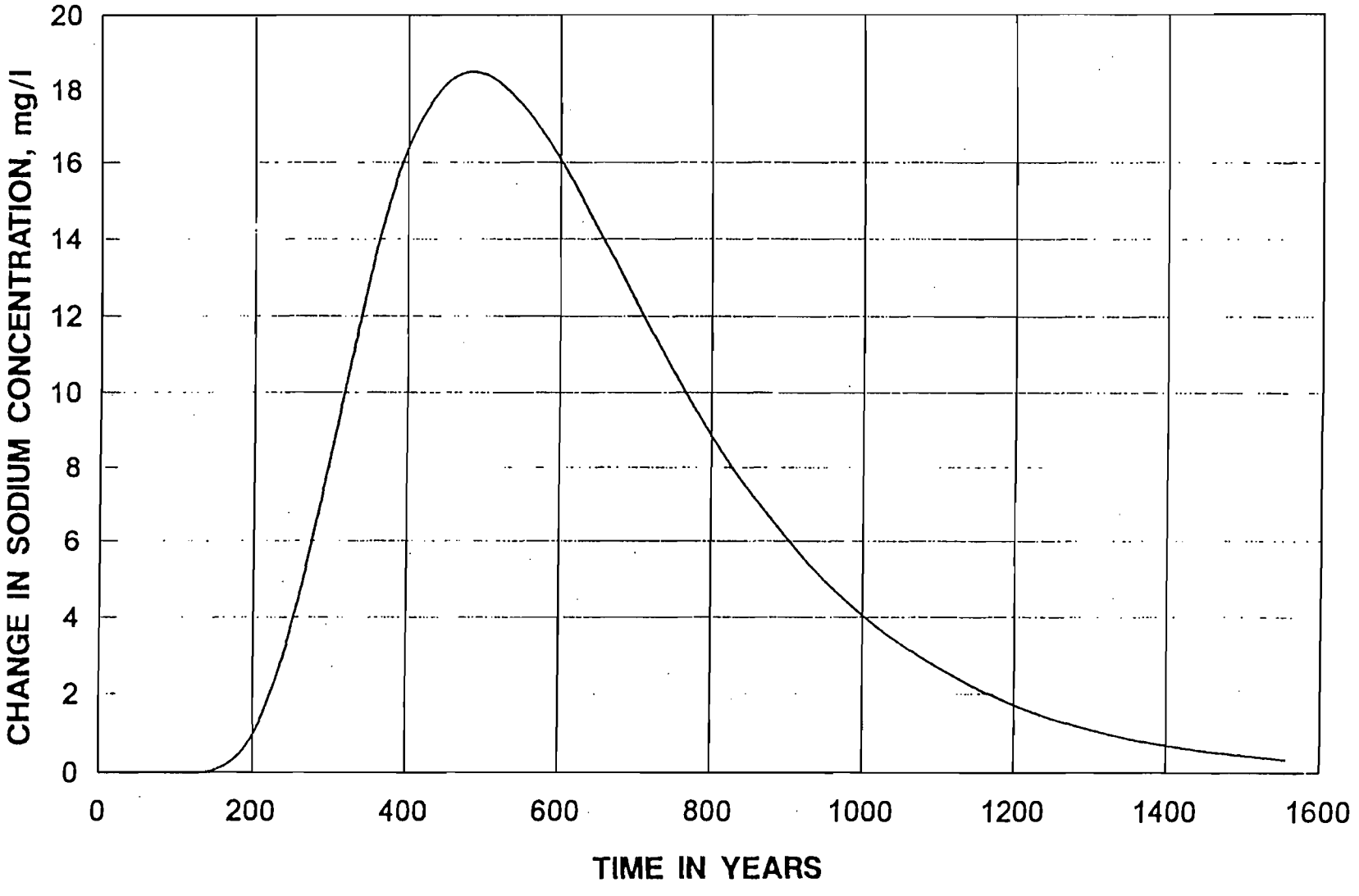
SODIUM CONCENTRATION AT EDGE OF MANATEE RIVER WITH NATURAL RECHARGE

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

GROUNDWATER IMPACT EVALUATION
FP&L COOLING POND
ORIMULSION PROJECT
MANATEE COUNTY, FLORIDA

FILE NO.	DRAWN BY:	CHECKED BY:	DATE:	FIGURE:
95-153	JJN	JLS	11/15/95	3

N957690



CHANGE IN SODIUM CONCENTRATION AT BASE OF CONFINING UNIT

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

GROUNDWATER IMPACT EVALUATION
FP&L COOLING POND
ORIMULSION PROJECT
MANATEE COUNTY, FLORIDA

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APPROVED BY:

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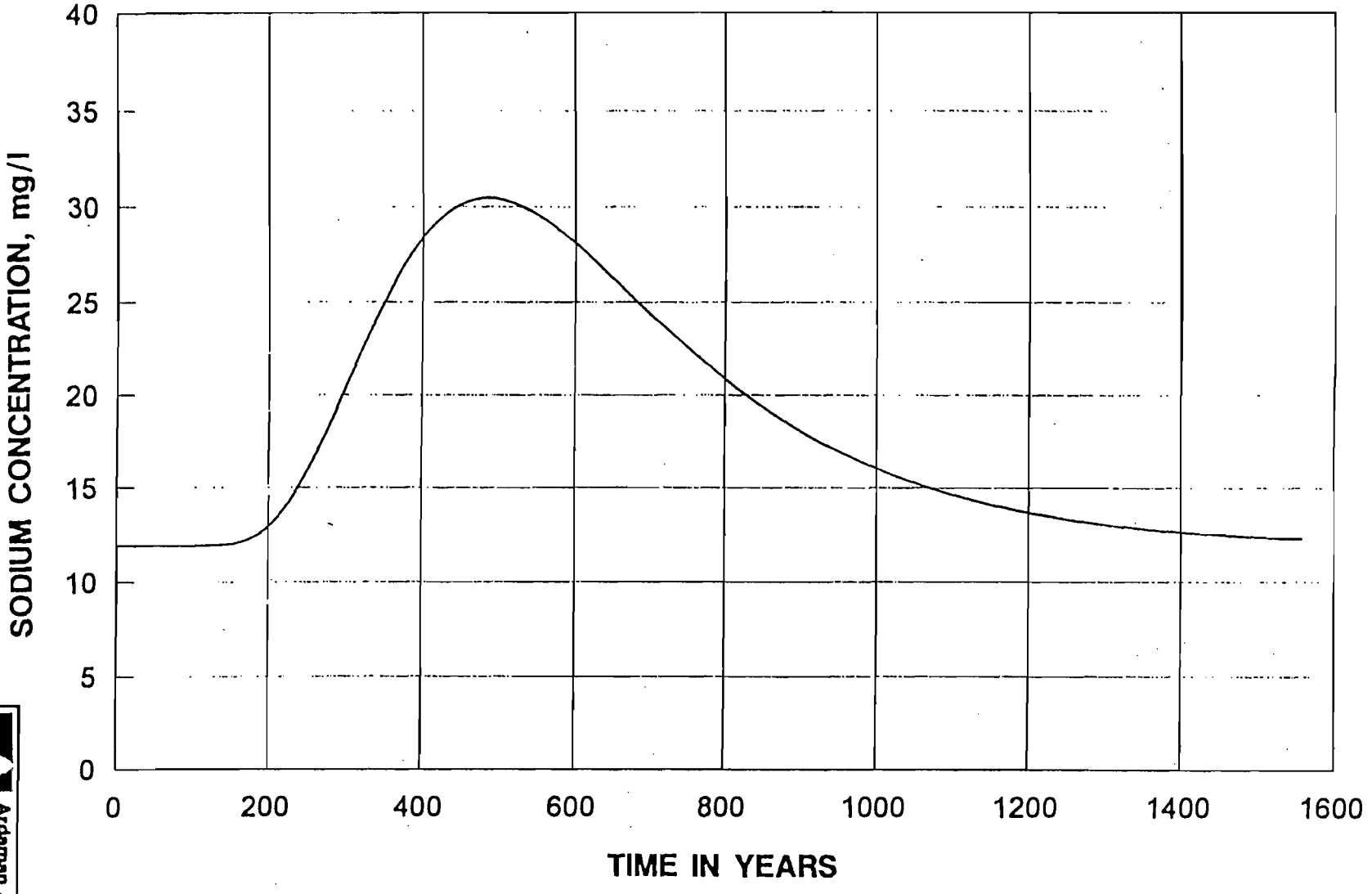

