Florida Power
CORPORATION

September 14, 1988
3F0988-09

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Environmental Protection Plan

Dear Sir:

Pursuant to the Crystal River Unit 3 Technical Specifications Appendix B, Part II, "Environmental Protection Plan", Section 3.2 (3), please find attached the National Pollulant Discharge Elemination System (NPDES) Permit No. FL0000159 which shall become effective on October 1, 1988. Also attached is one copy of each of the following:

1) NPDES Application Facts Sheets
2) NPDES Permit No. FL0000159 Findings and Determinations
3) Responses to comments on NPDES Permit No. FL0000159
4) Salt Drift Impact Assessment
5) Notice of NPDES Permit Determination

If you have any questions concerning this matter, please contact this office.

Rolf C. Widell, Director
Nuclear Operations Site Support

REF:RCW:wla

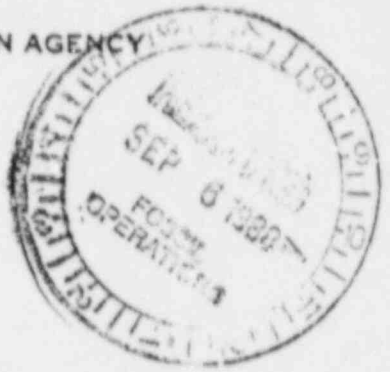
Attachments

xc: Regional Administrator, Region II

Senior Resident Inspector

Cool
1/1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365



CERTIFIED MAIL
RETURN RECEIPT REQUESTED

REF: 4WM-FP

Mr. John A. Hancock
Vice President, Fossil Operations
Florida Power Corportion
P. O. Box 14042
St. Petersburg, FL 33733

RE: Final Issuance of NPDES Permit No. FL0000159
Florida Power Company

Dear Mr. Hancock:

Enclosed is the National Pollutant Discharge Elimination System (NPDES) permit for the above referenced facility. This action constitutes the Environmental Protection Agency's final permit decision in accordance with 40 CFR 124.15(a). Any person may contest this decision by submitting a timely request for a hearing to the Regional Administrator under 40 CFR 124.74 or 124.114. Also enclosed is one copy each of the following:

Findings and Determinations, Fact Sheet - revised pages, Responses to Comments Salt Drift Impact Assessment, and Notice of NPDES Permit Determinations.

The permit will be effective as specified in the permit, provided that no request for a hearing is granted by the Agency under 40 C.F.R. 124.75 or 124.114. In the event that such a request is granted:

- For discharge(s) previously authorized by an NPDES permit, the force and effect of the contested provision(s) of this permit will be stayed, and any comparable provision(s) of the previous NPDES permit as well as all uncontested provision(s) of this permit shall be fully enforceable and effective until the administrative review process is completed, as provided by 40 CFR 124.16 and 124.60.

- For discharge(s) not previously authorized by an NPDES permit, the Agency's granting of a hearing (requested by you or any other person) will result in no authorization to discharge. In other words, there will not be an NPDES permit authorizing the discharge(s) and if such a discharge(s) occurs, the discharge(s) will constitute a violation of Section 301 of the Clean Water Act, (33 U.S.C. 1311) for which there is civil and/or criminal liability.

If you wish to request a hearing under 40 CFR 124.74 or 124.114 you must submit a request (an original and two copies) to the Regional Hearing Clerk within thirty (30) days from the receipt of this letter. The request will be timely if mailed by certified mail within the thirty (30) day time period. For the request to be valid, it must conform to the requirements of 40 CFR 124.74. A copy of the requirements of 40 CFR 124.74 is enclosed.

Information on procedures pertaining to the filing of a hearing request or other legal matters may be obtained by contacting Ms. Jacqueline F. Colson, Assistant Regional Counsel, at (404) 347-2335.

Sincerely yours,

John S Mallar for

Bruce R. Barrett, Director
Water Management Division

Enclosures (7): Hearing Request Requirements
Final NPDES Permit
Fact Sheet Pages with Revisions
Findings and determinations
Responses to Comments
Salt Drift Impact Assessment
Notice of NPDES Determinations

cc: Florida DER (with enclosures)

United States Environmental Protection Agency

Region 4
Office of Public Affairs
345 Courtland Street, NE
Atlanta, GA 30365

Alabama
Florida
Georgia
Kentucky
Mississippi
North Carolina
South Carolina
Tennessee

EPA **Environmental News** (404) 347-3004

PERMIT ISSUED FOR CRYSTAL RIVER POWER PLAN IN CITRUS COUNTY, FLORIDA

The U. S. Environmental Protection Agency (EPA) has issued a National Pollutant Discharge Elimination System Permit to Florida Power Corporation (FPC) for Units 1-3 at the Crystal River Power Plant in Citrus County, Florida. Issuance of the permit resolves a longstanding controversy on measures needed for the control of waste heat from the facility.

The permit limits the temperature of the discharge to 96.5° Fahrenheit (as a three-hour average) and 97.0°F at any time. To meet these requirements, FPC proposes to construct helper (non-recirculating) cooling towers which will cool a portion of the plant effluent to meet permit limitations. Also required by the permit is a 15 percent reduction in plant flow during the months of November through April, construction of a fish hatchery, and a program of monitoring seagrass recovery and seagrass planting (if inadequate natural recovery occurs).

Based on its assessment of salt deposition impacts at the site, EPA has concluded that there will be no significant impacts from salt drift from the new cooling towers at the site.

A permit, to be issued by the Florida Department of Environmental Regulation, will place limits on the discharge of particulates (salt drift) to the atmosphere. The permit is required prior to the start of tower construction.

-0- September 1, 1988

/CONTACT: Hagan Thompson of EPA, 404/347-3004

REQUIREMENTS FOR EVIDENTIARY/PANEL
HEARING REQUEST

Evidentiary Hearing (40 CFR 124.74)

(a) Within 30 days following service of notice of the Regional Administrator's final permit decision under 124.15 any interested person may submit a request to the Regional Administrator under paragraph (b) of this section for an evidentiary hearing to reconsider or contest that decision. If such a request is submitted by a person other than the permittee, the person shall simultaneously serve a copy of the request on the permittee.

(b)(1) In accordance with 124.76, such requests shall state each legal or factual question alleged to be at issue, and their relevance to the permit decision, together with a designation of the specific factual areas to be adjudicated and the hearing time estimated to be necessary for adjudication. Information supporting the request or other written documents relied upon to support the request shall be submitted as required by 124.73 unless they are already part of the administrative record required by 124.18.

Note: This paragraph allows the submission of requests for evidentiary hearings even though both legal and factual issues may be raised, or only legal issues may be raised. In the latter case, because no factual issues were raised, the Regional Administrator would be required to deny the request. However, on review of the denial the Administrator is authorized by 124.91(a)(1) to review policy or legal conclusions of the Regional Adminstrator. EPA is requiring an appeal to the Administrator even of purely legal issues involved in a permit decision to ensure that the Administrator will have an opportunity to review any permit before it will be final and subject to judicial review.

(2) Persons requesting an evidentiary hearing on an NPDES permit under this section may also request an evidentiary hearing on a RCRA or UIC permit, PSD permits may never be made part of an evidentiary hearing under Subpart E. This request is subject to all the requirements of paragraph (b)(1) of this section and in addition will be granted only if:

(i) Processing of the RCRA or UIC permit at issue was consolidated with the processing of the NPDES permit as provided in 124.4;

(ii) The standards for granting a hearing on the NPDES permit are met;

(iii) The resolution of the NPDES permit issues is likely to make necessary or appropriate modification of the RCRA or UIC permit; and

(iv) If a PSD permit is involved, a permittee who is eligible for an evidentiary hearing under Subpart E on his or her NPDES permit requests that the formal hearing be conducted under the procedures of Subpart F and the Regional Administrator finds that consolidation is unlikely to delay final permit issuance beyond the PSD one-year statutory deadline.

(c) These requests shall also contain:

(1) The name, mailing address, and telephone number of the person making such request;

(2) A clear and concise factual statement of the nature and scope of the interest of the requester;

(3) The names and addresses of all persons whom the requester represents; and

4) A statement by the requester that, upon motion of any party granted by the Presiding Officer, or upon order of the Presiding Officer sua sponte without cost or expense to any other party, the requester shall make available to appear and testify, the following:

(i) The requester;
(ii) All persons represented by the requester; and
(iii) All officers, directors, employees, consultants, and agents of the requester and the persons represented by the requester.

(5) Specific references to the contested permit conditions, as well as suggested revised or alternative permit conditions (including permit denials) which, in the judgement of the requester, would be required to implement the purposes and policies of the CWA.

(6) In the case of challenges to the application of control or treatment technologies identifed in the statement of basis or fact sheet, identification of the basis for the objection, and the alternative technologies or combination of technologies which the requester believes are necessary to meet the requirements of the CWA.

(7) Identification of the permit obligations that are contested or are inseverable from contested conditions and should be stayed if the request is granted by reference to the particular contested conditions warranting the stay.

(8) Hoaring requests also may ask that a formal hearing be held under the procedures set forth in Subpart F. An applicant may make such a request even if the proceeding does not constitute "initial licensing" as defined in 124.111.

(d) If the Regional Administrator grants an evidentiary hearing request in whole or in part, the Regional Administrator shall identify the permit conditions which have been contested by the requester and for which the evidentiary hearing has been granted. Permit conditions which are not contested or for which the Regional Administrator has denied the hearing request shall not be affected by, or considered at, the evidentiary hearing. The Regional Administrator shall specify these conditions in writing in accordance with §124.60(c).

(e) The Regional Administrator must grant or deny all requests for an evidentiary hearing on a particular permit. All requests that are granted for a particular permit shall be combined in a single evidentiary hearing.

(f) The Regional Administrator (upon notice to all persons who have already submitted hearing requests) may extend the time allowed for submitting hearing requests under this section for good cause.

Permit No. FL0000159
Major non-POTW

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et. seq; the "Act"),

Florida Power Corporation
P.O. Box 14042
St. Petersburg, Florida 33733

is authorized to discharge from a facility located at

Crystal River Power Plant
Units 1, 2, and 3
Citrus County, Florida

to receiving waters named

Gulf of Mexico

from discharge points enumerated herein as serial numbers

001, 002, 003, 004, 005, 006, 007, 008, 009, 010A, 10B, 011, 012, 013, and 014 (or 14A and 14B)

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof. The permit consists of this cover sheet, Part I: 12 page(s), Part II: 15 page(s), Part III: 4 page(s), Part IV: 2 page(s), and Attachments: 2.

This permit shall become effective on October 1, 1988.

This permit and the authorization to discharge shall expire at midnight, September 30, 1993.

SEP 1 1988
Date Signed

Bruce R. Barrett
Bruce R. Barrett, Director
Water Management Division

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date and lasting through implementation of flow reduction, the permittee is authorized to discharge from outfall(s) serial number(s) 001, 002, and 005 (once through cooling water from Units 1, 2, and 3, respectively) and 010A, 010B, and 011 (intake screen backwash to the plant intake or discharge canals) to the site discharge canal to the Gulf of Mexico.

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

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
	Instantaneous Maximum	Daily Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	1897.9	Report	N/A	Continuous	Pump logs
POD Discharge Temperature [°C(°F)]	See Below	Report	Report	Continuous	Recorders
Unit Temperature Rise [°C(°F)]	See Below	Report	See Below	Continuous	Recorders
Total Residual Oxidants (TRO, mg/l) 1/	0.05	N/A	N/A	2/week 2/	Multiple grabs
Time of TRO Discharge (min/day/unit) 1/	N/A	N/A	120	2/week 2/	Multiple grabs

The discharge temperature at the bulkhead line shall not exceed 39.4(103) for a period of more than three consecutive hours or a maximum of 41.1(106). Daily maximum temperature rise across the condensers of Units 1, 2, and 3 shall not exceed 9.4(17.0), 9.4(17.0), and 9.7(17.5), respectively. Neither shall the temperature rise across the condenser of Unit 3 exceed 9.7(17.5) for a period of more than three consecutive hours nor an instantaneous maximum of 11.7(21).

Total residual oxidants shall not exceed 0.05 mg/l in the discharge from any individual condenser (4 condensers per unit).

Intake screen backwash may be discharged from OSN 010A, 010B, and 011 without limitation or monitoring requirements after passage through debris baskets, except that there shall be no discharge of floating oil. Debris removed by the intake bar racks and debris baskets shall be disposed of by landfill.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): TRO at the outlet corresponding to an individual condenser (4 condensers per unit); flow from combined circulating water pumps; and temperature at the intake and outlet corresponding to an individual unit (inlet temperature is the average of the temperatures measured at the inlets to the four condensers and outlet temperature is the average of the temperatures measured at the outlets from the four condensers), and at the intersection of the site discharge canal and the original bulkhead line.

1/ Limitations and monitoring requirements for total residual oxidants (TRO) are not applicable for any calendar day in which chlorine is not added.

2/ In the event that the normal chlorine addition period is to exceed 120 minutes/day/unit, TRO shall be monitored by continuous recorder(s).

Note: See attached certification for mixing zone requirements for chlorine.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

2. During the period beginning on the implementation of flow reduction and lasting through implementation of of the helper cooling system, the permittee is authorized to discharge from outfall(s) serial number(s) 001, 002, and 005 (once through cooling water from Units 1, 2, and 3, respectively and 010A, 010B, and 011 (intake screen backwash to the plant intake or discharge canals) to the site discharge canal to the Gulf of Mexico.

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

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
	Instantaneous Maximum	Daily Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	1/	Report	N/A	Continuous	Pump logs
POD Discharge Temperature [°C(°F)]	See Below	Report	Report	Continuous	Recorders
POD Temperature Rise [°C(°F)]	N/A	Report	Report	Continuous	Recorders
Total Residual Oxidants (TRO, mg/l) 2/	0.05	N/A	N/A	2/week 3/	Multiple grabs
Time of TRO Discharge (min/day/unit) 2/	N/A	N/A	120	2/week 3/	Multiple grabs

The discharge temperature at the bulkhead line shall not exceed 39.4(103) for a period of more than three consecutive hours or a maximum of 41.1(106).

Total residual oxidants shall not exceed 0.05 mg/l in the discharge from any individual condenser (4 condensers per unit).

Intake screen backwash may be discharged from OSN 010A, 010B, and 011 without limitation or monitoring requirements after passage through debris baskets, except that there shall be no discharge of floating oil. Debris removed by the intake bar racks and debris baskets shall be disposed of by landfill.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): TRO at the outlet corresponding to an individual condenser (4 condensers per unit); flow from combined circulating water pumps; intake temperature at individual unit intakes (or water boxes); and discharge temperature at the intersection of the site discharge canal and the original bulkhead line.

1/ Combined condenser flow from Units 1, 2, and 3 shall not exceed 1897.9 MGD during the period of May 1st through October 31st of each year nor 1613.2 MGD during the remainder of the year.
2/ Limitations and monitoring requirements for total residual oxidants (TRO) are not applicable for any calendar day in which chlorine is not added.
3/ In the event that the normal chlorine addition period is to exceed 120 minutes/day/unit, TRO shall be monitored by continuous recorder(s).

Note: See attached certification for mixing zone requirements for chlorine.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

3. During the period beginning on implementation of the helper cooling system and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 001, 002, and 005 (once through cooling water from Units 1, 2, and 3, respectively); and 010A, 010B, and 011 (intake screen backwash to the plant intake canal) to the site discharge canal to the Gulf of Mexico.

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

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
	Instantaneous Maximum	Daily Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	1/	Report	N/A	Continuous	Pump logs
POD Discharge Temperature [°C(°F)]	See Below	Report	Report	Continuous	Recorders
POD Temperature Rise [°C(°F)]	See Below	Report	Report	Continuous	Recorders
Total Residual Oxidants (TRO, mg/l) 2/	0.05	N/A	N/A	2/week 2/	Multiple grabs
Time of TRO Discharge (min/day/unit) 2/	N/A	N/A	60 2/	2/week 2/	Multiple grabs

The discharge temperature at the bulkhead line shall not exceed 35.8(96.5) as a three-hour rolling average nor 36.1(97.0) at any time.

Total residual oxidants shall not exceed 0.05 mg/l in the discharge from any individual condenser (4 condensers per unit).

Intake screen backwash may be discharged from OSN 010A, 010B, and 011 without limitation or monitoring requirements after passage through debris baskets, except that there shall be no discharge of floating oil. Debris removed by the intake bar racks and debris baskets shall be disposed of by landfill.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Flow from the combined circulating water pumps, POD discharge temperature at the intersection of the site discharge canal and the original bulkhead line, intake temperature at individual unit intakes (or water boxes), and TRO at the outlet corresponding to an individual condenser (4 condensers per unit).

1/ Combined condenser flow from Units 1, 2, and 3 shall not exceed 1897.9 MGD during the period of May 1st through October 31st of each year nor 1613.2 MGD during the remainder of the year.

2/ Discharge of TRO from the condenser(s) of each unit shall not exceed a maximum of 60 minutes each in any calendar day. During the period(s) when TRO may be discharged from OSN 001, 002, 005, 012, and 013, TRO may be discharged from one or more individual condensers and/or TRO may be discharged from either or both tower outfalls, individually or in any combination, provided that no individual point of discharge shall exceed a maximum instantaneous concentration of 0.05 mg/l. Limitations and monitoring requirements for TRO and time of TRO discharge for OSN 001, 002 and/or 005 are not applicable for any calendar day in which chlorine is not added to OSN 001, 002, or 005, respectively. In the event that the normal chlorination addition period is to exceed 60 minutes/day/unit, TRO shall be monitored by continuous recorder(s).

Note: See attached certification for mixing zone requirements for chlorine.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

4. During the period beginning on the effective date and lasting through expiration the permittee is authorized to discharge from outfall(s) serial number(s) 003 1/ - Laundry and Shower Sump Tank (LSST) [includes laboratory drains] to OSN 006.

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

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Daily Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/batch	Calculation
Oil and Grease (mg/l)	15.0	20.0	1/batch	Grab
Total Suspended Solids (mg/l)	30.0	100.0	1/batch	Grab
Batches	Report 2/	Report	1/batch	Logs

Whenever metal cleaning wastes are discharged through this serial number, effluent shall not contain more than 8.345 lbs of total copper or total iron per million gallons of metal cleaning waste generated and shall be monitored 1/batch by composite sample.

NOTE: The radioactive component of this discharge is regulated by the U.S. Nuclear Regulatory Commission under the Atomic Energy Act and not by the U.S.E.P.A. under the Clean Water Act.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations): discharge from the LSST treatment system prior to mixing with any other waste stream.

1/ Serial number assigned for identification and monitoring purposes.
2/ Report total batches per month.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

5. During the period beginning on the effective date and lasting through expiration the permittee is authorized to discharge from outfall(s) serial number(s) 004 and 009 - Ash pond discharges (Units 1 and 2 combined) to the site discharge canal to the Gulf of Mexico.

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

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS (mg/l except as noted)		MONITORING REQUIREMENTS	
	Daily Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/Day	Instantaneous
Oil and Grease	15.0	20.0	1/Week	Grab
Total Suspended Solids	30.0	100.0	3/Week	Grab
Heavy Metals	N/A	Report	1/Month	Grab 1/
Arsenic	N/A	0.05	1/Month	Grab 2/, 3/
Cadmium	N/A	0.005	1/Month	Grab 2/
Chromium	N/A	0.050	1/Month	Grab 2/
Copper	N/A	0.015	1/Month	Grab 2/
[illegible]	N/A	0.3	1/Month	Grab 2/, 3/
[illegible]d	N/A	0.05	1/Month	Grab 2/
[illegible]ercury	N/A	0.0001	1/Month	Grab 2/
Nickel	N/A	0.1	1/Month	Grab 2/, 3/
Selenium	N/A	0.025	1/Month	Grab 2/, 3/
Zinc	N/A	1.0	1/Month	Grab 2/

The pH shall not be less than 6.5 standard units nor greater than 8.5 2/ standard units and shall be monitored 1/day 2/.

NOTE: Limitations and monitoring requirements are not applicable during periods of no discharge. Requirements are applicable to each pond individually; however, during any month in which ash pond use is discontinued for cleaning, analysis results for TSS and O&G from both ponds may be averaged.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): discharge from each ash pond effluent prior to mixing with any other waste stream, except for parameters to be monitored at the edge of the mixing zone.

1/ Monitoring for heavy metals shall include total arsenic, iron, and selenium.
2/ Condition of State permit(s).
3/ Monitoring shall be at the edge of the mixing zone which is that portion of the site discharge canal that extends 100 feet east of OSN 004 and 400 feet west of OSN 009.

Note: See attached certification for mixing zone requirements for oil and grease.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

6. During the period beginning on the effective date and lasting through expiration the permittee is authorized to discharge from outfall(s) serial number(s) 006 - Nuclear Services and Decay Heat Seawater System discharge to the site discharge canal to the Gulf of Mexico (includes OSN 003, 007, the Evaporator Condensate Storage Tank (ECST) discharge and the Condensate System (CD) discharge).

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

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
	Daily Average	Daily Maximum	Instantaneous Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	N/A	Continuous	Pump logs
Total Residual Oxidants (TRO, mg/l) 1/	N/A	N/A	0.05	1/week	Multiple grabs
Time of TRO Discharge (min/day/unit) 1/	N/A	Report	N/A	1/week	Multiple grabs
ECST Flow (MGD)	Report	Report	N/A	1/Day	Logs
CD System Flow (MGD)	Report	Report	N/A	1/Day	Logs
Total Suspended Solids (mg/l)	30.0	100.0	N/A	1/Week	Grab
Oil and Grease (mg/l)	15.0	20.0	N/A	1/Week	Grab

Whenever metal cleaning wastes are discharge through this serial number, effluent shall not contain more than 8.345 lbs. of total copper or total iron per million gallons of metal cleaning waste generated and shall be monitored 1/batch by composite sample.

Separate chlorination of this discharge is not authorized; however, discharge of TRO due to chlorination of OSN 005 is permitted.

NOTE: The radioactive component of this discharge is regulated by the U.S. Nuclear Regulatory Commision under the Atomic Energy Act and not by the U.S.E.P.A. under the Clean Water Act.

The pH of the combined discharge (006) shall not be less than 6.5 standard units nor greater than 8.5 standard units and shall be monitored 1/day during periods of 007 and/or CD discharge. If no discharge from 007 or CD occurs, sampling shall be at a convenient time.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with these monitoring requirements specified above shall be taken at the following location(s): TRO and pH at the point of discharge prior to entering the site discharge canal (006); flow at the combined intake water pumps; and flow, iron, copper, TSS, and O&G at the ECST and CD discharges to OSN 006.

1/ Limitations and monitoring requirements for total residual oxidants (TRO) are not applicable for any calendar day in which chlorine is not added to OSN 005.

Note: See attached certification for mixing zone requirements for chlorine.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

7. During the period beginning on the effective date and lasting through expiration the permittee is authorized to discharge from outfall(s) serial number(s) 007 1/ - Regeneration Waste Neutralization Tank (SDT-1) to OSN 006.

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

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Daily Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/batch	Calculation
Oil and Grease (mg/l)	15.0	20.0	1/batch	Grab
Total Suspended Solids (mg/l)	30.0	100.0	1/batch	Grab
Batches	Report 2/	Report	1/batch	Logs

Whenever metal cleaning wastes are discharged through this serial number, effluent shall not contain more than 8.345 lbs of total copper or total iron per million gallons of metal cleaning waste generated and shall be monitored 1/batch by composite sample.

NOTE: The radioactive component of this discharge is regulated by the U.S. Nuclear Regulatory Commission under the Atomic Energy Act and not by the U.S.E.P.A. under the Clean Water Act.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): discharge from the SDT-1 treatment system prior to mixing with any other waste stream.

1/ Serial number assigned for identification and monitoring purposes.
2/ Report total batches per month.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

8. During the period beginning on the effective date and lasting through expiration the permittee is authorized to discharge from outfall(s) serial number(s) 008 - Coal pile runoff (Units 1 and 2) to marshy area.

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

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS	MONITORING REQUIREMENTS	
		Measurement	Sample
	Instantaneous Maximum	Frequency	Type
Flow (MGD)	Report	1/Week	Grab
Total Suspended Solids (mg/l)	50 1/	1/Week	Grab

The pH shall not be less than 6.5 standard units nor greater than 8.5 standard units and shall be monitored 1/week on a grab sample 1/.

NOTE: Limitations and monitoring requirements are not applicable during periods of no discharge.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): points(s) of discharge from treatment system prior to mixing with any other waste stream.

1/ Applicable to any flow up to the flow resulting from a 24-hour rainfall event with a probable recurrence interval of once in ten years. The treatment system shall be capable of containing a 10-year, 24-hour rainfall event.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

9. During the period beginning on implementation of the helper cooling system and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 012 and 013 (helper cooling tower effluents) and 014 (or 014A and 014B - intake screen backwash) to the site discharge canal to the Gulf of Mexico.

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

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
	Instantaneous Maximum	Daily Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	NA	Report	Report	Continuous	Pump Logs
Total Residual Oxidants (TRO, mg/l) 1/	0.05 2/	N/A	N/A	Continuous	Recorders
Time of TRO Discharge 2/	N/A	N/A	60 1/	Continuous	Recorders

Cooling towers shall be operated as necessary to assure that the discharge temperature at the bulkhead line does not exceed 35.8(96.5) as a three-hour rolling average nor 36.1(97.0) at any time (see Page I-3).

Intake screen backwash may be discharged from OSN 014 (or 014A and 014B) without limitation or monitoring requirments after passage through debris baskets, except that there shall be no discharge of floating oil. Debris removed by the intake bar racks and debris baskets shall be disposed of by landfill.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Flow from the tower intake pumps and TRO at each cooling tower outfall (to the site discharge canal).

1/ Discharge of TRO from each cooling tower outfall shall not exceed a maximum of 60 minutes each in any calendar day. During the period(s) when TRO may be discharged from OSN 001, 002, 005, 012, and 013, TRO may be discharged from one or more individual condensers and/or TRO may be discharged from either or both tower outfall(s), individually or in any combination, provided that no individual point of discharge shall exceed a maximum instantaneous concentration of 0.05 mg/l 2/. Limitations and monitoring requirements for TRO and time of TRO discharge for OSN 012 and/or 013 are not applicable for any calendar day in which chlorine is not added to the tower systems discharging through OSN 012 or 013, respectively.

2/ Limitation shall be 0.01 mg/l, unless a mixing zone(s) [MZ] is granted by FDER. If a MZ is granted, the limitation will be 0.05 mg/l at OSN 012 and 013 and 0.01 mg/l at the edge of the MZ.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIRMENTS

10. During the period beginning on the effective date and lasting through expiration the permittee is authorized to discharge storm water from diked petroleum storage or handling areas, provided the following conditions are met:

Such dicharges shall be limited and monitored by the permittee as specified below:

a. The facility shall have a valid SPCC Plan pursuant to 40 CFR 112.

b. In draining the diked area, a portable oil skimmer or similar device or absorbant material shall be used to remove oil and grease (as indicated by the presence of a sheen) immediately prior to draining.

c. Monitoring records shall be maintained in the form of a log and shall contain the following information, as a minimum:

(1) Date and time of discharge,

(2) Estimated volume of discharge,

(3) Initials of person making visual inspection and authorizing discharge, and

(4) Observed conditions of storm water discharged.

d. There shall be no discharge of floating solids or visible foam in other than trace amounts and no discharge of a visible oil sheen at any time.

B. SCHEDULE OF COMPLIANCE

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

a. Effluent Flow Reduction (001 and 002)
   1. Progress report ---------- 02/28/89
   2. Progress report ---------- 08/31/89
   3. Progress report ---------- 02/28/90
   4. Intallation completed ---------- 08/31/90

b. Hatchery (Part III.K)
   1. Submit necessary permit applications ---------- 02/28/89
   2. Start construction ---------- 08/31/89
   3. Initial plan and budget ---------- 11/30/89
   4. Progress report ---------- 12/31/89
   5. Implement operation ---------- 03/31/90
   6. Subsequent annual plan and budget ---------- 11/30/XX
   6. First annual report ---------- 03/31/91
   7. Subsequent Annual Reports ---------- 03/31/XX

c. Helper Cooling Towers (001, 002, and 005 and Part III.L)
   1. Submit complete PSD application ---------- 05/31/89
   2. Start construction and progress report ----------*02/28/90
   3. Progress report ----------*08/31/90
   4. Progress report ----------*02/28/91
   5. Implement operation ----------*08/31/91

d. Condenser Cooling Water Flow Verification (Part III.M)
   1. Report ----------*02/28/92

e. Discharge Temperature Monitoring (Part III.N)
   1. Start field surveys ----------*08/31/91
   2. Submit report ----------*02/28/92
   3. Implement changes, existing eqpt. (if required) ----------*05/31/92
   4. Implement changes, new eqpt. (if required) ----------*02/28/93

f. Seagrass Monitoring and Planting (Part III.O)
   1. Biological survey ---------- Fall 1991
   2. Biological survey ---------- Fall 1993
   3. Submit report ---------- 11/30/93

ITEMS 4 - 23 ARE APPLICABLE ONLY IF NEEDED, BASED ON RESULTS OF THE ABOVE REPORT AND MAY BE TERMINATED ON PERMITTING AUTHORITY APPROVAL IF/WHEN SUBSEQUENT DATA INDICATES THAT NO FURTHER ACTION IS REQUIRED.

   4. Sprig planting ---------- 04/01/94
   5. Biological survey ---------- Fall 1995
   6. Submit annual report ---------- 11/30/95

* Date is subject to slippage if the the PSD Permit is not issued by the FDEP by 01/31/90 and to advancement if the PSD Permit is issued sooner; i.e., start of construction is to be not later than one month after issuance of the PSD permit, and other compliance dates similarly slipped or advanced.