SODIUM CONCENTRATION AT BASE OF CONFINING UNIT

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

GROUNDWATER IMPACT EVALUATION
FP&L COOLING POND
ORIMULSION PROJECT
MANATEE COUNTY, FLORIDA

FILE NO.	DRAWN BY: JJN	CHECKED BY: JJN	APPROVED BY:	DATE: 11/15/95	FIGURE: 5
95-153					

APPENDIX 10.10

WATER SUPPLY ALTERNATIVE ANALYSIS

WATER SUPPLY
ALTERNATIVES ANALYSIS
MANATEE EXPANSION PROJECT

Prepared by:
Golder Associates Inc.
6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653

February 2002

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1.0 INTRODUCTION/SUMMARY

FPL proposes to construct a new natural gas-fired combined cycle generating unit at its existing power plant site near Parrish in Manatee County, Florida (Figure 1-1). The plant site lies approximately 5 miles east of Parrish, Florida. It is approximately 5 miles east of U.S. 301 and 9.5 miles east of Interstate Highway 75 (I-75). The existing plant is approximately 2.5 miles south of the Hillsborough-Manatee County line; a portion of the north property boundary of the plant site abuts the county line. The new unit will utilize four new combustion turbines (CTs), four new heat recovery steam generators (HRSGs) and a new steam turbine/electric generator. The resulting combined cycle unit (Manatee Unit 3) will be capable of generating approximately 1,150 megawatts (MW).

FPL is seeking approval of the Manatee Expansion Project under the Florida Electrical Power Plant Siting Act (PPSA), Chapter 403, Part II, Florida Statutes (F.S.). The PPSA provides a centralized review process for new electrical generating facilities in Florida, involving a balancing of "the increasing demand for electrical power plants with the broad interests of the public". The Florida Department of Environmental Protection (FDEP) acts as the coordinator for the remainder of the site certification process, with input from various state, regional and local agencies, along with interested citizens. Ultimate disposition of the SCA is by the Governor and Cabinet sitting as the Siting Board.

The conclusion reached in this analysis is that the existing cooling pond can be used with the current source of makeup for meeting the Project's specified water requirements. FPL is proposing a modified withdrawal plan from the Little Manatee River that provides the best use of the local water resources within the Most Impacted Area (MIA) of the Eastern Tampa Bay Water Use Caution Area, while meeting Project economic and technical requirements.

1.1 PURPOSE

The Manatee Plant currently withdrawals water from the Little Manatee River under a Permit Agreement with SWFWMD. The withdrawals allowed under that Permit Agreement are sufficient to provide all water needed by the existing Manatee Units and Unit 3 for process and cooling purposes. For informational purposes only, this study identifies and assesses the technical, environmental, and economic feasibility of the various water supply alternatives available for use by FPL in conjunction with the Project.

1.2 PROJECT DESCRIPTION

The Manatee Expansion Project will be designed to operate as a base load power generating plant. The water use for the Project has been estimated on an average daily quantity and peak month daily quantity.

This section provides a description of the Manatee Expansion Project, including the overall Site layout and key components of the Project. Estimates of the expected quantity of water supply needs for the Project are provided in Sections 2 and 3, based on the current available engineering and design information.

The Project will be located adjacent to an existing power plant and will tie into a number of facilities, including a fuel supply pipeline, existing water supply and wastewater facilities, paved roads and other existing infrastructure. As a result, the location of the new facility at the existing Manatee Plant site and the selection of the combined-cycle technology will maximize the beneficial use of the Site while minimizing environmental, land use, and cost impacts.

The Manatee Expansion Project will consist of a nominal 1,150-MW combined-cycle power plant and directly associated facilities. The Project will include four combustion turbines (CTs) and an associated heat recovery steam generator (HRSG). The CTs will be equipped with Dry Low Nitrogen Oxide (NO_x) combustors (DLN) and Selective Catalytic Reduction (SCR). The HRSGs will have the ability to duct fire and will be connected to a nominal 460-MW steam turbine electric generator. The HRSG will utilize the waste heat from the CTs to produce steam for this new steam turbine. The facility is commonly referred to as a "4 by 1" combined-cycle configuration. By utilizing the heat from the CTs, which otherwise would be wasted, the combined-cycle facility will be more efficient than simple cycle CTs and traditional steam cycle power plants. The facility will be fired exclusively with natural gas.

Steam injection will be used during some operating conditions to increase the power output from the unit. This is commonly referred to as "steam for power augmentation." This is different than using steam injection in the combustion zone for standard combustors, which is used for NO_x control. The turbine inlets will be equipped with evaporative cooling to reduce the inlet temperature. This increases the power and output of the combined cycle. Thus, a number of water uses for the Project will result in increased efficiency and performance. The CTs will be fired exclusively with natural gas, which will be transported by a natural gas pipeline.

All non-contact stormwater runoff will be collected and routed to the existing cooling pond. Wastewaters, including process water, pretreatment backwash, sanitary wastewater, plant and equipment drains will be treated as appropriate and discharged to be recycled within the existing cooling pond. The Manatee Expansion Project will utilize the existing Manatee Plant potable water supply and fire protection systems.

2.0 PROJECT WATER USE ALTERNATIVES

The major water use for the Project is associated with the condenser cooling of the steam cycle. Closed cycle cooling systems primarily require the use of either cooling towers or, in the case of the Manatee Plant site, the use of a cooling pond. Water use occurs due to evaporation either by forced evaporation in a cooling tower or evaporation in the cooling pond due to increased thermal load. Of the nominal 1,150-MW capacity for Unit 3, the steam cycle capacity is 460 MW (nominal). The net water use (i.e., evaporation) is associated with this generating capacity.

The configuration of Unit 3 will inherently use less water than traditional steam electric units. As noted above, only about 460 MW or 40 percent of the nominal 1,150-MW unit capacity will require water for condenser cooling. A majority of the electric energy produced by Unit 3 will be generated through the use of combustion turbine technology that has very little water use. Moreover, the generation of electricity using the hot exhaust of the combustion turbines increases the overall efficiency of producing electric power and decreases the amount of water used per MW generated. Indeed, selection of combined cycle technology substantially reduces water required to generate electricity (i.e., by about 60 percent).

For Manatee Unit 3, the availability of an existing cooling pond for condenser cooling allows closed cycle cooling with water use based on the incremental difference between historical withdrawals from the Little Manatee River and proposed withdrawals with Unit 3. Based on a comparison of 24 years of historical usage and projected usage using the same database, the net water use is about 4 million gallons per day (MGD) from the Little Manatee River with the addition of Unit 3. Using the average steam electric generation of 440 MW and subtracting the water used in the steam cycle (see below), the water use for the cooling is about 360 gallons per MW generated.

In contrast, net water use using a cooling tower for Unit 3 would be about 460 gallons per MW generated. The net average cooling water requirements for condenser cooling using a cooling tower is about 5 MGD. Water use associated with a cooling tower would be continuous while the cooling pond would utilize only a portion of the available flow and provide storage throughout the year for cooling purposes. Net water use by condenser cooling for other new combined cycle projects located in the SWFWMD have ranged from about 580 to 840 gallons per MW generated. These new combined cycle projects generally have smaller steam electric generators and wastewater considerations that increase water use relative to Unit 3. The use of a cooling tower

for Unit 3 would also have other collateral effects including higher cost (about 10 percent higher cooling system cost), lower steam cycle efficiency (an increase of 0.5 to 0.8 percent) and higher internal power use (a decrease in power produced of 0.5 to 0.8 percent). The lost power on average would be about 9 MW, which is sufficient power to serve about 6,000 residential customers.

Air cooled condensers, also referred to as dry cooling towers, are a form of closed cycle condenser cooling using air as the cooling medium. This technology has not been used in Florida due to the warm climate and results in the decrease of thermal efficiency in the steam cycle and increased internal power usage. For Manatee Unit 3, the efficiency would decrease on average by about 1.5 percent with a decrease of about 3 percent at high ambient temperatures. Power used by air-cooled condensers would range from about 16 to 33 MW. On average, this lost power could serve about 12,000 residential customers with electrical power. Moreover, there is a substantial economic impact associated with air-cooled condensers. This includes an estimated increase in capital cost of about $60 million for Unit 3 and increased cost of power production. The annualized present worth cost would be about $4 million per year. In addition, air cooled condensers occupy a very large area (about 2 acres) and typically generate considerable noise due to the numerous fans.

For Manatee Unit 3, the use of the existing cooling pond is the preferred alternative from technical and economic perspective.

Other water uses include inlet fogging, the steam cycle, power augmentation and other minor service uses. The net average requirement for these other water uses associated with Unit 3 is about 230,000 gallons per day (GPD). The use of inlet fogging reduces the amount of water use relative to other evaporative cooling systems. In an inlet fogging system, fog droplets are produced by specially designed nozzles in an injection placed in the turbine inlet. The fog droplets are about 10 to 20 microns in diameter and extract the latent heat of vaporization from the inlet gas stream when the liquid water is converted to gas. This cools the inlet air and provides an increase in power and efficiency for the combustion turbine. This water use is about 50 gallons per minute (gpm) and used when temperatures are typically above 70 degrees Fahrenheit (°F) with relative humidity below 80 percent. During normal operation this is the only water use for the combustion turbine since water is not required for NO_x control. Water used for the steam cycle is recycled within the steam production equipment (i.e., HRSGs) and the steam

turbine generator. Small amounts of water in the steam cycle (about 40 gpm) are evaporated. Power augmentation involves the injection of steam in the combustion turbine to increase power output. This operation will be limited to a maximum of 400 hours per year and is used during peak electric demand periods. Water use is about 900 gpm for the periods of power augmentation operation.

3.0 MANATEE EXPANSION PROJECT WATER USES

3.1 BACKGROUND

The site for the Project is the existing FPL Manatee Plant 9,500-acre site, located in unincorporated north-central Manatee County. The Manatee Plant is an existing generating facility originally constructed in the early to mid 1970s, with the commercial in-service dates for Units 1 and 2 in October 1976 and December 1977, respectively. Each of the existing steam electric generating units has a nominal capacity of 800 MW. The Manatee Plant site has a 4,000-acre cooling pond used for condenser cooling. Water from the pond is also used for process and service water uses.

The existing cooling pond is man-made and has earth embankments. The cooling pond surface area is approximately 4,000 acres, and has a gross storage volume of 52,000 acre-ft. The normal pond water level range is between elevation 57.0 feet mean sea level (ft-msl) and elevation 67.67 ft-msl. Included within the pond are two divider dikes to prevent short circuiting between the circulating water inlet and outfall, thus enhancing the cooling pond's heat dissipation efficiency.

The Manatee Plant currently withdraws water from the Little Manatee River under a Permit Agreement with SWFWMD to maintain the required water levels for its 4,000-acre (6.25 mi^2) cooling pond. The total Little Manatee River drainage basin encompasses approximately 229 mi^2.

3.2 PLANT WATER USE

Makeup to the existing cooling pond is, and will continue to be, from the existing makeup water pumping station that withdraws water from the Little Manatee River in accordance with the Permit Agreement with SWFWMD. This water will continue to be pumped into the existing cooling pond, from which it will be withdrawn for Unit 3 uses, including condenser cooling, general plant service water, fire protection water, and demineralized water. The largest consumptive use will continue to be replacement of net evaporation from the cooling pond. The overall water management plan for the Manatee Plant, including Unit 3, is shown in Figure 3-1.

Process water uses for the Project will include: demineralized water use in the CT inlet fogger system, CT power augmentation, and HRSG steam-cycle makeup; and general services water use for wash downs.

3.2.1 CIRCULATING WATER HEAT REJECTION SYSTEM

The Manatee Plant will continue to use the existing closed loop cooling system in its current configuration, subsequent to the construction of Unit 3. There are no modifications needed to the cooling pond, the cooling water systems for Units 1 and 2, or the cooling pond makeup system to support the new Unit 3. The maximum estimated heat rejected to the cooling pond, at 100-percent load on all 3 units, is estimated to be:

Units 1 and 2	8.2 Billion Btu per hour
Units 3	2.3 Billion Btu per hour

Mathematical modeling of the thermal performance of the cooling pond has been performed to predict water usage and operating temperatures, and associated water quality. The modeling is based on the period of record including water years (October 1 through September 30) 1977 through 2001. This period of record spans the operating history of Units 1 and 2, and includes the severe drought of 2000-2001. This model was employed in the mid-1990s, and was adapted at that time to estimate daily withdrawals (diversions) from the Little Manatee River based on water level in the cooling pond, flow in the river, and a revised allowable diversion schedule.

Operation of the model proceeds in a step-wise fashion month to month over the 24-year period simulating 2005 to 2028. The combination of expected plant operating loads, pond area, and meteorological conditions was used to estimate the evaporation rate from the pond and its monthly inlet and outlet temperatures. The model also predicts the number of cycles of concentration at which the pond would operate, relative to the makeup water (Little Manatee River). This information can be used to estimate the dissolved solids level in the cooling pond so that performance of the condenser cooling system can be evaluated with respect to water chemistry, and so that water quality within the pond can be predicted.