B. SCHEDULE OF COMPLIANCE (continued)

1. f. Seagrass Monitoring and Planting (continued)

7. Biological Survey ---------- Fall 1996
8. Submit final report ---------- 11/30/96
9. Start plot planting ---------- 04/01/97
10. Biological survey ---------- Fall 1997
11. Submit report ---------- 11/30/97
12. Start plot planting ---------- 04/01/98
13. Biological survey ---------- Fall 1998
14. Submit report ---------- 11/30/98
15. Start plot planting ---------- 04/01/99
16. Biological survey ---------- Fall 1999
17. Submit report ---------- 11/30/99
18. Start plot planting ---------- 04/01/00
19. Biological survey ---------- Fall 2000
20. Submit report ---------- 11/30/00
21. Start plot planting ---------- 04/30/01
22. Biological survey ---------- Fall 2001
23. Submit report ---------- 12/31/01

g. BMP Plan (Part IV)

1. Develop plan ---------- 03/31/89
2. Implement plan ---------- 03/31/90

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 specified actions being required by identified dates, a written notice of compliance or noncompliance, any remedial actions taken, and probability of meeting the next scheduled requirement.

PART II

STANDARD CONDITIONS FOR NPDES PERMITS

SECTION A. GENERAL CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

2. Penalties for Violations of Permit Conditions

Any person who violates a permit condition is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

4. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, terminated or revoked for cause (as described in 40 CFR 122.62 et seq) including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any conditions that requires either temporary interruption or elimination of the permitted discharge; or

d. Information newly acquired by the Agency indicating the discharge poses a threat to human health or welfare.

If the permittee believes that any past or planned activity would be cause for modification or revocation and reissuance under 40 CFR 122.62, the permittee must report such information to the Permit Issuing Authority. The submittal of a new application may be required of the permittee. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

5. Toxic Pollutants

Notwithstanding Paragraph A-4, above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the permittee so notified.

The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

6. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing" Section B, Paragraph B-3, nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

9. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

10. Onshore or Offshore Construction

This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any waters of the United States.

11. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

12. Duty to Provide Information

The permittee shall furnish to the Permit Issuing Authority, within a reasonable time, any information which the Permit Issuing Authority may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Permit Issuing Authority upon request, copies of records required to be kept by this permit.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Need to Halt or Reduce not a Defense

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 condition of this permit.

3. Bypass of Treatment Facilities

a. Definitions

(1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility, which is not a designed or established operating mode for the facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations.

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Paragraphs c. and d. of this section.

c. Notice

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass; including an evaluation of the anticipated quality and effect of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section D, Paragraph D-8 (24-hour notice).

d. Prohibition of bypass.

(1) Bypass is prohibited and the Permit Issuing Authority may take enforcement action against a permittee for bypass, unless:

(a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the by ss, 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

(c) The permittee submitted notices as required under Paragraph c. of this section.

(2) The Permit Issuing Authority may approve an anticipated bypass, after considering its adverse effects, if the Permit Issuing Authority determines that it will meet the three conditions listed above in Paragraph d.(1) of this section.

4. Upsets

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. An upset constitutes an affirmative defense to an action brought for non-compliance with such technology based permit limitation if the requirements of 40 CFR 122.41(n)(3) are met.

5. Removed Substances

This permit does not authorize discharge of solids, sludge, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters to waters of the United States unless specifically limited in Part 1.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins o s diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Permit Issuing Authority.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to insure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10% from the true discharge rates throughout the range of expected discharge volumes. Once-through condenser cooling water flow which is monitored by pump logs, or pump hour meters as specified in Part I of this permit and based on the manufacturer's pump curves shall not be subject to this requirement. Guidance in selection, installation, calibration and operation of acceptable flow measurement devices can be obtained from the following references:

1. "A Guide of Methods and Standards for the Measurement of Water Flow", U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 421, May 1975, 97 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by SD catalog No. C13.10:421.)

2. "Water Measurement Manual", U.S. Department of Interior, Bureau of Reclamation, Second Edition, Revised Reprint, 1974, 327 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by catalog No. 127.19/2:W29/2, Stock No. S/N 24003-0027.)

(3) "Flow Measurement in Open Channels and Closed Conduits", U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 484, October 1977, 982 pp. (Available in paper copy or microfiche from National Technical Information Service (NTIS), Springfield, VA 22151. Order by NTIS No. PB-273 535/5ST.)

(4) "NPDES Compliance Flow Measurement Manual", U.S. Environmental Protection Agency, Office of Water Enforcement, Publication MCD-77, September 1981, 135 pp. (Available from the General Services Administration (8BRC), Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, CO 80225.)

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties for Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

5. Retention of Records

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by the Permit Issuing Authority at any time.

6. Record Contents

Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

7. Inspection and Entry

The permittee shall allow the Permit Issuing Authority, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable time any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Change in Discharge

The permittee shall give notice to the Permit Issuing Authority as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source; or

b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under Section D, Paragraph D-10(a).

2. Anticipated Noncompliance

The permittee shall give advance notice to the Permit Issuing Authority of any planned change in the permitted facility or activity which may result in noncompliance with permit requirements. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during noncritical water quality periods and carried out in a manner approved by the Permit Issuing Authority.

3. Transfer of Ownership or Control

A permit may be automatically transferred to another party if:

a. The permittee notifies the Permit Issuing Authority of the proposed transfer at least 30 days in advance of the proposed transfer date;

b. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

c. The Permit Issuing Authority does not notify the existing permittee of his or her intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph b.

4. Monitoring Reports

See Part III of this permit.

5. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report (DMR). Such increased frequency shall also be indicated.

6. Averaging of Measurements

Calculations for limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Permit Issuing Authority in the permit.

7. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

8. Twenty-Four Hour Reporting

The permittee shall orally report any noncompliance which may endanger health or the environment, within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 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 times; 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 reoccurrence of the noncompliance. The Permit Issuing Authority may verbally waive the written report, on a case-by-case basis, when the oral report is made.

The following violations shall be included in the 24 hour report when they might endanger health or the environment:

a. An unanticipated bypass which exceeds any effluent limitation in the permit.

b. Any upset which exceeds any effluent limitation in the permit.

9. Other Noncompliance

The permittee shall report in narrative form, all instances of noncompliance not previously reported under Section D, Paragraphs D-2, D-4, D-7, and D-8 at the time monitoring reports are submitted. The reports shall contain the information listed in Paragraph D-8.

10. Changes in Discharges of Toxic Substances

The permittee shall notify the Permit Issuing Authority as soon as it knows or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic substance(s) (listed at 40 CFR 122, Appendix D, Table II and III) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) One hundred micrograms per liter (100 ug/l);

(2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony; or

(3) Five (5) times the maximum concentration value reported for that pollutant(s) 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 (listed at 40 CFR 122, Appendix D. Table II and III) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 ug/l);

(2) One milligram per liter (1 mg/l) for antimony; or

(3) Ten (10) times the maximum concentration value reported for that pollutant(s) in the permit application.

11. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application should be submitted at least 180 days before the expiration date of this permit. The Permit Issuing Authority may grant permission to submit an application less than 180 days in advance but not later than the permit expiration date.

Where EPA is the Permit Issuing Authority, the terms and conditions of this permit are automatically continued in accordance with 40 CFR 122.6, only where the permittee has submitted a timely and sufficient application for a renewal permit and the Permit Issuing Authority is unable through no fault of the permittee to issue a new permit before the expiration date.

12. Signatory Requirements

All applications, reports, or information submitted to the Permit Issuing Authority shall be signed and certified.

a. All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (1) a president, secretary, treasurer or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy - or decision-making functions for the corporation, or (2) the manager of one or more manufacturing production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding 25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the Permit Issuing Authority shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

(3) The written authorization is submitted to the Permit Issuing Authority.

c. Certification. Any person signing a document under paragraphs (a) or (b) of this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

13. Availability of Reports

Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Permit Issuing Authority. As required by the Act, permit applications, permits and effluent data shall not be considered confidential.

14. Penalties for Falsification of Reports

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

SECTION E. DEFINITIONS

1. Permit Issuing Authority

The Regional Administrator of EPA Region IV or his designee, unless at some time in the future the State receives authority to administer the NPDES program and assumes jurisdiction over the permit; at which time, the Director of the State program receiving authorization becomes the issuing authority.

2. Act

"Act" means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) Public Law 92-500, as amended by Public Law 95-217 and Public Law 95-576, 33 U.S.C. 1251 et seq.

3. Mass/Day Measurements

a. The "average monthly discharge" is defined as the total mass of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month. It is therefore, an arithmetic mean found by adding the weights of the pollutant found each day of the month and then dividing this sum by the number of days the tests were reported. The limitation is identified as "Daily Average" or "Monthly Average" in Part I of the permit and the average monthly discharge value is reported in the " Average" column under "Quantity" on the Discharge Monitoring Report (DMR).

b. The "average weekly discharge" is defined as the total mass of all daily discharges sampled and/or measured during the calendar week on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such week. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the week and then dividing this sum by the number of days the tests were reported. This limitation is identified as "Weekly Average" in Part I of the permit and the average weekly discharge value is reported in the "Maximum" column under "Quantity" on the DMR.

c. The "maximum daily discharge" is the total mass (weight) of a pollutant discharged during a calendar day. If only one sample is taken during any calendar day the weight of pollutant calculated from it is the "maximum daily discharge". This limitation is identified as "Daily Maximum", in Part I of the permit and the highest such value recorded during the reporting period is reported in the "Maximum" column under "Quantity" on the DMR.

d. The "average annual discharge" is defined as the total mass of all daily discharges sampled and/or measured during the calendar year on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such year. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the year and then dividing this sum by the number of days the tests were reported. This limitation is defined as "Annual Average" in Part I of the permit and the average annual discharge value is reported in the "Average" column under "Quantity" on the DMR. The DMR for this report shall be submitted in January for the previous reporting calendar year.

4. Concentration Measurements

a. The "average monthly concentration", other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average monthly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar month. This limitation is identified as "Monthly Average" or "Daily Average" under "Other Limits" in Part I of the permit and the average monthly concentration value is reported under the "Average" column under "Quality" on the DMR.

b. The "average weekly concentration", other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar week on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such week (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average weekly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar week. This limitation is identified as "Weekly Average" under "Other Limits" in Part I of the permit and the average weekly concentration value is reported under the "Maximum" column under "Quality" on the DMR.

c. The "maximum daily concentration" is the concentration of a pollutant discharge during a calendar day. It is identified as "Daily Maximum" under "Other Limits" in Part I of the permit and the highest such value recorded during the reporting period is reported under the "Maximum" column under "Quality" on the DMR.

d. The "average annual concentration", other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar year on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such year (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average yearly count for fecal coliform bacteria is the geometric mean of the counts

for samples collected during a calendar year. This limitation is identified as "Annual Average" under "Other Limits" in Part I of the permit and the average annual concentration value is reported under the "Average" column under "Quality" on the DMR. The DMR for this report shall be submitted in January for the previous reporting year.

5. Other Measurements

a. The effluent flow expressed as M^3/day (MGD) is the 24 hour average flow averaged monthly. It is the arithmetic mean of the total daily flows recorded during the calendar month. Where monitoring requirements for flow are specified in Part I of the permit, the flow rate values are reported in the "Average" column under "Quantity" on the DMR.

b. An "instantaneous flow measurement" is a measure of flow taken at the time of sampling, when both the sample and flow will be representative of the total discharge.

c. Where monitoring requirements for pH, dissolved oxygen or fecal coliform bacteria are specified in Part I of the permit, the values are generally reported in the "Quality or Concentration" column on the DMR.

6. Types of Samples

a. Composite Sample: A "composite sample" is a combination of not less than 8 influent or effluent portions, of at least 100 ml, collected over the full time period specified in Part I.A. The composite sample must be flow proportioned by either time interval between each aliquot or by volume as it relates to effluent flow at the time of sampling or total flow since collection of the previous aliquot. Aliquots may be collected manually or automatically.

b. Grab Sample: A "grab sample" is a single influent or effluent portion which is not a composite sample. The sample(s) shall be collected at the period(s) most representative of the total discharge.

7. Calculation of Means

a. Arithmetic Mean: The arithmetic mean of any set of values is the summation of the individual values divided by the number of individual values.

b. Geometric Mean: The geometric mean of any set of values is the N^{th} root of the product of the individual values where N is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

c. Weighted by Flow Value: Weighted by flow value means the summation of each concentration times its respective flow divided by the summation of the respective flows.

8. Calendar Day

A calendar day is defined as the period from midnight of one day until midnight of the next day. However, for purposes of this permit, any consecutive 24-hour period that reasonably represents the calendar day may be used for sampling.

9. Hazardous Substance

A hazardous substance means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the Clean Water Act.

10. Toxic Pollutant

A toxic pollutant is any pollutant listed as toxic under Section 307(a)(1, of the Clean Water Act.

OTHER REQUIREMENTS

A. Reporting of Monitoring Results

Monitoring results obtained each calendar month shall be summarized for that month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), 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.) Duplicate signed copies of these, and all other reports required by Section D of Part II, Reporting Requirements, shall be submitted to the Permit Issuing Authority at the following addresses:

Environmental Protection Agency
Region IV
Facilities Performance Branch
Water Management Division
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Florida Department of Environmental Regulation
Southwest District
4520 Oak Fair Blvd.
Tampa, FL 33610

B. Reopener Clause

This 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, if the effluent standard or limitation so issued or approved:

1. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

2. Controls any pollutant not limited in the permit.

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

C. Definitions

1. "Calendar day" for the purposes of flow and temperature measurement is from midnight to midnight.
2. "Continuous" measurement frequency is defined as measurements taken at intervals of no greater than one hour each, except for TRO, which shall be taken at intervals of no greater than one per 10 minutes.
3. "Total residual oxidants" or "TRO" is defined as the value obtained using the amperometic titration method for total residual chlorine described in 40 CFR Part 136.
4. "Multiple grabs" for total residual oxidant analysis is defined as samples taken at intervals of no greater than ten minutes over the entire period of chlorine addition and TRO discharge.
5. "Three-hour rolling average" for temperature means the average of the most recent value with those values collected over the previous 180 minutes.
6. "Director" means the EPA Director of the Water Management Division.
7. "N/A" means no limitations, monitoring, or reporting requirements are applicable.

D. Polychlorinated biphenyl Compounds

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

E. FIFRA Registered Compounds

Discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act to any waste stream which may ultimately be released to lakes, rivers, streams or other waters of the United States is prohibited unless specifically authorized elsewhere in this permit. This requirement is not applicable to products used for lawn and agricultural purposes. Discharge of chlorine from the use of chlorine gas, sodium hypochlorite, or other similar chlorination compounds for disinfection in plant potable and service water systems and in sewage treatment is authorized.

F. Toxic Compounds

The permittee shall notify the Director in writing not later than six months prior to planned use and discharge of any chemical, other than chlorine or other product previously reported to the Director, which may be toxic to aquatic life. Such notification shall include:

1. Name and general composition of the chemical,
2. Frequencies of use,
3. Quantities to be used,
4. Proposed discharge concentrations, and
5. EPA registration number, if applicable.

G. Prohibited Plant Discharges

Except as specifically permitted for 003, 006 and 007, there shall be no point source discharge of the following categories of wastes to waters of the United States or to any waste stream which enters such waters: low volume wastes (including, but not limited to, boiler blowdown, wet scrubber air pollution control systems, ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, floor drainage, cooling tower basin cleaning wastes and blowdown from recirculating house service water systems), metal cleaning wastes (cleaning compounds, rinse waters, or any other waterborne residues derived from cleaning any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning and air preheater cleaning, and specifically including such water wash operations as hosing down boiler fireside surfaces), and sanitary wastes. Event recorders shall be placed at all overflow points from evaporation/seepage ponds receiving such wastes to assure compliance with this requirement.

H. Barge Loading and Unloading Facilities

The permittee shall operate and maintain barge loading and unloading facilities in such a manner so as, to the the maximum extent practicable, preclude spillage of coal, chemicals, etc. used at the facility, and shall take all actions necessary to clean up and control any such spill which may occur.

I. Floating Materials

The permittee shall report all visible discharges of floating materials, such as ash or an oil sheen, to the Director when submitting DMR's.

J. Erodable Material Storage

The permittee shall not store coal, soil nor other similar erodable materials in a manner in which runoff is uncontrolled, nor conduct construction activities in a manner which produces uncontrolled runoff unless such uncontrolled runoff has been specifically approved by the Director. 'Uncontrolled' shall mean without sedimentation basin or other controls approved by the Director. This permit may be modified to include limitations for the discharge from such facilities, when installed.

K. Fish Hatchery

Permittee shall provide up to seven million dollars to construct and operate for the remaining life of Units 1, 2, and 3 a fish hatchery as idicated it Part I.B.1.b, Schedule of Compliance. A Technical Advisory Committee (TAC) shall be established to review reports and offer suggestions on necessary actions. Copies of reports and other documents noted herein shall be provided to the Director, State Director, and TAC members. A three-year plan and budget shall be developed by the permittee acting on the advice of the TAC by the start of hatchery operation. Permittee shall annually develop a detailed plan and operating budget for hatchery operation during the following year and update the three-year plan by the end of November, acting on the advice of the TAC. Reports of hatchery activities and progress over the previous year shall be submitted annually, by the end of March.

L. PSD Application

Not later that eight months after issuance of this permit, permittee shall submit a complete application for a PSD permit to the Florida Department of Environmental Regulation with a copy to EPA.

M. Condenser Cooling Water Flow Verification

On completion of the helper cooling towers, permittee shall accurately measure condenser cooling water flows from Units 1, 2, and 3 to verify (within statistical accuracy) that the combined condenser flow does not exceed 1,318,000 gallons per minute during the period of May 1st through October 31st of each year nor 1,120,300 gpm during the remainder of the year (see Part I.A.3, Page I-3). A report demonstrating compliance shall be submitted not later than six months after implementation of tower operation. Should permittee propose to modify the condenser cooling water pumps or systems, the Director shall be notified not less than three months prior to such proposed modification. Upon notification by the Director, permittee shall conduct additional flow verification studies and report results as required by the Director.

N. Discharge Temperature Monitoring

On completion of the helper cooling towers, permittee shall evaluate temperatures in the plant discharge canal in the vicinity of the intersection of the discharge canal and the original bulknead line to determine the most appropriate location

and system design for monitoring plant discharge temperature. The evaluation shall include all plant operating modes and tidal conditions. A report shall be provided within six months following implementation of tower operation indicating proposed modifications to the present discharge temperature monitoring system, if any. Necessary modifications shall be completed within three months using existing thermal sensors to the extent practicable. Additional equipment, if needed, shall be installed within one year.

O. Seagrass Monitoring and Planting

Following completion of the helper cooling towers necessary to meet the temperature requirements established in Part I.A.3, Page I-3, for OSN 001, 002, and 005, permittee shall monitor natural seagrass recovery, conduct experimental sprig planting, plant seagrass if natural recovery is not adequate, and report on this program as indicated in Part I.B.1.f, Schedule of Compliance. A Technical Advisory Committee (TAC) shall be established to review reports and offer suggestions on necessary actions. Reports shall be submitted to the Director, State Director, and TAC members. Biological studies shall be conducted during the two years following tower completion to quantify seagrass presence and recovery. Unless acceptable levels of natural seagrass recovery occur, permittee shall conduct multi-species sprig planting as recommended by the TAC during the third spring following completion of towers and shall monitor the growth of planted seagrasses and the continued natural recovery for two years. If acceptable levels of natural recovery have not occurred by the sixth spring following completion of the towers and if experimental sprig planting has proven successful, permittee shall plant seagrass in area(s) of approximately 10 acres per year as recommended by the TAC. This seagrass planting may be terminated should seagrass recovery be deemed to be at an acceptable level or if continued seagrass planting is considered to be infeasible by the TAC.

P. State Certification

The State of Florida Department of Environmental Regulation has certified the discharge(s) covered by this permit with conditions (Attachment B). Section 401 of the Act requires that conditions of certification shall become a condition of the permit. The monitoring and sampling shall be as indicated for those parameters included in the certification.

Any effluent limits, and any additional requirments, specified in the attached state cerification which are more stringent, supersede any less stringent effluent limits provided herein. During any time period in which the more stringent state certification effluent limits are stayed or inoperable, the effluent limits provided herein shall be in effect and fully enforceable.

PART IV

BEST MANAGEMENT PRACTICES CONDITIONS

SECTION A. GENERAL CONDITIONS

1. BMP Plan

For purposes of this part, the terms "pollutant" or "pollutants" refer to any substance listed as toxic under Section 307(a)(1) of the Clean Water Act, oil, as defined in Section 311(a)(1) of the Act, and any substance listed as hazardous under Section 311 of the Act. The permittee shall develop and implement a Best Management Practices (BMP) plan which prevents, or minimizes the potential for, the release of pollutants from ancillary activities, including material storage areas; plant site runoff; in-plant transfer, process and material handling areas; loading and unloading operations, and sludge and waste disposal areas, to the waters of the United States through plant site runoff; spillage or leaks; sludge or waste disposal; or drainage from raw material storage.

2. Implementation

The plan shall be developed within six months after the effective date of this permit and shall be implemented as soon as practicable but not later than 18 months after the effective date of this permit condition unless a later date is specified by the Director.

3. General Requirements

The BMP plan shall:

a. Be documented in narrative form, and shall include any necessary plot plans, drawings or maps.

b. Establish specific objectives for the control of pollutants.

(1) Each facility component or system shall be examined for its potential for causing a release of significant amounts of pollutants to waters of the United States due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc.

(2) Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances to result in significant amounts of pollutants reaching surface waters, the plan should include a prediction of the direction, rate of flow, and total quantity of pollutants which could be discharged from the facility as a result of each condition or circumstance.

c. Establish specific best management practices to meet the objectives identified under paragraph b of this section, addressing each component or system capable of causing a release of significant amounts of pollutants to the waters of the United States, and identifying specific preventative or remedial measures to be implemented.

d. Include any special conditions established in Section B of this part.

e. Be reviewed by plant engineering staff and the plant manager.

4. Documentation

The permittee shall maintain the BMP plan at the facility and shall make the plan available to the permit issuing authority upon request.

5. BMP Plan Modification

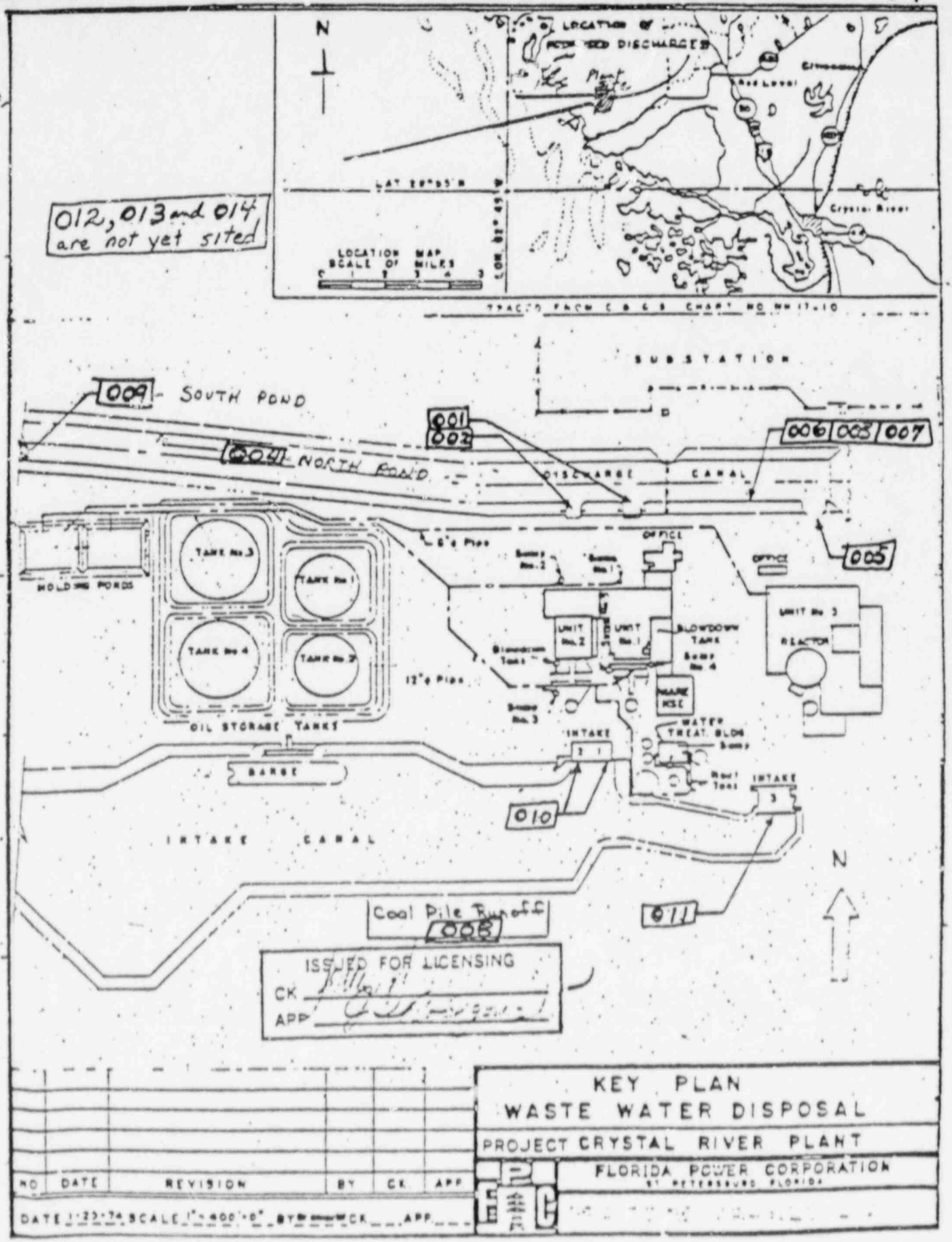
The permittee shall amend the BMP plan whenever there is a change in the facility or change in the operation of the facility which materially increases the potential for the ancillary activities to result in a discharge of significant amounts of pollutants.

6. Modification for Ineffectiveness

If the BMP plan proves to be ineffective in achieving the general objective of preventing the release of significant amounts of pollutants to surface waters and the specific objectives and requirements under paragraphs b and c of Section 3, the permit shall be subject to modification pursuant to 40 CFR 122.62 or 122.63 to incorporate revised BMP requirements. Any such permit modification shall be subject to review in accordance with the procedures for evidentiary hearings set forth in 40 CFR Part 124.

SECTION B. SPECIAL CONDITIONS

NONE.


012, 013 and 014 are not yet sited
N
LOCATION OF ASH SED DISCHARGES
LAT 28°55'N
LONG 82°45'W
LOCATION MAP SCALE OF MILES
TRACED FROM C & GS CHART NO 11410
SUBSTATION
009 - SOUTH POND
001
002
004 - NORTH POND
006
008
007
DISCHARGE CANAL
005
OFFICE
OFFICE
MOLDING PONDS
TANK No 3
TANK No 1
TANK No 4
TANK No 2
OIL STORAGE TANKS
6"ø Pipe
12"ø Pipe
UNIT No 2
UNIT No 1
BLOWDOWN TANK
UNIT No 3
REACTOR
MAINT. BLDG
WATER TREAT. BLDG
INTAKE
INTAKE
3
BARGE
010
INTAKE CANAL
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Coal Pile Runoff
006
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KEY PLAN
WASTE WATER DISPOSAL
PROJECT CRYSTAL RIVER PLANT
FLORIDA POWER CORPORATION
ST PETERSBURG FLORIDA

Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Bob Martinez, Governor Dale Twachtmann, Secretary John Shearer, Assistant Secretary

July 20, 1988

Bruce R. Barrett
Director, Water Management Division
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Barrett:

Following your request of April 14, 1988 and pursuant to Section 401 of the Federal Water Pollution Control ACT as amended (33 USC 1251, 1341), the Department hereby issues a state certification to:

Florida Power Corporation (FPC) FL0000159
Crystal River Power Plant, Units 1,2, and 3
Citrus County

an applicant for a National Pollutant Discharge Elimination System (NPDES) permit. The state certification is issued based on the following factors:

A. The applicant is an authorized discharger under applicable state laws and regulations and currently holds a valid state permit authorizing discharge to the Gulf of Mexico. This state permit is identified as IO09-100280 which expires December 31, 1988. The applicant has two additional state permits, identified as IO09-80908 and IO09-82180, authorizing dischargers from the ash ponds into the discharge canal. These permits expire on March 31, 1989 and August 31, 1989 respectively.

B. Crystal River Power Plant Units 1,2 and 3 are existing dischargers. Unit 1 began commercial operation in October 1966; Unit 2 in November 1969 and Unit 3 in March 1977. The thermal component of the discharges from these three units is subject to compliance with Florida Water Quality Standards. Section 17-3.050 of the Florida Administrative Code (F.A.C.) provides that heated water discharges "shall not increase the temperature of the RBW [receiving body of water] so as to cause substantial damage or harm to the aquatic life or vegetation therein or interfere with the beneficial uses assigned to the RBW." Section 316(a) of the Clean Water Act (the Act) allows the Regional Administrator to impose alternative and less stringent thermal limitations after demonstration that the water quality standards limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving water. FPC filed an

application under Section 316 of the Act and subsequently conducted an approved biological study in an attempt to demonstrate a variance from the Florida Water Quality Standards should be granted. Section 17-3.050 F.A.C. authorizes the state proceedings for this demonstration to be conducted jointly with those of the federal government under 316(a) of the Clean Water Act.