After Manatee Unit 3 begins operation, makeup water for the cooling pond will continue to be withdrawn from the Little Manatee River. The existing Permit Agreement between FPL and SWFWMD allows sufficient makeup water for operation of the Manatee Plant cooling pond with the addition of Unit 3. To minimize withdrawals from the Little Manatee River, FPL proposes to use a more restrictive schedule for diversions after Unit 3 becomes operational in mid-2005. Under this proposal, withdrawals from the Little Manatee River will generally reduce the rate of daily river flow by no more than 10 percent (see Figure 3-2). If the cooling pond level falls to

62 ft-msl, FPL could make withdrawals in accordance with the current Permit Agreement diversion schedule for October through July until the pond level reaches 63 ft-msl. As under the Permit Agreement, withdrawals will not be allowed to reduce stream flow below a minimum flow rate of 40 cfs, and the maximum withdrawal rate from the river is 190 cfs. FPL's proposed revised diversion schedule, in summary, includes the following conditions:

- No diversion will reduce flow in the river below 40 cfs, as measured at the USGS gaging station at Wimauma;
- Under normal conditions, diversions will not exceed 10 percent of river flow, as measured at the Manatee Plant;
- Under defined emergency conditions (cooling pond level falls to 62 ft-msl), revert to the October through July diversion schedule under the current SWFWMD Permit Agreement until the cooling pond level reaches 63 ft-msl;
- Diversions will not exceed a rate of 190 cfs.

Estimated diversions using the revised schedule and based on the modeling performed, are shown in Table 3-1. The overall average monthly diversion (withdrawal) is estimated to be about 8.9 MGD. Estimated pond water levels associated with operation at these diversions rates are shown on Figure 3-3. The modeling indicates that there would be only three events in a 24-year period that would qualify as "emergencies" in which the current diversion schedule would have to be used. The predicted cumulative frequency of withdrawals above 10 percent of the total river flow is only 3 percent of the time.

3.2.2 DOMESTIC/SANITARY USES

There will be only 12 additional employees associated with the operation of Unit 3. Additional domestic/sanitary wastewater generated by Unit 3 will be handled by the existing system. No new facilities are planned for Unit 3.

3.2.3 POTABLE WATER SYSTEMS

Potable water uses at Unit 3 will not cause the facility to exceed existing permitted values. Potable water use will be limited by using bottled water for drinking purposes and by use of portable safety shower/eyewash stations.

3.2.4 PROCESS WATER SYSTEMS

The Manatee Plant's reverse osmosis (RO)/mixed bed (MB) demineralizer system will be used for Unit 3.

3.2.4.1 Demineralized Water

The second largest water use for the Project will be the preparation of demineralized water [i.e., conductivity < 0.1 microSiemens per centimeter (μS/cm)]. Demineralized water is required for:

- Makeup to replace blowdown from the HRSG (necessary to maintain a low dissolved solids content in the HRSG);
- Makeup to replace miscellaneous steam losses in the steam cycle;
- CT air inlet fogger cooling system feed; and
- CT power augmentation.

Raw water from the existing Manatee cooling pond will be used as service water. The service water system, among other uses, will feed the RO/MB train (Process Water Treatment System). The MBs are rental units and will be periodically regenerated offsite. The RO reject will be treated by existing plant systems for recycling to the cooling pond.

3.2.4.2 General Service Water

General service water uses, including seal water, cleaning and flushing water, and fire protection water, will be provided by the service water system.

3.3 USE OF NATURAL GAS AND DLN FOR POWER GENERATION

The Project will use natural gas as the source of fuel for power generation. By using natural gas, the Manatee Expansion Project will eliminate the need to use water for the control of air pollutant emissions. The development in the 1990's of DLN technology when firing natural gas, minimizes the formation of NO_x without the use of either water or steam. Prior to the development of DLN, water or steam was used to minimize the formation of NO_x by reducing combustion temperatures. Typically, about 1.2 pounds of water per pound of fuel was required. This would result in a water usage of about 1.3 MGD for a similar sized power unit as Unit 3. Moreover, the NO_x levels achieved with water injection were much higher than those that can be achieved with DLN. The use of DLN is a pollution prevention technology that does not utilize water.

3.4 OPERATIONAL CONSERVATION MEASURES

The Manatee Expansion Project will be designed and operated in a manner consistent with good engineering and environmental practices and FPL will make every effort to conserve water. The plant will use only the amount of water needed by putting in place those engineering controls that will ensure that water is not wasted.

Steam that is used to generate electricity through the steam turbine will be condensed, and reused in a continuous loop. All wastewaters and other water used in the steam cycle (e.g., blowdown) will be recycled back to the cooling pond. On average, about 40 percent of the water used in the generation of electricity (excluding cooling) will be recycled back to the cooling pond. Generally, the drainage in the area of the CT/HRSG, water tanks and system substation areas will be directed away from the structures and routed to catch basins. The water from these catch basins will be pumped to the new outfall structure and recycled to the existing cooling pond. This will result in about 10 percent of the overall water use in the steam cycle (excluding cooling) being supplemented to the pond.

Specific water conservation measures that will be implemented for Unit 3 are:

- Recycle of all treated wastewater to the cooling pond.
- Routing of treated contact stormwater to the cooling pond.
- Routing of non-contact stormwater from equipment areas to the cooling pond.
- Continued recycling of seepage collected by toe drain system to the cooling pond.
- Implementation of the "10-Percent Diversion schedule".

The above conservation measures will be implemented upon start-up of Unit 3.

4.0 PROJECT WATER SUPPLY SOURCES

4.1 WATER SOURCES

There are a number of potential sources of water for the Project. However, selection of the source(s) to be used is a function of technical, economic, and regulatory constraints. Following is a list of potential water sources.

1. Surface water,
2. Groundwater, and
3. Reclaimed water.

4.2 SURFACE WATER

The Little Manatee River is the current source of makeup water for the existing cooling pond.

4.3 GROUNDWATER

The potential sources of groundwater include: the surficial aquifer; the intermediate aquifer; the Upper Floridan aquifer (UFA); and the Lower Floridan aquifer (LFA). Water quality in the surficial aquifer system (SAS) is generally fair to good, however, the available resource is not able to meet the Project demand. The Project is located within the Eastern Tampa Bay Water Use Caution Area Most Impacted Area (MIA). Permitting new quantities of groundwater from confined aquifers from the MIA is not allowed by SWFWMD Rules.

4.4 RECLAIMED WATER

Currently, reclaimed water is not available at the Manatee Plant site. Reclaimed water from Manatee County Manatee Agricultural Reuse System (MARS) may be available in the future.

5.0 WATER SUPPLY ALTERNATIVE IDENTIFICATION AND ANALYSIS

5.1 GENERAL DISCUSSION

Water source alternatives for the Project are analyzed in this section. The water alternatives for the Manatee Expansion Project are dictated by its location within the existing Manatee Plant site and the water sources available in the vicinity of the Project. The location of the Project at the Manatee Plant site allows the use of the existing infrastructure available that would not be available at a greenfield site. The Manatee Unit 1 and 2 currently utilizes the 4,000-acre existing cooling pond for condenser cooling with pond makeup water provided by diversion from the Little Manatee River. The cooling pond incorporates numerous water conserving features that include recycling back to the pond water collected from a toe drains system designed to recover horizontal seepage. Treated wastewater is also recycled back to the cooling pond.

5.2 EXISTING CASE: WITHDRAWAL FROM THE LITTLE MANATEE RIVER

The Manatee Plant will continue to use the existing cooling pond for heat dissipation subsequent to the addition of the Unit 3 Project. Currently, the Manatee Plant uses an approximate 4,000-acre cooling pond with make-up water supplemented by withdrawal from the Little Manatee River. The withdrawal from the River is authorized by a Permit Agreement issued in 1973, and amended in 1975, by the SWFWMD. This Permit Agreement includes a diversion curve that specifies the rate of withdrawal based on the river flow.