C. On December 18, 1986, EPA issued a public notice of tentative determinations that the thermal discharge from Units 1,2, and 3 had caused substantial damage and that, therefore, in accordance with Section 17-3.05(1)(a)(3) of the F.A.C., appropriate NPDES permit limitations on the thermal component were those consistent with off-stream cooling. Such limitations would satisfy requirements of both the Florida Water Quality Standards and Sections 316(a) and (b) of the Act. EPA and the Department jointly conducted two public hearings in February 1987. At that time, FPC proposed to extend the discharge canal into deeper water as an alternative to off-stream cooling facilities. On March 1, 1988, FPC offered a second proposal including the construction of helper cooling towers. Under this proposal, the plant discharge temperature will not exceed 96.5° Fahrenheit (as a three-hour average) nor an instantaneous maximum temperature of 97.0°F at any time. FPC also proposes a 15 percent reduction in plant flow during the months of November through April, construction and operation of a fish hatchery, and a program to monitor seagrass recovery and to plant seagrass if inadequate natural recovery occurs.

D. In determining off-stream cooling or other approved alternate methods for reducing the thermal discharge, Section 17-3.05(1)(a)(3) F.A.C. requires the Department to consider the nature and extent of the existing damage, the projected lifetime of the existing discharge, and any adverse economic and environmental impacts. Based on this provision, the Department evaluated the FPC proposal of March 1, 1988 and supported it at the public hearing of June 22, 1988. Therefore, the Department concurs with the proposed NPDES permit conditions.

E. On June 13, 1988, FPC filed applications for renewal of state permits consistent with the provisions of the NPDES draft permit and has petitioned the Department for a mixing zone for chlorine discharged from Outfalls 001, 002, and 005 (condenser cooling water). FPC has also requested a mixing zone for oil and grease

discharged from Outfalls 004, 006 (which includes Outfalls 003 and 007), and 009. The Department has determined FPC's request for mixing zones for chlorine and oil and grease to be appropriate. Upon its renewal, the Department will include in the state permit mixing zones for chlorine and for oil and grease which are contained in the attached Table 1 and are made part of this state certification. The Department concurs with the mixing zone provision contained in the draft NPDES permit for arsenic, iron, nickel, and selenium in the ash pond discharge Outfalls 004 and 009. This mixing zone provision, which is in the current State permit, will be included when the state permit is renewed.

The State of Florida certifies that on compliance with the above conditions, the facility will meet the provisions of Sections 301, 302 and 303, of the Federal Water Pollution Control Act as amended.

This state certification will also be applicable to any subsequent changes to the draft NPDES permit so long as such changes do not cause the requirements to be less stringent than the state requirements as enumerated in Items B, C,D,and E above; however, the Department reserves the right to modify the effluent limitations placed on this facility pursuant to federal and state law, should further water quality analysis of the proposed discharge, its volume and character, together with the flow and characteristics of the receiving body of water, indicate that the discharge will not meet and comply with applicable water quality standards contained in Chapter 17-3, Florida Administrative Code.

The correct address for submission of Florida's copy of the Discharge Monitoring Report is:

Florida Department of Environmental Regulation
Southwest District
4520 Oak Fair Boulevard
Tampa, Florida 33610

FILING AND ACKNOWLEDGEMENT

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

Clerk Date

Sincerely,

Richard M. Harvey
Deputy Director
Division of Water Facilities

RMH/mlj

cc: Dr. Patsy Baynard, FPC
Dr. Richard Garrity, DER

Table 1

Florida Power Corporation
Crystal River Power Plant
Units 1, 2, and 3

FL0000159
July 20, 1988

Parameter(s)	Outfall(s)	Mixing Zone
Chlorine	001, 002 and 005	700 feet downstream and 100 feet upstream from each Outfall
Oil and Grease	004, 006 and 009	400 feet downstream and 100 feet upstream from each Outfall
Arsenic, iron, nickel, and selenium	004 and 009	400 feet downstream and 100 feet upstream from each Outfall

NOTE: A DOUBLE BAR IN THE RIGHT MARGIN INDICATES THAT A CHANGE HAS BEEN MADE TO THE DECEMBER 18, 1986, FACT SHEET IN THE LINE SO DESIGNATED (excludes page number changes and changes to permit pages.) MINOR CHANGES ARE UNDERLINED ALSO. A single bar with asterisk indicates a change to the May 19, 1988, Fact sheet. *

FACT SHEET

APPLICATION FOR
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT TO DISCHARGE TREATED WASTEWATER
TO U.S. WATERS

Application No: FL0000159
Proposed Permit Period: 5 years

Date: May 19, 1988
Revised: September 1, 1988 *

1. SYNOPSIS OF APPLICATION

a. Name and Address of Applicant

Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

FOR

Crystal River Power Plant
Units 1 - 3
Citrus County, Florida

b. Description of Applicant's Operation

Generation, transmission, and distribution of electricity generally falling under Standard Industrial Classification 4911. Plant fuel is coal (Units 1 and 2) and nuclear (Unit 3).

c. Production Capacity of Facility

Number of Units - 3 [Units 4 and 5 have a separate permit (FL0036366)]
Largest Unit (megawatts - 890.5)
Nameplate rating (megawatts - 1854.8)

d. Applicant's Receiving Waters

Gulf of Mexico. For a sketch showing the location of the discharge(s), see Attachment A.

e. Description of Existing Pollution Abatement Facilities

Once through condenser cooling water for all three units (Outfall Serial Numbers (OSN) 001, 002 and 005) and nuclear auxiliary cooling water (OSN 006) is passed through bar racks and intake screens, chlorinated (except for OSN 006), and discharged to the site discharge canal. Water used to sluice ash from Units 1 and 2 is treated in ash ponds (OSN 004 and 009) with effluent to the site discharge canal. Rainfall runoff from the coal pile is treated in a pond which infrequently discharges to adjacent tidal marshes (OSN 008). Debris from the intake is disposed of by landfill and wash water is returned to the plant intake canal (OSN 010A, 010B, and 011 serving Units 1, 2, and 3, respectively). Evaporation/percolation ponds are provided for all other wastes from Units 1 and 2. Non-radioactive wastes and radwaste from Unit 3 (OSN 003 and 007) are treated (neutralization, settling, filtration and/or oil removal) and discharged to OSN 006.

NOTE: The radioactive component of the Unit 3 discharges is regulated by the U.S. Nuclear Regulatory Commission under the Atomic Energy Act and not by the U.S.E.P.A. under the Clean Water Act.

Organism	96-hr LC_{50} (ug/1)
Shore Crab	1418
Pacific herring	65
Atlantic Silverside	37
Tidewater Silverside	54
Shrimp	90
Shrimp (sand)	134
Hermit Crab	102
Hermit Crab	211
Naked goby	80
Stickleback, Threespine	167
Spot	90
Grass Shrimp	220

Selected organisms do not include Mysidopsis bahia or similar fish food organisms, since these organisms could only be present in the site discharge canal after passage through the plant.

(3) Limitation for TRO. For consistency with Florida Water Quality Standards requirements, TRO is limited to 50 ug/1 (0.05 mg/1) in 001, 002, 005, 012, and 013. However, if no mixing zone is established by FDER, the limit will be 0.01 mg/1. Discharge of TRO is limited to 120 minutes per day to assure compliance with §423.12 and 423.13.

D. Intake Screen Backwash. No discharge of oil is permitted, with no other limitations or monitoring required, based on BPJ. Landfill disposal is required for the debris removed by bar racks and baskets.

II. INTERIM LIMITATIONS OSN 001, 002, and 005 (once through cooling water from Units 1, 2, and 3, respectively) and 010A, 010B, and 011 (intake screen backwash) after completion of the flow minimization system but before completion of helper cooling towers (see permit page I-2).

A. Flow. See Item 6.b.I.A.

B. Discharge Temperature. Unchanged from the previous permit.

C. Temperature Rise. Unchanged from previous permit. Individual unit temperature rise limitations are deleted when the flow minimization system is operational.

D. Total Residual Oxidants. Limited to 0.01/0.05 mg/1. Addition of chlorine is limited to two hours per day per unit. In a once through cooling system, time of addition is virtually equal to time of discharge, but is easier to monitor. Also see Item 6.b.I.C.

E. Intake Screen Backwash. See Item 6.b.I.D.

III. INITIAL LIMITATIONS OSN 001, 002, and 005 (once through cooling water from Units 1, 2, and 3, respectively) and 010A, 010B, and 011 (intake screen backwash) until implementation of the flow minimization system (see permit page I-1).

A. Flow. Combined condenser flow from Units 1, 2, and 3 is limited to 1,318,000 gallons per minute, the reported value.

B. Discharge Temperature. Unchanged from the previous permit.

C. Temperature Rise. Unchanged from previous permit.

D. Total Residual Oxidants. Limited to 0.01/0.05 mg/l. Addition of chlorine is limited to two hours per day per unit. In a once through cooling system, time of addition is virtually equal to time of discharge, but is easier to monitor. Also see Item 6.b.I.C.

E. Intake Screen Backwash. See Item 6.b.I.D.

IV. OSN 003 (an internal waste stream) - Laundry and Shower Sump Tank discharge to OSN 006 (see permit page I-4). Limitations for O&G and TSS are as required by §423.12(b)(3) for "low volume waste sources." Any treatment and discharge of "metal cleaning wastes" through this OSN is subject to total iron and total copper limitations as required by §423.12(b)(5) and 423.13(e). Limitations for pH are applied at OSN 006.

V. OSN 004 and 009 - Ash Pond Discharges (see permit page I-5).

A. TSS, O&G, and pH. Limitations for O&G and TSS are as required by §423.12(b)(4) for "fly ash and bottom ash transport water" and for O&G as required by FDER Permits IO09-80908A and IO09-82180A. Modification dates for these permits are both December 24, 1987 and expiration dates are March 31, 1989 and August 31, 1989, respectively. Limitations for pH are as required by FAC §17-3.121.

B. Toxic Substances and Water Quality Criteria (See Item 6.b.I.C(2). Limitations consisistent with water quality standards criteria and the assigned mixing zone have been included in the permit for arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, and zinc as provided in FDER Permits IO09-80908A and IO09-12180A. See Table I for a synopsis of effluent data.

VI. OSN 006 - Nuclear Services and Decay Heat Seawater System discharge to the Plant Discharge Canal to the Gulf of Mexico (includes internal waste streams OSN 003, 007, the Evaporator Condensate Storage Tank (ECST) discharge, the Condensate System (CD) discharge, and once through cooling water) [see permit page I-6].

A. Total Residual Oxidants. Limited to 0.01/0.05 mg/l. Addition of chlorine is limited to that which is associated with OSN 005, since water for OSN 006 may receive samll amounts of chlorine when OSN 005 is chlorinated due to the proximity of the pumps for OSN 005 and 006.

B. pH. Limitations for pH are as required by FAC §17-3.121.

C. Limitations for ECST and CD (internal waste streams). O&G and TSS are as required by §423.12(b)(3) for "low volume waste sources." Any treatment and discharge of "metal cleaning wastes" through this OSN is subject to total iron and total copper limitations required by §423.12(b)(5) and 423.13(e). Limitations for pH are applied at OSN 006.

Note: The radioactive component of this discharge is regulated by the U.S. Nuclear Regulatory Commission under the Atomic Energy Act and

VII. OSN 007 (internal waste stream) - Regeneration Waste Neutralization Tank (SDT-1) to OSN 006 (see permit page I-7). Limitations for O&G and TSS are as required by §423.12(b)(3) for "low volume waste sources." Any treatment and discharge of "metal cleaning wastes" through this OSN is subject to total iron and total copper limitations required by §423.12(b)(5) and 423.13(e). Limitations for pH are applied at OSN 006.

Note: The radioactive component of this discharge is regulated by the U.S. Nuclear Regulatory Commission under the Atomic Energy Act and not by the U.S.E.P.A. under the Clean Water Act.

VIII. OSN 008 - Coal pile runoff (Units 1 and 2) to marsh area (see permit page I-8). Limitation for TSS is as required by §423.12(b)(9) and (10). Limitation for pH is as required by FAC §17-3.121.

IX. Storm water from diked petroleum storage or handling areas (see permit page I-9). Requirements established by best professional judgement.

7. CHRONOLOGY OF PERMIT ISSUANCE/REISSUANCE

a.	Initial permit issuance with expiration date of 02/18/80 -------	12/31/74
b.	Permit modification requiring conduct and reporting of biological studies in accordance with CWA §316(a) and (b) ------	07/09/79
c.	Application for permit reissuance submitted ----------	08/30/79
d.	Permit expiration (permit remains effective until reissuance under the Administrative Procedures Act) ----------	02/18/80
e.	Revised application and summary of changes ----------	09/11/85
f.	Biological report submitted ----------	01/31/86
g.	FPC proposal of mitigative measures only ----------	08/21/86
h.	Public notice of tentative determinations and proposed permit reissuance (required off-stream cooling) ----------	12/18/86
i.	Public hearing, Clearwater, FL (alternate proposal to extend the discharge canal made by FPC) ----------	02/03/87
j.	Public hearing, Crystal River, FL (alternate proposal to extend the discharge canal made by FPC ----------	02/04/87
k.	Public notice extending comment period ----------	03/12/87
l.	Additional information provided on the canal extension proposal as requested by EPA and FDER ----------	04/17/87
m.	Alternate proposal submitted by FPC (helper cooling towers to achieve 98°F discharge temperature, reduce plant intake flow, and hatchery construction and operation)----------	08/25/87
n.	Additional information provided as requested by EPA and FDER ---	01/27/88
o.	Alternate proposal modified per EPA and FDER concerns [discharge temperature of 96.5°F (as 3-hour average) and seagrass monitoring/planting program] ----------	03/01/88
p.	News release of EPA/FDER/FPC tentative agreement on control measures to be required ----------	03/09/88
q.	Public notice ----------	05/19/88 *
r.	Public hearing, Crystal River, Florida ----------	06/22/88 *

TABLE 1

CRYSTAL RIVER UNITS 1 AND 2
Heavy Metals in Ash Pond Discharges

Parameter	Ash Pond Effluent OSN 009 (1) No. Obs.	Median Value	Max. Value	2nd High	Water Quality Criteria (2)
Arsenic, ug/l	16	35	147	104	50 (3),(4)
Cadmium, ug/l	16	1	3	3	5
Chromium, ug/l	16	16	38	35	50 (3)
Copper, ug/l	16	7	17	13	15
Iron, ug/l	16	355	440	380	300 (4)
Lead, ug/l	16	<5	<5	<5	50 (3)
Mercury, ug/l	16	<0.15	<0.15	<0.15	0.1
Nickel, ug/l	16	13	19	18	100 (4)
Selenium, ug/l	16	22	71	67	25 (4)
Zinc, ug/l	16	45	59	59	1000 (3)

(1) Data for the period April 1985 through July 1986. During this period, ash pond OSN 004 was not used. Heavy metals in OSN 004 will be similar during periods of operation.

(2) Section 17-3.121, Florida Administrative Code, except as otherwise noted.

(3) Section 17-3.061, F.A.C.

(4) Applicable at the edge of the assigned mixing zone.

NOTE: Limitations for OSN 004 and 009 included in FDER Permits IO09-80908A and IO09-82180A (and the redrafted NPDES permit) generally are those in the last column, above. Modification dates for these permits are both December 24, 1987, and expiration dates are March 31, 1989, and August 31, 1989, respectively.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV

In The Matter Of	)	NPDES Permit No. FL0000159
	)	
Florida Power Corporation	)	
Crystal River Power Plant	)	Findings and Determinations
Units 1, 2, and 3	)	Pursuant to 33 U.S.C. §1326
Citrus County, Florida	)	

Statutory and Regulatory Authority

Section 301(b)(1)(c) of the Clean Water Act (CWA), 33 U.S.C. §1311(b)(1)(c), requires that National Pollutant Discharge Elimination System (NPDES) permits contain sufficient limitations ". . .to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations. . .". Environmental Protection Agency (EPA) regulations implementing the above statutory provision are found at 40 C.F.R §122.44(d).

Pursuant to the above authorities, EPA must apply the following requirements for thermal surface water discharges found in §17-3.05(1) of the Florida Administrative Code (FAC) in issuing an NPDES permit, unless a variance is granted under §316(a) of the CWA, 33 U.S.C. §1326(a), (see discussion below):

(a) Heated water discharges existing on July 1, 1972: 1/

1. Shall not increase the temperature of the RBW [receiving body of water] so as to cause substantial damage or harm to the aquatic life or vegetation therein or interfere with beneficial uses assigned to the RBW,

2. Shall be monitored by the discharger to ensure compliance with this rule, and

3. If the Department, pursuant to notice and opportunity for hearing, finds by preponderant evidence that a discharge has caused substantial damage, it may require conversion of such discharge to offstream cooling or approved alternate methods. In making determinations regarding such conversions, the Department may consider:

1/ The definition of "existing discharge" found at §17-3.05 (1)(c)(iv) of the FAC includes any thermal discharge which was under construction or for which a construction or operation permit was issued prior to the effective date of the rule.

a. The nature and extent of the existing damage;

b. The projected lifetime of the existing discharge;

c. Any adverse economic and environmental (including non-water quality) impacts which would result from such conversion; and

d. Such other factors as may be appropriate.

Under §316(a) of the CWA, EPA may impose alternative effluent limitations with respect to the thermal component of a point source discharge ". . .whenever the owner or operator of any such source. . .can demonstrate to the satisfaction of the Administrator. . .that any effluent limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made. . .".

The CWA at §316(b), 33 U.S.C. §1326(b), requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

Factual Background

On December 31, 1974, EPA issued a permit to the Florida Power Corporation (FPC) for its Crystal River Power Plant, Units 1, 2 and 3, which permit required offstream cooling subject to consideration of a variance and alternative limits under §316(a). Since the Agency found that adequate data were not available to determine whether alternative limits for the thermal component could be allowed, the §316(a) determination was deferred pending the completion of adequate engineering and biological studies. FPC requested an adjudicatory hearing on the permit in January, 1975.

In settlement of the hearing request, EPA issued a modified permit on July 9, 1979, with an effective date of July 23, 1979 and an expiration date of February 28, 1980. The Florida Department of Environmental Regulation (FDER) certified the permit on February 7, 1979. The modified permit imposed a discharge flow limitation of 100 MGD subject to implementation or modification consistent with the Regional Administrator's final §316 determination. (The current discharge is 1898 MGD). The permit also contained a schedule of compliance which required, among other things, thermal/biological post-operational monitoring (following the start-up of Unit 3) and

§316(a) and §316(b) studies. Further, the permit stated that [b]ased on these [§316(a) and §316(b)] studies, the Regional Administrator shall make a determination as to the possible need for procedure modification, facility construction, reduced thermal discharge or reduced intake flow."

On August 30, 1979, prior to the expiration date of its modified permit, FPC submitted a permit renewal application to EPA. Until now, EPA has not acted on that application; however, pursuant to the Administrative Procedures Act, the previous permit remains effective until EPA reissues a permit to FPC.

In January 1985, FPC submitted its final report of the §316(a) and §316(b) studies which were required by its July 23, 1979, modified permit and which were conducted from June 1983 to August 1984. On September 11, 1985, FPC submitted an updated version of its August 30, 1979 renewal application. FPC submitted a proposal for certain mitigation measures on August 21, 1986. These included: creation of marshes, planting of seagrasses, construction and operation of a hatchery, and conduct of a monitoring program. On January 23, 1987, FPC submitted an alternative proposal to extend the existing discharge canal. Additional information regarding that proposal was provided on April 17, 1987. FPC proposed a second alternative plan on August 25, 1987 comprising the installation of helper cooling towers 2/, reduction of intake flow and hatchery construction and operation. Additional information was provided on January 27, 1988, and the proposal was modified on March 1, 1988 to include a seagrass monitoring and planting program and a limitation on plant operations to maintain a three-hour average temperature not to exceed 96.5° F and an instantaneous maximum temperature not to exceed 97.0° F.

2/ In the proposed helper cooling tower system, a portion of the plant's heated effluent will be cooled and returned to the discharge canal where it will mix with the remainder of the uncooled effluent. In a recirculating (offstream or closed cycle) cooling tower system, the entire volume of thermal effluent is cooled (with the exception of a relatively small amount of "blowdown", which is discharged to maintain an acceptable chemical equilibrium in the towers), recycled to the plant for reuse, and subsequently returned to the towers for additional cooling. Recirculating cooling towers for Units 1, 2, and 3 would reduce the plant intake flow by approximately 85% (85% of the water is recirculated and 15% is evaporated or blown down). No reduction in intake flow occurs with the proposed helper cooling towers.

Findings of Fact and Determinations

Pursuant to §316 of the CWA and under authority delegated by the Regional Administrator on March 15, 1985, the Director of the Water Management Division, Region IV, Environmental Protection Agency makes the following findings relative to the Crystal River Power Plant, Units 1, 2 and 3:

1. The Crystal River generating facility is located adjacent to Crystal Bay, an estuarine nursery area between the community of Crystal River and the Cross Florida Barge Canal. At this facility, the Florida Power Corporation operates five generating units. Historically these units were placed into operation in the following sequence:

   Unit 1, 1966
   Unit 2, 1969
   Unit 3, 1977
   Unit 4, 1982
   Unit 5, 1984

   Units 4 and 5 employ closed cycle cooling with the use of natural draft cooling towers, whereas, Units 1, 2 and 3 each rely on once-through flow for cooling the condensers.

2. A combined daily flow of 2936 cfs (1898 MGD) is required for the cooling systems of the two coal-fired units (Units 1 and 2) and the nuclear unit (Unit 3). Approximately 50 percent of the total flow is directed to the nuclear unit. Water for the once-through mode of operation is drafted from an intake channel extending westerly into Crystal Bay. Separating the intake channel from the discharge area of the facility is a seven-mile long dike which flanks the northern side of the intake channel. This channel also serves barge traffic for the delivery of coal to the plant site. Heated water from the condenser cooling systems is returned to the bay on the northern side of the seven-mile dike.

3. From June 1983 through August 1984, FPC conducted §316(a) and §316(b) studies according to a plan of study approved by EPA and FDER. The operational effects of Units 1, 2 and 3 on the marine biota of Crystal Bay were the subject of those studies.

4. Seasonally, the maximum temperature regime for the area of Crystal Bay supplying water for condenser flow occurred in mid-July to mid-August. Temperatures of inshore and offshore waters not impacted by the thermal plume at this time averaged about 86°F with maximum ranges of about 84.2°F to 89.6°F. Maximum average 24-hour discharge temperatures at the point of discharge (POD) were in the range of 102.9°F to 103.8°F.

8. A representative view of the plume dimension for the period of seasonally maximum temperature was depicted in the records of intensive temperature sampling of August 13, 1983. At this time Units 1, 2 and 3 were operating at 77 percent of maximum thermal output. The average 24-hour discharge temperature was 99°F. The seaward boundary of the plume (87.8°F isotherm) extended approximately 2.8 miles offshore of the POD and encompassed approximately 2100 acres (3.3 square miles) of bay bottom. At 100 percent capacity, water temperatures within the 2100 acres of the plume would be equal to or greater than 91.8°F.

6. Seagrass and attached macroalgal communities were adversely impacted by heated water discharges from Units 1, 2 and 3. Within a 2-mile radius of the POD, an area of approximately 1100 acres of bay bottom was shown to be virtually barren of attached seagrasses and macroalgae. This area of severe thermal impact represented nearly a three-fold increase in the acreage of barren bay bottom since Unit 3 was placed into operation in 1977.

7. The benthic community of macroinvertebrates living upon and within the sediments of Crystal Bay were adversely impacted in a 3000-acre zone of the discharge area. The benthic impact was attributed to the following:

   a. Thermal stress;

   b. Reduction and loss of attached seagrass and macroalgal habitat;

   c. Siltation resulting from materials carried in the discharge plume as well as wind and discharge induced turbulence acting upon the bay bottom which has lost the stabilizing benefits of attached macroalgae and seagrasses.

8. The Crystal Bay region associated with the power station was shown to be a spawning and nursery area for numerous species of fish and shellfish. These species included animals of recreational, commercial, and forage value.

9. Trawl and seine sampling studies show that during much of the year over 50 percent of fish and invertebrate species normally indigenous to Crystal Bay are excluded from the thermally impacted area.

10. Annual impingement of finfish and shellfish species having recreational, commercial and/or forage value approximated 23 tons including 3.4 tons of pink shrimp and 14.3 tons of blue crab. No system is provided for the return of viable organisms to the bay.

11. The entrainment of fish eggs and larvae of fish and shellfish by Units 1, 2 and 3 was considerable. Annual entrainment involved billions of animals most of which were anchovies and crustaceans, i.e. stone crab, Callinectes crabs, and penaeid shrimp. The Callinectes crab includes the commercially important blue crab and the penaeid shrimp classification includes the three commercially important white, brown, and pink shrimp.

12. The FPC modeling efforts to forecast the effects of entrainment on adult populations of fish and shellfish at large are flawed and provide an inadequate basis to judge the full impact of entrainment on fishery resources.

13. Section 17-3.05(1)(a) of the FAC is applicable to discharges existing on July 1, 1972 or under construction prior to that date. Units 1 and 2 were in operation on that date and Unit 3 was under construction prior to that date, therefore, that section applies to the Crystal River Power Plant discharge from those units.

Based upon the above authorities and findings, I hereby determine the following:

1. The §316(a) and §316(b) studies conducted by FPC were sufficient to demonstrate significant adverse biological effects associated with the siting and operating of Crystal River Units 1, 2 and 3.

2. Approximately 3000 acres (4.7 square miles) of Crystal Bay are adversely affected by the thermal discharge from the facility. Within this 3000 acres, at least 800 acres (1.2 square miles) of seagrass and attached macroalgal communites have been destroyed because of the excessive temperatures created by the operation of Units 1, 2 and 3. An additional 300 acres (0.5 square miles) were barren at the start of the §316 studies, all or a portion of which was due to the previous operation of Units 1 and 2. In addition, major components of locally indigenous fish and invertebrate species are excluded from the thermally impacted area.

3. The §316(a) study demonstrates that the existing thermal discharge has caused substantial damage in Crystal Bay in violation of the FAC at §17-3.05(1)(a). The draft permit proposed on December 18, 1986 contained effluent limitations which were consistent with installation of an off-stream cooling system, such as recirculating cooling towers, on Units 1, 2, and 3. Those limitations would have assured compliance with the FAC and would have been consistent with §316(a).

4. The FPC proposal to install helper cooling towers will produce a maximum instantaneous discharge temperature of 97.0° F. and a maximum three-hour average temperature of 96.5° F. The helper cooling towers are expected to return the discharge area to the approximate thermal levels in existence prior to the operation of Unit 3 beginning in 1977. The thermal discharge from Units 1 and 2 is known to have impacted an area not greater than 300 acres of bay bottom. Based on an evaluation of new information submitted by FPC, I have tentatively determined that the thermal effluent limitations proposed in the December 18, 1936 draft permit were "more stringent than necessary to assure the protection and propagation of a balanced indigenous population of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made. . .". Accordingly, the previous tentative determination to deny the request for a §316(a) variance is hereby revised. I have tentatively determined that a variance for a 300-acre area would assure the protection and propagation of a balanced, indigenous population in Crystal Bay.

5. The level of entrainment and impingement demonstrated by the §316(b) study constitutes an adverse impact to the biota of Crystal Bay and environs. The intakes of the Crystal River Power Plant are located in an estuarine nursery area. The capacity of Units 1, 2 and 3, based on a once-through cooling mode, is 2936 cfs (1898 MGD). There are no design features incorporated in the facility which would minimize impact of the large volume of flow (capacity) and poor location. The location, capacity and design of Crystal River Units 1, 2 and 3 do not reflect the best technology available for minimizing adverse impacts as required by §316(b) of the Clean Water Act.

6. Helper cooling towers will not reduce the present intake flow or the entrainment of aquatic organisms associated with that flow. However, the proposed reduction in plant intake flow during the months of November through April will proportionately reduce entrainment during that period. Installation of closed cycle cooling towers would reduce entrainment damage by about 85 percent, however, the increased cost (about $150 million more that the system proposed by FPC) is considered to be wholly disproportionate to the environmental benefits to be derived.

7. To minimize the adverse impact of the Crystal River Plant intake structures, installation of fine mesh screens and a return mechanism (similar to that in operation at the Big Bend Station in Tampa) would constitute best available technology under §316(b) of the Act. However,

this modification is not considered to be technically feasible due to the use of the intake canal for coal delivery. Ambient silt from the Gulf of Mexico, which settles in the intake canal and is resuspended by coal barges, would collect on the intake screens (0.5 mm mesh would be necessary to remove fish eggs and larvae). Even if silt did not clog the screens and render them inoperable, return of the removed solids to Salt Creek (necessary for return of aquatic organisms at the Crystal River site) would cause unacceptable siltation in the small creek.

8. No other practical technological modification of the cooling water intake structures is available which would minimize the environmental impacts to an acceptable level. Therefore, I have tentatively determined that (1) reduction of plant flow by 15 percent during the months of November through April, in conjunction with, (2) construction and operation of a fish hatchery over the remaining operating life of the three units (in an attempt to replace fish and shellfish eggs, larvae, and juveniles entrained by the plant) will constitute minimization of the environmental impacts of the cooling water intake as required by Section 316(b) of the Act for the Crystal River Power Plant, Units 1, 2 and 3.

DATE: SEP 1 1988

Bruce R. Barrett

BRUCE R. BARRETT, Director
Water Management Division

September 1, 1988

RESPONSE TO COMMENTS
CRYSTAL RIVER POWER PLANT
UNITS 1, 2, AND 3
NPDES NO. FL0000159

I. Response to Permittee and Public Comments, June 22, 1988 Public Hearing ---------- 6 pages

II. Response to Written Comments ---------- 8 pages

September 1, 1988

RESPONSE TO
PERMITTEE AND PUBLIC COMMENTS
PUBLIC HEARING, JUNE 22, 1988
CRYSTAL RIVER POWER PLANT
UNITS 1, 2, AND 3
NPDES NO. FL0000159

1. Dr. Patsy Baynard, Florida Power Corporation (FPC), Hearing Transcript pages 12-18.

   A. pp 12-14. Introduction of self, responsibilities for FPC, FPC service area, site location and unit description, and permitting history.