The additional cooling requirements will be satisfied by circulating cooling pond water through the new Unit 3 condenser and heat exchangers. Consequently, the Project will increase the total heat load to the cooling pond. The additional heat load from Unit 3 will increase the pond temperature, the evaporation rate, the makeup water demand and the cooling pond cycles-of-concentration.

5.3 ALTERNATIVE 1: TEN PERCENT WITHDRAWAL RATE FROM THE LITTLE MANATEE RIVER

To assess the effect of these changes on the existing cooling pond with the addition of Unit 3, a cooling pond performance model was used. The modeling was performed using historic load factors for Units 1 and 2 and corresponding meteorologic/hydrologic conditions, for the period from 1977 to 2001, with and without Unit 3 at full load. While the current SWFWMD authorization is sufficient to meet the needs for the existing units and Unit 3, FPL proposes that

water withdrawals from the Little Manatee River for cooling pond makeup, after Unit 3 becomes operational, be governed by a 10 percent diversion schedule. The current diversion curve for October-July would only be used under defined conditions (see Section 3.2.1). The cooling pond performance model shows that pond water levels can generally be maintained within acceptable limits, using the 10 percent diversion limitation. The modeling predicts that there are only 3 events in a 24-year period that would require diversions in excess of the ten percent of the stream flow of the Little Manatee River. The predicted cumulative frequency of such withdrawals is only 3 percent of the time.

High-water-control discharges from the cooling pond may be required during periods of extreme rainfall (rainfall amounts exceeding the 100-year 24-hour event). To accommodate the possibility of such discharges, which are required to maintain public safety, the cooling pond has an existing spillway located on the north side. The spillway consists of three sluice gates and has a crest elevation of 68.75 ft-msl. The spillway is designed to safeguard against overtopping of the embankment in keeping with sound engineering practice.

When Unit 3 is operational, excess rainfall releases will be become less frequent. There are at least two reasons for this improvement. First, the normal maximum water level for the pond will be set at 67.67 ft-msl. This level provides adequate reserve storage to retain all direct rainfall and surface runoff to the pond from a 100-year 24-hour storm event. Second, the additional heat load from Unit 3 improves operational control of the cooling pond. This is evident from the results of the calibrated cooling pond performance model, which was run using the last 24-years of historical data. The model results show that with Unit 3 operational, no high-water-control discharges would occur over the 24-year period modeled.

To ensure reliability, spillway gate tests are conducted annually. During these tests, approximately 10,000 gallons of water is released. The water released from the spillway flows into a stilling basin at the base of the spillway, which can hold approximately 500,000 gallons. Water overflowing the stilling basin outlet structure (Weir 10) must flow another 1,700 ft down the spillway canal before entering the Little Manatee River.

The only planned releases from the cooling pond are associated with annual testing of the spillway gates. FPL intends to continue analyzing the pond water, as required by the Units 1 and 2 Industrial Waste Water Facility Permit, prior to any such releases. If the analysis indicates that

any pond constituent is present in concentrations that would exceed Class III surface water criteria, water in the stilling basin, which receives the release will be analyzed for the same constituent(s). Provided that calculations indicate that the combined discharge would meet Class III surface water criteria, the gate test will be conducted.

5.4 ALTERNATIVE 2: GROUNDWATER FROM THE UPPER FLORIDAN AQUIFER

The Project is located within the Eastern Tampa Bay Water Use Caution Area MIA. Permitting new quantities of groundwater from confined aquifers from the MIA is not allowed by SWFWMD Rules. Reallocation of existing permitted onsite groundwater quantities may be viable as a source of water to meet a portion of the makeup requirements for the cooling pond.

5.5 ALTERNATIVE 3: GROUNDWATER FROM THE INTERMEDIATE AQUIFER

The Project is located within the Eastern Tampa Bay Water Use Caution Area MIA. Permitting new quantities of groundwater from confined aquifers from the MIA is not allowed by SWFWMD Rules. Additionally, limited yield from the intermediate aquifer makes it unrealistic to obtain meaningful quantities of groundwater from wells located at the Manatee Plant site. As a result, this alternative is not considered viable.

5.6 ALTERNATIVE 4: SALINE GROUNDWATER FROM THE LOWER FLORIDAN AQUIFER

Saline water from the Lower Floridan aquifer (LFA) is potential source of water. This water would have to be used in a separate closed cycle cooling system (cooling tower) since it could not be used to supplement water to the cooling pond. The poor quality of the LFA water would require both additional capital expenditures and increased operational expenses for pretreatment systems and waste disposal. In addition, capital costs (specifically well construction costs and pumping costs) would increase substantially utilizing water from the LFA. Another significant cost associated with this alternative is the disposal of the saline water reject from the pretreatment plant. The only feasible means of disposal for the concentrated liquid is via deep well injection. The cost and permitting difficulties associated with utilization of saline water from the LFA and waste disposal result in this alternative being not feasible.

5.7 ALTERNATIVE 6: RECLAIMED WATER

Currently, there is no source of reclaimed water available, however the Manatee Plant site could receive reclaimed water from Manatee County Manatee Agricultural Reuse System (MARS). Although the MARS has not yet been implemented in the vicinity of the Project, FPL would consider utilizing this resource if it becomes available. Important factors in determining the viability of reclaimed water include quantity, quality, available storage and cost.

6.0 SELECTED PROJECT WATER SUPPLY ALTERNATIVE

6.1 EVALUATION OF ALTERNATIVES

The evaluation of alternatives indicates that the continued use of the cooling pond with diversions from the Little Manatee River is the most appropriate for Unit 3. When Unit 3 becomes operational, the diversion schedule would be changed to the "10-percent" schedule outlined in Section 3.2-1. Other alternatives are rejected as being infeasible, having greater water usage, having collateral energy and environmental impacts, and/or not being cost effective.

6.2 WATER SUPPLY ALTERNATIVES CONCLUSION

When considering the evaluation of water supply alternatives, it is clear that the only feasible alternative for the Manatee Expansion Project is the continued utilization of the existing cooling pond with the Little Manatee River as the source of makeup. This alternative, after considering technical, environmental, and economic factors, provides the lowest quality of water in sufficient quantities that can serve the Project.

6.3 PROJECT CONSISTENCY WITH SWFWMD CRITERIA

As indicated in the Purpose portion of this report, the water needs for Unit 3 can be met under the existing SWFWMD allocation pursuant to the Permit Agreement. However, as additional information supporting the continued use of the Little Manatee River as the source of makeup for the cooling pond, the following is a summary of the information demonstrating that the Project water use is consistent with the criteria in Chapter 373, F.S., and Chapter 40D-2, F.A.C. The information presented herein demonstrates that the water use is reasonable and beneficial, is in the public interest, and will not interfere with any existing legal use of water.

a. The water use is necessary to fulfill a reasonable demand. The electrical generation from the Manatee Expansion Project is a required need established growth in electric demand. FPL has a statutory requirement to meet this demand.

b. The water use will not cause quantity or quality changes which adversely impact the water resources, including both surface and ground waters. The continued use of the Little Manatee River will not cause adverse impacts to water resources. This is addressed in Section 5.1 and 5.2 of the SCA.

c. The water use will not cause adverse environmental impacts to wetlands, lakes, streams, estuaries, fish and wildlife, or other natural resources. The continued use of the Little

Manatee River will not cause adverse impacts to wetlands or the Little Manatee River. This is addressed in Section 5.1 and 5.2 of the SCA.

d. The water use will not cause water levels or rates of flow to deviate from the ranges set forth in Chapter 40D-8, F.A.C. The proposed water use will not cause deviation in any applicable rate of flow in the Little Manatee River. While there is currently no minimum rate of flow established for the Little Manatee River, FPL proposes to reduce the rate of withdrawal currently authorized by SWFWMD for the Little Manatee River, through the use of an alternative withdrawal schedule that would be implemented with the operation of the Project.

e. The water use will utilize the lowest water quality the Applicant has the ability to use. The Little Manatee River is the lowest quality of water available for making up the evaporation lost from the cooling pond. Water will, however, only be diverted according to the conditions proposed by FPL (see Section 3.2 in this document).

f. The water use will not significantly induce saline water intrusion. The continued use of the Little Manatee River will not significantly induce saline intrusion as described in Section 5.1.2.3 of the SCA.

g. The water use will not cause pollution of the aquifer. The continued use of the Little Manatee River and cooling pond will not significantly degrade the water quality in the aquifers offsite as described in Section 5.3.2.2 of the SCA.

h. The water use will not adversely impact offsite land uses existing at the time of the application. The continued use of the Little Manatee River and cooling pond will not significantly impact offsite users as described in Section 5.3.2 of the SCA.

i. The water use will not adversely impact an existing legal withdrawal. The continued use of the Little Manatee River and cooling pond will not significantly impact existing legal users as described in Sections 5.1 and 5.3 of the SCA.

j. The water use will utilize the local water resources to the greatest extent practicable. The continued use of the Little Manatee River will utilize the water to the greatest extent practicable. Indeed, as described in Section 3.2 of this document, a revised diversion schedule is being proposed that would benefit the use of this local resource.

k. The water use will incorporate water conservation measures. The Project with continued use of the Little Manatee River would incorporate water conservation measures as described in Sections 3.3 and 3.4 of this document. Seepage from the pond is captured by a toe drain system and directed back to the cooling pond.

l. The water use will incorporate reuse measures to the greatest extent practicable. The Manatee Expansion Project will incorporate reuse measures as described in Section 3.4 of this document. The measures include the recycling of wastewaters and stormwaters back to the cooling pond.

m. The water use will not cause water to go to waste. The water diverted from the Little Manatee will not be wasted but used for the production of electric power.

n. The water use will not otherwise be harmful to the water resources within the District The continued use of the Little Manatee River will not be harmful to the water resources as described in Section 3.2 of this document and Sections 5.1 and 5.2 of the SCA.

Table 3-1. Estimated Monthly River Diversions (MGD) with Unit 3 Added

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual Average
1	0.00	0.00	0.00	0.00	0.00	0.00	1.23	4.06	5.73	28.12	15.52	2.85	4.79
2	2.57	0.00	1.27	15.94	4.08	6.61	0.00	5.82	1.39	4.35	15.83	14.40	6.02
3	16.43	3.89	4.34	5.64	6.69	5.11	7.40	8.38	6.29	5.81	7.19	15.24	7.70
4	1.42	0.92	0.69	1.52	8.11	2.15	0.00	2.34	4.13	6.83	50.09	32.74	9.24
5	3.14	0.50	1.53	3.37	6.29	14.22	6.76	8.71	35.03	24.05	19.93	32.26	12.98
6	10.99	5.63	2.51	3.82	1.23	0.00	11.18	1.94	10.04	22.67	9.29	0.00	6.61
7	6.76	4.79	0.00	7.98	9.41	9.02	5.67	1.90	0.15	6.07	10.50	4.56	5.57
8	0.81	0.55	0.05	2.24	4.08	4.18	1.27	0.57	3.24	2.80	10.79	16.55	3.93
9	4.17	3.67	1.70	5.50	6.05	12.38	3.49	1.88	28.76	43.71	84.87	10.40	17.22
10	5.27	5.20	3.46	7.75	4.55	21.45	16.00	21.57	2.86	14.53	16.75	8.85	10.69
11	5.72	10.91	5.01	6.88	9.00	13.45	4.17	2.05	1.17	10.14	24.18	36.58	10.77
12	7.07	9.64	4.73	7.68	4.62	6.85	2.21	0.22	2.29	19.89	11.50	25.45	8.51
13	8.36	5.51	10.77	5.44	8.57	3.63	1.47	0.24	3.78	15.87	5.57	3.55	6.06
14	11.23	1.65	0.14	5.87	0.09	33.05	13.76	46.31	14.76	33.84	24.56	7.22	16.04
15	1.96	0.00	0.09	0.15	9.83	5.16	9.90	2.97	28.98	24.21	28.71	15.98	10.66
16	8.18	3.90	3.56	12.20	7.21	12.60	12.30	2.70	4.50	3.45	3.80	17.97	7.70
17	8.35	8.31	2.12	9.63	4.36	6.08	5.54	1.29	22.77	22.51	34.08	5.38	10.87
18	11.92	5.22	6.49	8.36	8.10	4.26	3.44	0.57	5.59	22.84	18.97	10.82	8.88
19	9.36	0.00	4.31	0.00	7.42	9.61	6.73	7.77	10.88	11.22	4.37	2.57	6.19
20	2.28	0.04	2.18	0.41	0.71	1.60	4.76	4.84	4.05	15.20	22.08	19.36	6.46
21	10.20	28.39	0.44	0.00	0.00	0.00	0.00	2.90	0.35	4.79	10.89	20.01	6.50
22	14.31	9.92	5.60	6.06	5.24	3.58	0.00	0.96	14.00	11.51	13.03	9.57	7.82
23	7.89	4.15	4.78	2.76	1.32	0.23	0.12	0.00	1.50	7.41	8.10	18.78	4.75
24	0.51	0.32	0.09	0.00	0.00	1.91	1.32	0.00	10.43	79.35	78.97	46.07	18.25
Maximum	16.43	28.39	10.77	15.94	9.83	33.05	16.00	46.31	35.03	79.35	84.87	46.07	35.17
Average	6.62	4.71	2.74	4.97	4.87	7.38	4.95	5.42	9.28	18.38	22.06	15.71	8.93
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	2.80	3.80	0.00	0.56