Response: Comments noted.

   B. p 14. Disagreement on study results: area affected, previous presence of seagrass, absence of substantial damage, and sufficiency of existing permit limitations.

Response: In terms of the area affected by the thermal plume, the EPA estimate of 2100 acres is very conservative in favor of the power plant. Even a cursory examination of various data sets shows that the plume frequently encompasses almost the whole area between the barge canal spoil islands and intake dike and extends westward beyond the westernmost end of the dike and spoil islands -- an area in excess of 5000 acres. Furthermore, the data show that temperatures exceeding the thermal death point of indigenous organisms encompass areas in excess of 3000 acres.

Furthermore, a 1972-1974 study (sponsored by FPC) clearly demonstrates the presence of extensive acreages of seagrass and macroalgae in the discharge area prior to the operation of Unit 3. With the operation of Unit 3, nearly 800 acres of seagrasses and macroalgae have been eliminated from Crystal Bay. FPC disagreement with the EPA determination of substantial damage is noted.

   C. pp 15-18. Described FPC proposal relating to construction and seasonal operation of helper cooling towers (indicated possible locations and indication of no expected significant off-site salt drift effects), seasonal flow reductions, construction and operation of a fish hatchery, seagrass monitoring and planting program. Provided cost estimate of between $80 and 100 million.

Response: Comments noted.

2. Ms. Helen Spivey, President, Crystal River City Council, speaking as a private citizen, pp 34-35. Asked questions relating to copper in oysters, impact of discharge on manatees, and personal observations of "pigs" (mechanical condenser cleaning balls) in the discharge area.

Response: Answers provided by Mr. Charles Kaplan of EPA.

3. Mr. Dixie Hollins, Executive Vice President, Hollins Corporation, pp 37-39.

   A. pp 37-38. Introduced self and Corporate holdings and activities.

Response: Comments noted.

B. p 38. Indicated concern with salt water drift impacts on planted pines, hardwood hammocks, magnolias, and other vegetation on the Hollinswood Ranch property over the long-term, rather than on short-term observations.

Response: EPA has conducted an independent assessment[1] of salt deposition impacts and concluded that there should be no long term significant impacts to the vegetation. EPA evaluated vegetation types reported as ranging from very tolerant to intolerant and divided into two plant community types: overstory/understory (e.g. live oaks, pine trees) and shrubs and herbaceous species (e.g. holly bush, marsh grass). The EPA analysis utilized a worst case scenerio which was more critical than that used by FPC[2] and assessed potential impacts using short-term drift deposition rates (one to 10-day periods) as if they were occurring continuously over the entire four-month summer period of helper tower operation.

The majority or the species that make up the overstory/understory in the Crystal River site area are high and moderate resistance plants with the majority of the low resistance species located in the groundcover layer of the plant community[2]. This includes the areas containing planted pine, hardwood hammocks, and magnolia. The Crystal River area contains a negligible amount of salt intolerant vegetation[2].

The potential damage to vegetation has been divided into two types of damage; threshold damage and 50% leaf damage. Threshold damage is when the plant being impacted begins to show signs of stress. Threshold damage caused by salt deposition is difficult to identify in field studies because there are usually other sources of stress impacting the vegetation. The 50% leaf damage level of stress caused by salt deposition is evidenced by 50% of the leaves of the plants being damaged. Necrosis is a common a sign of salt damage.

The planted pine located in areas that will receive salt deposition from the cooling towers have been identified as slash pine[2]. Salt sensitivity data on slash pine is not available; however, Virginia pine is a moderate resistance species and pitch pine is a high resistance species[2]. The EPA assessment assumed slash pine to be a moderate resistance species. Salt sensitivity data is not available for magnolia trees. However, the physical charecteristics (a tall plant species with waxy leaf surfaces and hard cuticle) of magnolias are common to species with moderate or high salt resistance[2]. EPA assumed magnolias to be a moderate resistance species.

Area I (See Figure 1) is a 15-20 acre portion of land that will receive the greatest salt deposition not on FPC property. The vegetation in Area I is coastal and coastal hydric hammock. The upper levels of vegetation in Area I are mostly high resistance species. These taller plants will receive the majority of the salt deposition and will shield the low-lying vegetation from the salt deposition. The low resistance species are most common in the groundcover level of vegetation. The salt deposition has the potential of causing 50% leaf damage to low resistance species; however, the shielding effect of the tall vegetation will reduce the amount of salt deposited on the low resistance species and the associated damage to those species. There may be threshold damage to moderate resistance species in Area I. However, this potential damage should not be observable.

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[1] U.S. Environmental Protection Agency, Office of Policy and Management, Region IV, Assessment of Salt Deposition Impacts at Crystal River, August 31, 1988.

[2] KBN Engineering and Applied Sciences, Inc., Environmental Assessment of Salt Drift Impacts from Florida Power Corporation Crystal River Plant, June 1988.

The largest area of impact, Area II, is 250-300 acres that is comprised of plant communities that have an overstory/understory, except for the freshwater marshes. The overstory/understory species, being taller than the groundcover vegetation, will receive a majority of the salt deposition, thus shielding the low-lying species. The salt deposition has the potential of causing 50% leaf damage to low resistance species. However, the shielding effect of the taller vegetation will reduce any potential impacts from salt deposition. There may be occasional threshold damage to moderate resistance species, although this damage should be unobservable.

There are about five acres of freshwater marshes in Area II that do not contain a canopy and will receive the full salt deposition. The species in the freshwater marshes are about one third of each low, moderate, and high resistance species. The salt deposition may cause damage to the low resistance species which might result in a shift of the plant population toward a higher percentage of more salt tolerant species. There should be no observable impacts north of Area II.

C. p 38. Opined the need to extend the established FPC salt drift impact monitoring program onto Hollins property to determine any build-up prior to damage becoming apparent.

Response: Although no impacts to soil and freshwater are expected, EPA plans to modify the existing NPDES and PSD permits for Units 4 and 5 in the near future. FPC will be required to increase the number of deposition and vegetation monitoring stations included in the approved monitoring program to include a representative number of hammock areas and freshwater marshes. The monitoring program will also be modified to include initiation of soil and freshwater sampling to establish baseline salt concentrations, measure future concentrations, and evaluate changes which could impact vegetation prior to the impacts becoming visibly evident. Additionally permit conditions will require FPC to continue its evaluation of impacts and to implement corrective actions if significant damage occurs. Such action could include the installation of more efficient drift eliminators.

D. p 38. Questioned who would be liable if damage occurred.

Response: Florida Power Corporation.

E. pp 38-39. Opined that existing damage should be accepted rather than risking thousands of acres of forest.

Response: Over 800 acres of aquatic habitat will be improved to meet Florida Water Quality Standards requirements by the proposed action. Potential, though not expected to be observable, impacts to land offsite from FPC property would be limited to an area of not more than 300 acres. The Clean Water Act (CWA) requires compliance with Florida Water Quality Standards, and EPA cannot issue a permit which will not meet those standards unless a variance is granted under Section 316(a) of the CWA, which is applicable to thermal discharges only. That section provides that any alternative limitations on the thermal component of the discharge must assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the body of water into which the discharge is made. It follows that EPA cannot issue a permit which does not address the damage caused by the discharge. See, Decision of the General Counsel

No. 58, In Re Bethlehem Steel Corporation, March 29, 1977 (the Administrator must independently interpret and apply state water quality standards to ensure compliance with Section 301(b)(1)(c) of the CWA). EPA has tentatively determined that the alternative thermal limitations associated with helper cooling towers are consistent with Section 316(a) and Florida Water Quality Standards requirements. Also see previous responses.

4. Ms. Virginia Splitt, p 39. Objected to hearing procedures which preclude the immediate resporse to questions.

Response: Opening statement by Mr. Bruce Barrett of EPA (as well as materials previously mailed to Ms. Splitt) indicated that all comments and questions would be responded to in writing and distributed to hearing participants.

5. Mr. Richard Pilney, representing ManaSota-88, Inc. and Concerned Citizens of Citrus County, pp 39-41.

A. p 40. Opined that the proposal is more of an experiment than an assurance that it will work and that the proposed discharge temperature will not assure that the grasses will recover.

Response: The degree of habitat recovery associated with the installation of helper cooling towers can not be precisely forecast. It is the EPA judgement that with a reduction in the discharge temperature during the warmer months, a significant recovery of habitat should occur. The redrafted permit requires seagrass monitoring and replanting if inadequate revegetation occurs.

B. p 40. Opined that closed-cycle cooling towers would be a better solution to the problem due to reduction in intake flow and associated intake impacts and also that mitigation by use of the fish hatchery may not be legally permissable.

Response: EPA has tentatively determined that the alternative thermal limitations associated with helper cooling towers are consistent with Section 316(a) and Florida Water Quality Standards requirements and therefore, closed-cycle cooling towers are not required for control of the thermal component. EPA has also tentatively determined that the costs associated with closed-cycle cooling towers are wholly disproportionate to the environmental benefits to be derived, and that there is no other practical technological modification of the cooling water intake structures available which would minimize the environmental impacts to an acceptable level. It has therefore been tentatively determined that: (1) reduction of plant flow by 15 percent during the months of November through April, in conjunction with; and (2) construction and operation of a fish hatchery over the remaining operating life of the three units (in an attempt to replace fish and shellfish eggs, larvae, and juveniles entrained by the plant) will constitute minimization of the environmental impacts of the cooling water intake as required by Section 316(b) of the CWA for the Crystal River Power Plant, Units 1, 2, and 3.

C. pp 40-41. Opined that the damage caused by a spill at Gardinier did less damage to aquatic life than the Crystal River Plant.

Response: Requirements of Section 316 of the CWA are applicable to the thermal discharge and intake impacts of the Crystal River Plant and have been followed in arriving at the draft permit conditions. Other sections of the the CWA are applicable to other types of waste discharges and spills.

6. Mr. David E. Walker, President, Citrus County Audubon Society, pp 41-44.

A. p 41. Indicated personal observations of dead bottom vegetation and need for power.

Response: Comments noted.

B. p 42. Expressed concern with damage to the estuary due to storm related spoil bank erosion, combined with thermal and other plant discharges. Noted his observations of fishing decline over the past nine years. Opined that elimination of the discharge canal alternate and the associated dredging and siltation impacts was a good decision, but that the "larger" towers would be the best proposal, but that the "smaller" towers would be better than nothing. Expressed understanding and concurrance with Mr. Hollins' concerns relative to salt drift.

Response: Comments noted. See Response 5.B.

C. p 42-43. Expressed doubt that seagrass can be restored at depths to ten feet.

Response: Depths associated with restoration will typically be not more than three to six feet, mean low water.

D. p 43. Questioned the species of fish to be raised in the hatchery.

Response: A Technical Advisory Committee will be established to provide recommendations.

E. p 43. Indicated confusion with the source of salt.

Response: A small quantity of the hot condenser cooling water which is cooled in the cooling tower (generally about 0.001 to 0.005 percent) is entrained as very small droplets in the air as it contacts the water (to cool it) in passing through the cooling tower. This water is discharged with the air at the top of the cooling tower. At the Crystal River site the condenser cooling water is "salty" since intake is from the Gulf of Mexico and therefore the water droplets going out the top of the tower are "salty".

F. p 43. Opined that our first priority must be the preservation of the natural resources.

Response: Comment noted.

7. Carl Cervi, pp 43-45. Proposed the installation of dilution pumps to pump water from the intake canal to the discharge canal to reduce the plant discharge temperature to an acceptable level.

Response: Increasing the flow of water (presently almost two billion gallons per day) would also increase the number of small aquatic organisms that are killed by passage through the new pumps and by contact with the hot water in the discharge canal. The existing amount of damage to these organisms has already been determined to be at an unacceptable level and FPC will be seasonally reducing the plant intake flow in order to reduce the present level of damage. Increasing the intake flow and associated damage is not an acceptable solution to the Crystal River Plant problems.

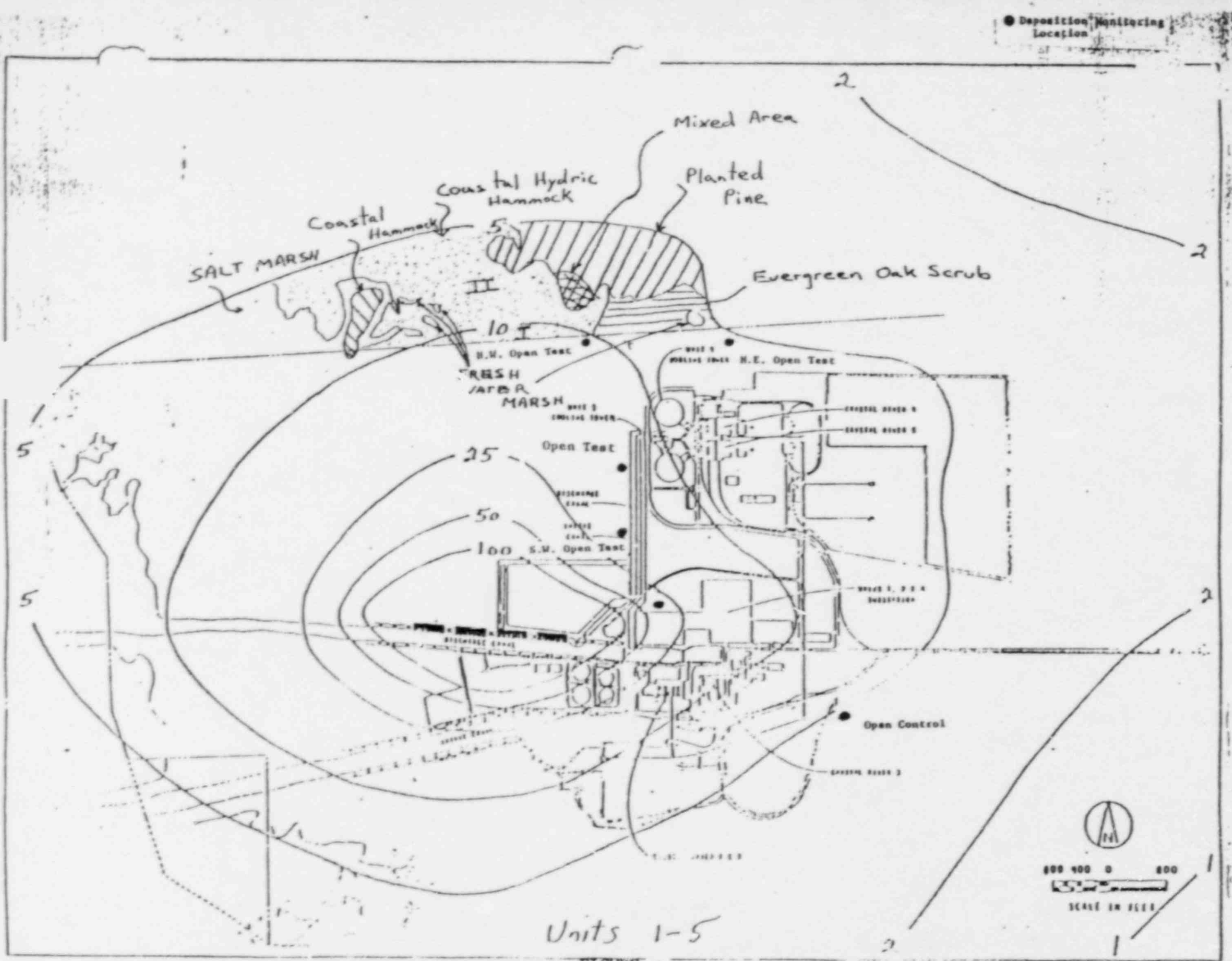

FIGURE 1
Areas Affected by Proposed Maximum Deposition

ASSESSMENT OF SALT DESPOSITION IMPACTS AT CRYSTAL RIVER

Environmental Protection Agency

Office of Policy and Management

Region IV

August 31, 1988

Assessment of Salt Deposition Impacts at Crystal River

PURPOSE

The Environmental Protection Agency (EPA) has prepared this report to support permit decisions for discharges to waters of the United States under the Clean Water Act and emissions to the air under the Clean Air Act. This report directly responds to the comments and the concerns presented by Dixie M. Hollins and Louie N. Adcock (Hollins Corporation) at the public hearing held on June 22, 1988 and subsequent written comments on a proposed NPDES permit. These comments raised questions regarding the impacts of salt drift from the proposed modifications and additions to the cooling towers at Florida Power Corporation's (FPC) Crystal River Power Plant.