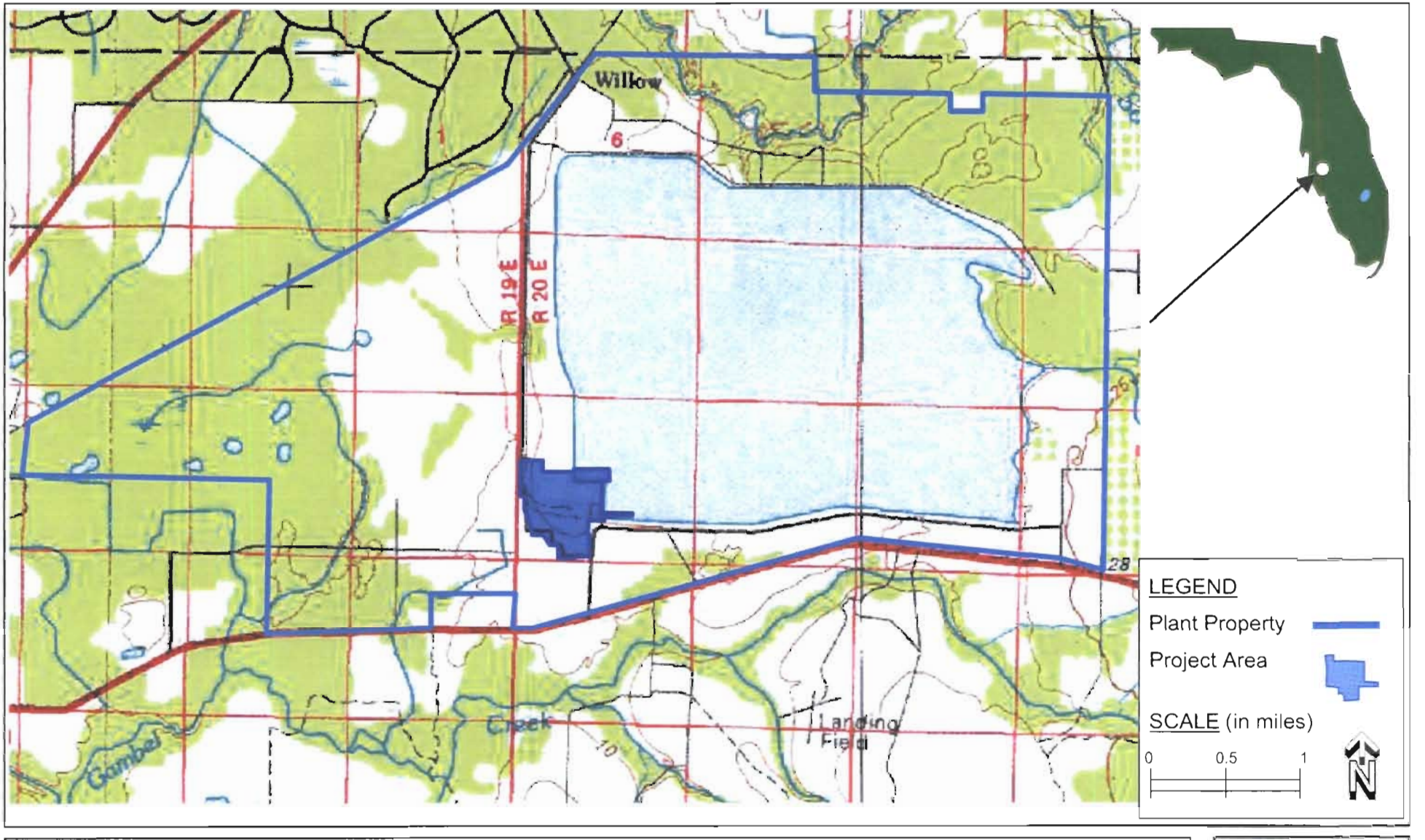

Figure 1-1. FPL Manatee Plant Site Location

Source: TerraServer.com, 2002; Golder, 2002.

FPL
Manatee Unit 3

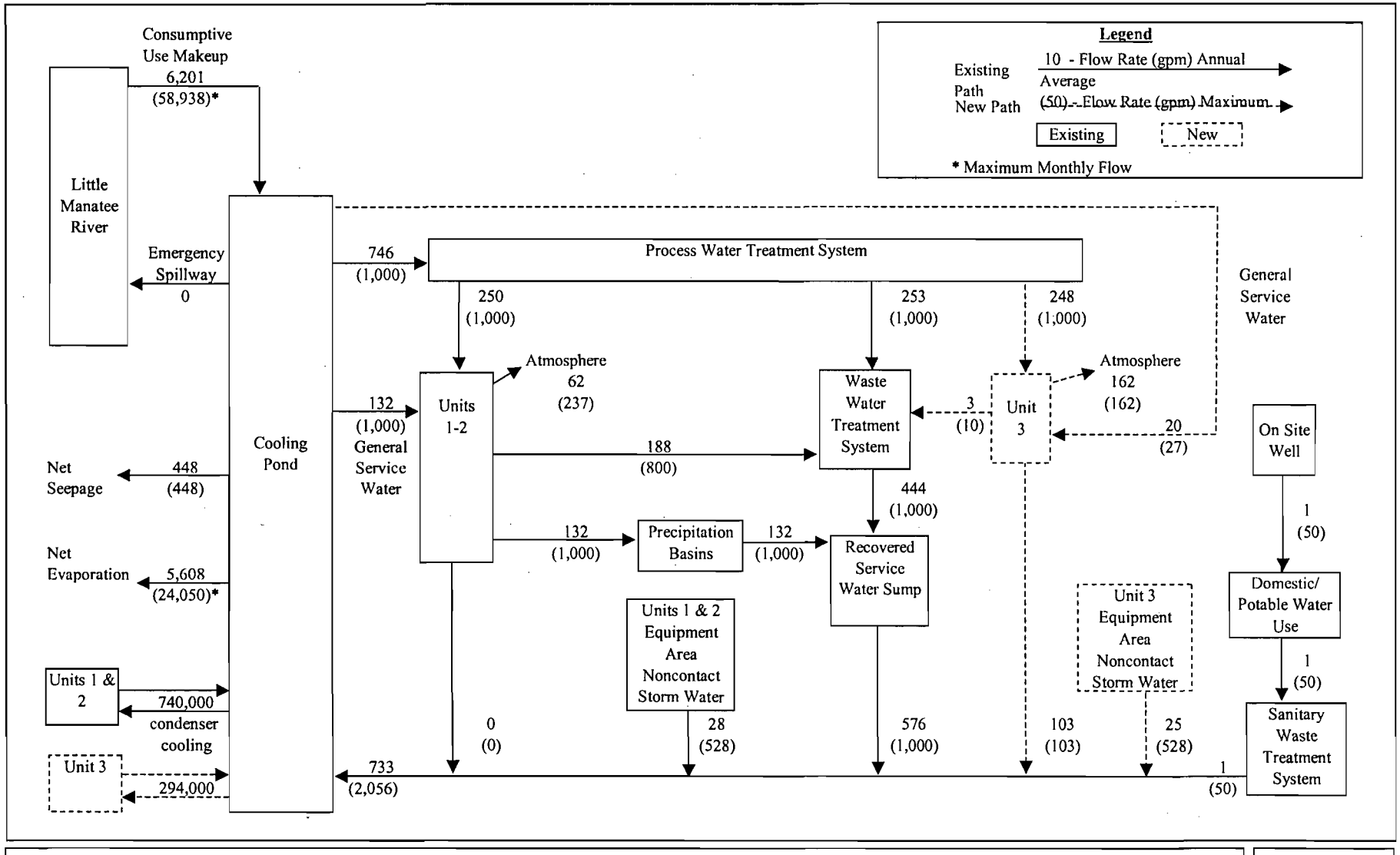

Figure 3-1. FPL Manatee Plant Water Management Plan

Source: Foster Wheeler, 2002.

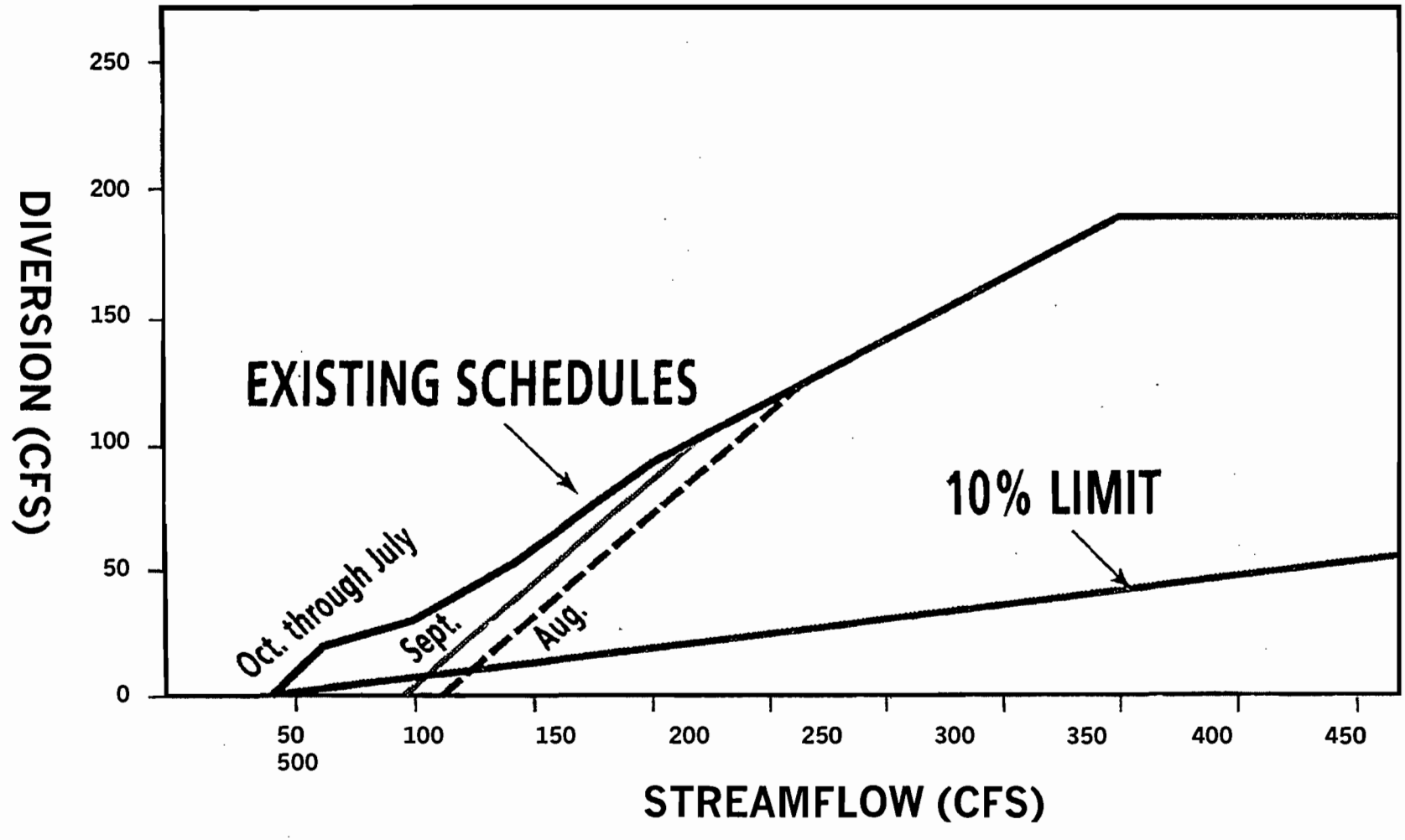

Figure 3-2. Comparison of Existing Diversion Schedules and Ten Percent Limit

Source: SWFWMD, 1995; Golder, 2002.

FPL
Manatee Unit 3

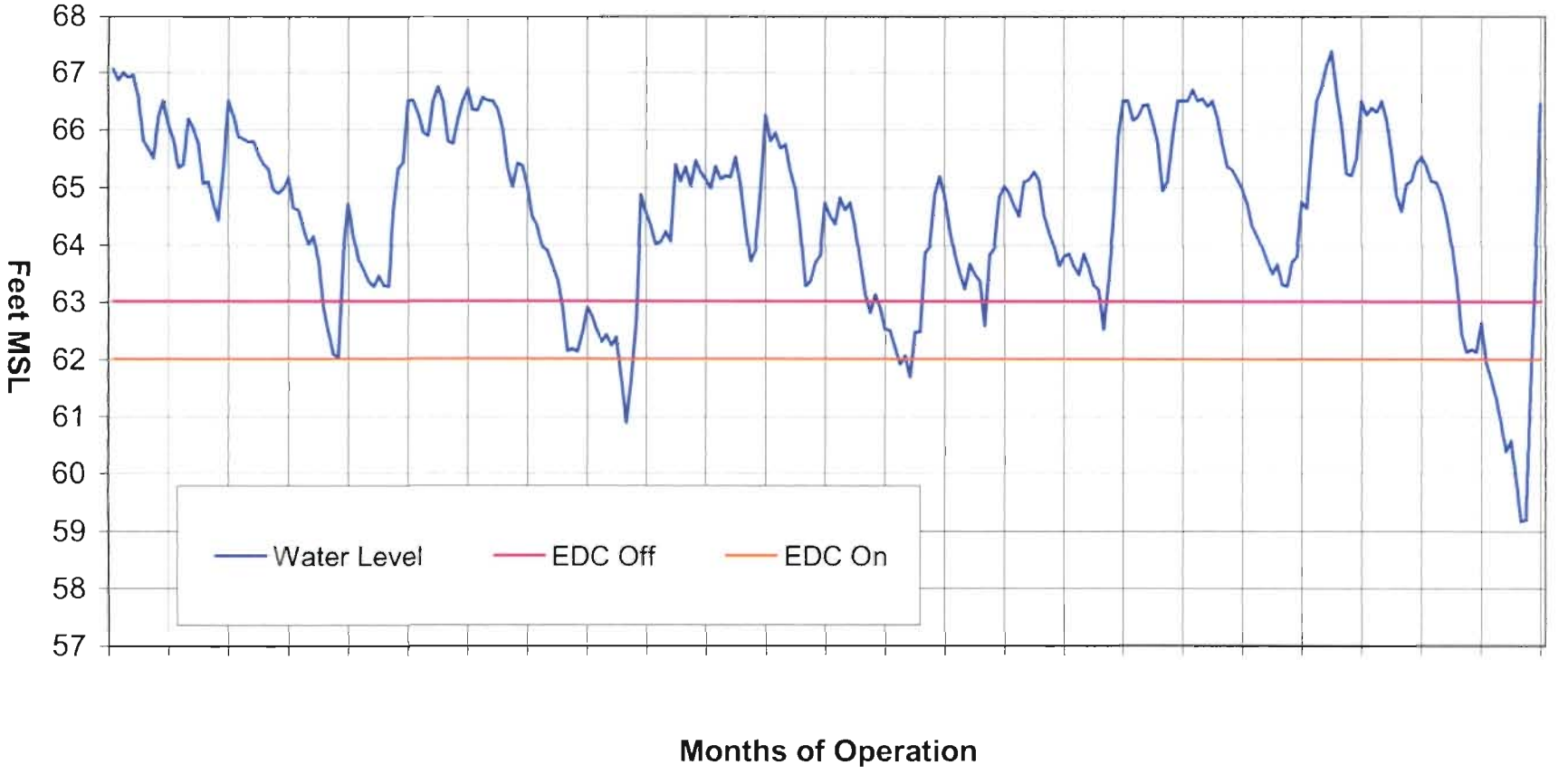

Figure 3-3. Estimated Operating Monthly Cooling Pond Water Levels

Source: Foster Wheeler, 2002.

FPL
Manatee Unit 3