Florida Power Corporation has requested that they be allowed to operate their Units 4 and 5 cooling towers at higher drift rates than currently permitted. FPC is also proposing to add cooling towers for Units 1, 2, and 3 to reduce current unacceptable thermal impacts from present operation. These actions would result in increased salt deposition on the area. This report evaluates the potential impact to the area's vegetation and water resources resulting from the several possible permitting scenarios. The scenarios are: initial permit conditions, current emissions, FPC's requested changes in emissions for units 4 and 5, and the addition of proposed helper cooling towers for units 1, 2, and 3. Conclusions and recommendations are presented following this evaluation.

BACKGROUND

This section of the report gives a brief history of the Crystal River power plant complex and cites some of the earlier reports addressing salt drift .

FPC's Crystal River power plant complex is located on the Gulf of Mexico in northwestern Citrus County, Florida outside of the town of Crystal River, Florida. In January 1981 the EPA issued an Environmental Impact Statement (EIS) which examined and discussed the impacts of the construction and operation of two 695 megawatt capacity coal-fired electric generating plants at the existing Crystal River Complex. Prior to the EIS, FPC issued a Site Certification Application (SCA) for Crystal River Units 4 and 5 in 1977. The SCA was a support document for FPC's application to construct the coal-fired power units. FPC has been operating Units 1, 2, and 3 since 1966, 1969, and 197/ respectively. Units 4 and 5 have been operating since 1982 and 1984 respectively.

Mitigating measures were developed in the EIS to reduce adverse impacts from the construction and operation of Units 4 and 5. The EIS recommended conditions to the issuance of FPC's NPDES permit. Specific conditions addressing the impact of salt drift were included in the permit and are: 1), the maximum drift rate of the cooling towers of Units 4 and 5 shall be 0.0005% of

the circulating cooling water, and 2), FPC shall conduct and report results of a vegetation and salt deposition monitoring program acceptable to the EPA and the Florida Department of Environmental Resources (FDER). The maximum allowable drift rate of 0.0005% was, at the time of the EIS, thought to be the lowest achievable drift rate using the best drift eliminator technology available.

Since the initiation of operation of Unit 4 in October, 1982, FPC has submitted monthly vegetation impact reports and annual salt deposition monitoring reports to the EPA.[1] Additionally, EPA has prepared a salt drift impact analysis (Crystal River Cooling Tower Salt Drift Evaluation, December 23, 1987). The December 1987 report was prepared to address four natural draft cooling towers to be used to reduce the thermal discharge of Units 1-3. The assessment included the salt deposition from Units 4 and 5 operating at a drift rate of 0.0023%. Also, FPC issued a salt drift analysis report in June 1988 to address the combined salt drift of increasing the drift of Unit 4 and 5 cooling towers and the additional drift of the helper cooling towers for Units 1, 2, and 3.[2] When unit 4 was placed in operation and tested, it was found to be in compliance with the permitted drift rate. However, it was found to be operating significantly below its designed thermal efficiency. In an attempt to increase the cooling capability of the Unit 5 cooling tower, the spray system for the tower was modified during construction. When the Unit 5 tower was started up and tested, it was found to have increased thermal efficiency (over Unit 4), but the measured drift rate exceeded the permitted drift rate limit. As directed by EPA, FPC instituted studies of how the drift rate could be reduced and conducted an evaluation of the impact of the increased salt drift. Based on the results of this evaluation and ongoing environmental studies, FPC has requested that EPA increase the permitted drift rates for Units 4 and 5 cooling towers. While FPC's request is being considered, EPA has issued an administrative order allowing FPC to operate Unit 5 cooling tower at the elevated drift rate as long as there are no adverse impacts of the salt drift on the indigenous vegetation.

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[1]Crystal River Salt Drift Annual Reports, 1982-83, 1983-84, Applied Biology, Inc.

Crystal River Salt Drift Annual Report, 1984-85, Florida Power Corporation

Crystal River Salt Drift Deposition Monitoring Annual Reports 1985-86, 1986-87, KBN Engineering and Applied Sciences, Inc.

[2]Submittal to EPA of revised deposition contours, June 1988, KBN/FPC

SALT DRIFT ANALYSIS

This section of the report describes the amount of salt drift and salt deposition occurring and expected to occur at the Crystal River facility. Salt drift modeling has been performed and the salt deposition rates have been predicted by the model. The deposition predicted by the model is compared to the current salt deposition monitoring data.

Units 1-3 are presently cooled using a once-through salt water system, that is they do not use cooling towers. FPC proposes to construct helper (nonrecirculating) cooling towers to reduce the thermal impact of the liquid waste discharge of Units 1-3 to the Gulf of Mexico (Crystal Bay). These cooling towers will be operated only as necessary to assure that the plant discharge temperature does not exceed 97.0 °F as an instantaneous maximum nor 96.5 °F as a maximum three hour average. Therefore, the towers will not be operated if plant discharge temperatures remain below 96.5 °F. Although periodic operation of the towers could begin as early as late April during unusual warm weather conditions and extend until late October, near continuous operation of the towers will generally not occur except during the summer months (June through September).

The cooling process in a cooling tower is primarily due to evaporation. To achieve this evaporation, the water to be cooled must be brought into contact with large volumes of air. This contact of air and water results in the entrainment of small droplets (drift particles) in the air from the top of the cooling tower to the atmosphere. Since the water used at the site is salt water from the Gulf, the drift droplets contain a high concentration of dissolved salts (primarily sodium chloride with smaller amounts of potassium and manganese salts).

Drift particles from cooling towers do not stay entrained in the air indefinitely. The salt drift is carried by prevailing winds and falls (due to gravity) as salt deposition on the land around the cooling tower. The amount of salt deposited on any specific area is generally dependent upon its distance from the cooling tower, its location relative to the tower and to the prevailing winds, the height of the cooling tower, the cooling water and ambient air temperatures, and environmental conditions such as topography and locations of surface waters. Using meteorological data, the size of the drift droplets, the height of the cooling tower, the temperature of the exit gases, and the salt emission rate, it is possible to calculate the salt deposition at various locations around the cooling tower. This type of calculation, called salt deposition modeling, is complex and is subject to errors based on the assumptions and periods used for data averaging. However, a model can be compared to field data and used to make decisions about projected salt drift and its impact to the environs surrounding the cooling tower.

Areas that are close to large salt water bodies receive natural salt deposition from wind blown salt water droplets. The EIS stated that the area received a natural background salt deposition from the Gulf of Mexico of 3.4 g/(m^2-yr). Two years of pre-operational monitoring (1980 and 1981) indicated background salt deposition rates of 3.5 and 6.7 g/(m^2-yr).[3] Additionally, the FPC annual deposition monitoring reports suggest that the data from the Open Control monitoring location (see Figure 1) could be used as an approximation to determine background deposition.[4] EPA's report, here in, will use high values of background deposition to give the analyses a conservative (i.e. worst case) bias. The measured pre-operational value of 6.7 g/(m^2-yr) is averaged with the Open Control measured deposition rate for the 1985/86 monitoring period. For use in this calculation, the modeled deposition at that location of 2.2 g/(m^2-yr) was subtracted from the monitored value of 7.8 g/(m^2-yr) to yield a calculated 1985/86 background of 5.6 g/(m^2-yr). The average of these values (5.6 and 6.7), 6.2 g/(m^2-yr), is used in this report as the total annual background salt deposition for the Crystal River site. In their June, 1988 report, KBN Engineering and Applied Sciences, Inc. (KBN) stated that 2.5 g/(m^2-yr) of the annual salt deposition is contained in rainfall. The annual background dry salt deposition used in this report is therefore 3.7 g/(m^2-yr).

McVehil-Monnet Associates performed modeling analyses for the operation of the cooling towers at Crystal River.[5] This modeling shows only the predicted salt deposition from the cooling towers and does not include the annual background salt deposition. Figure 2 shows the expected annual salt deposition contours from Units 4 and 5 cooling towers operating at a drift rate of 0.0005% (i.e. the NPDES permit conditions).[6] Figure 3 shows the expected annual salt deposition contours from Unit 4 and 5 cooling towers at the existing conditions of an average drift rate of 0.0014% (Unit 4 at 0.0005% and Unit 5 at 0.0023%) at an 81% capacity factor with a concentration of dissolved solids in the cooling water of 32,000 parts per million (ppm).[7] Table 1 lists the annual salt deposition rates at the monitoring locations as extrapolated from the modeled results (Figure 3) for Units 4 and 5 cooling towers at the existing drift rate and the total annual salt deposition rates (i.e. predicted deposition from Units 4 and 5 plus background deposition).

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[3]Submittal to EPA of revised deposition contours, June 1988, KBN/FPC.

[4]Crystal River Salt Drift Deposition Monitoring Annual Reports, 1985-86, 1986-87, KBN Engineering and Applied Sciences, Inc.

[5]Cooling Tower Drift Deposition Crystal River Units 4 & 5 Florida Power Corporation (0.0005%), (0.002% Drift Rate), and (0.005% Drift Rate) Cooling Tower Drift Deposition Crystal River Units 1,2,3,4 & 5 Florida Power Corporation (0.0005% Drift Rate), and (0.002% Drift Rate), McVehil-Monnett Associates, March 1986

[6]Ibid

[7]Submittal to EPA revising deposition contours and modified by memorandum of Charles Kaplan, Water Management Division, EPA Region IV, June 28, 1988.

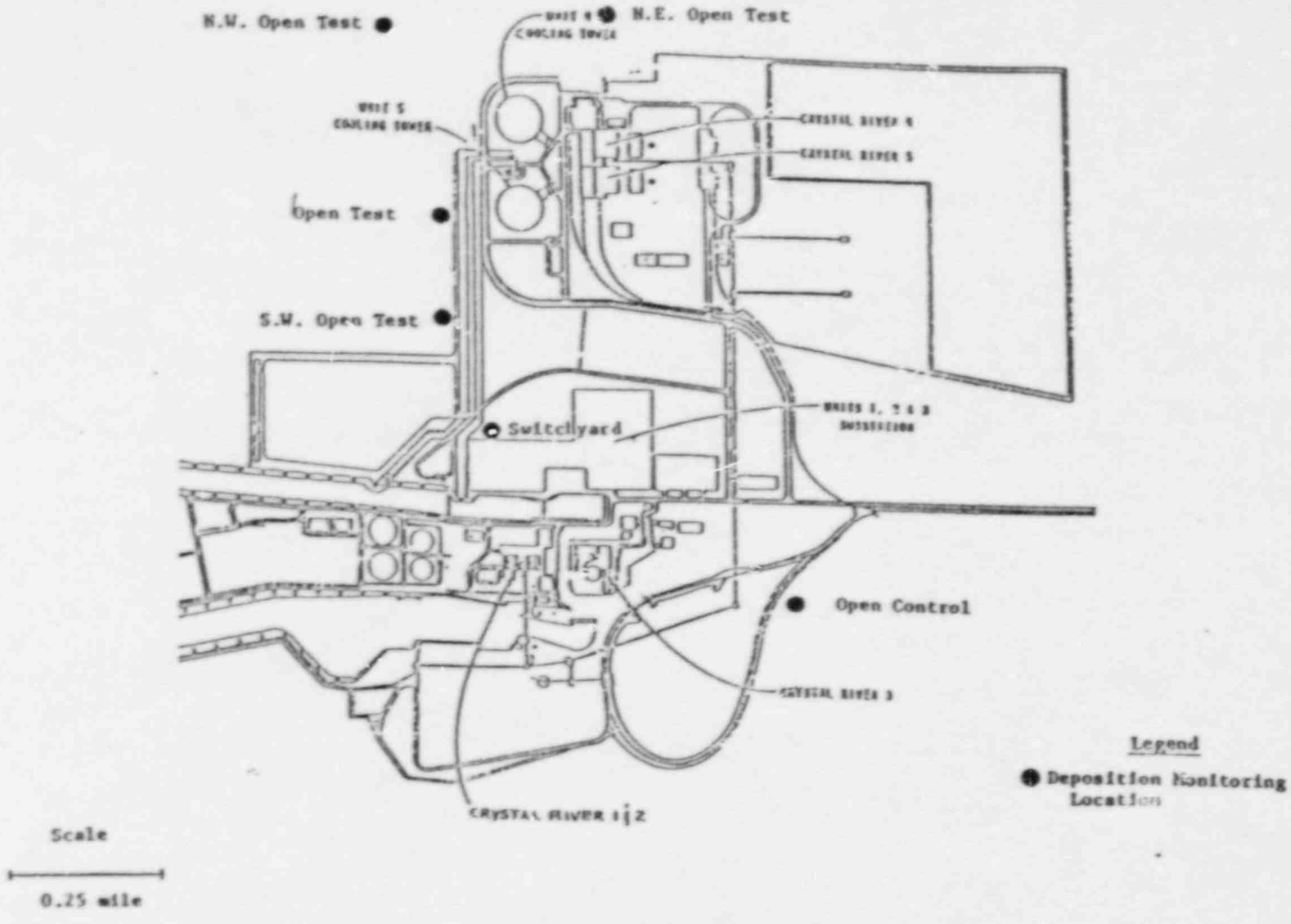

Figure 1. Monitoring Locations for FPC Crystal River Deposition Network

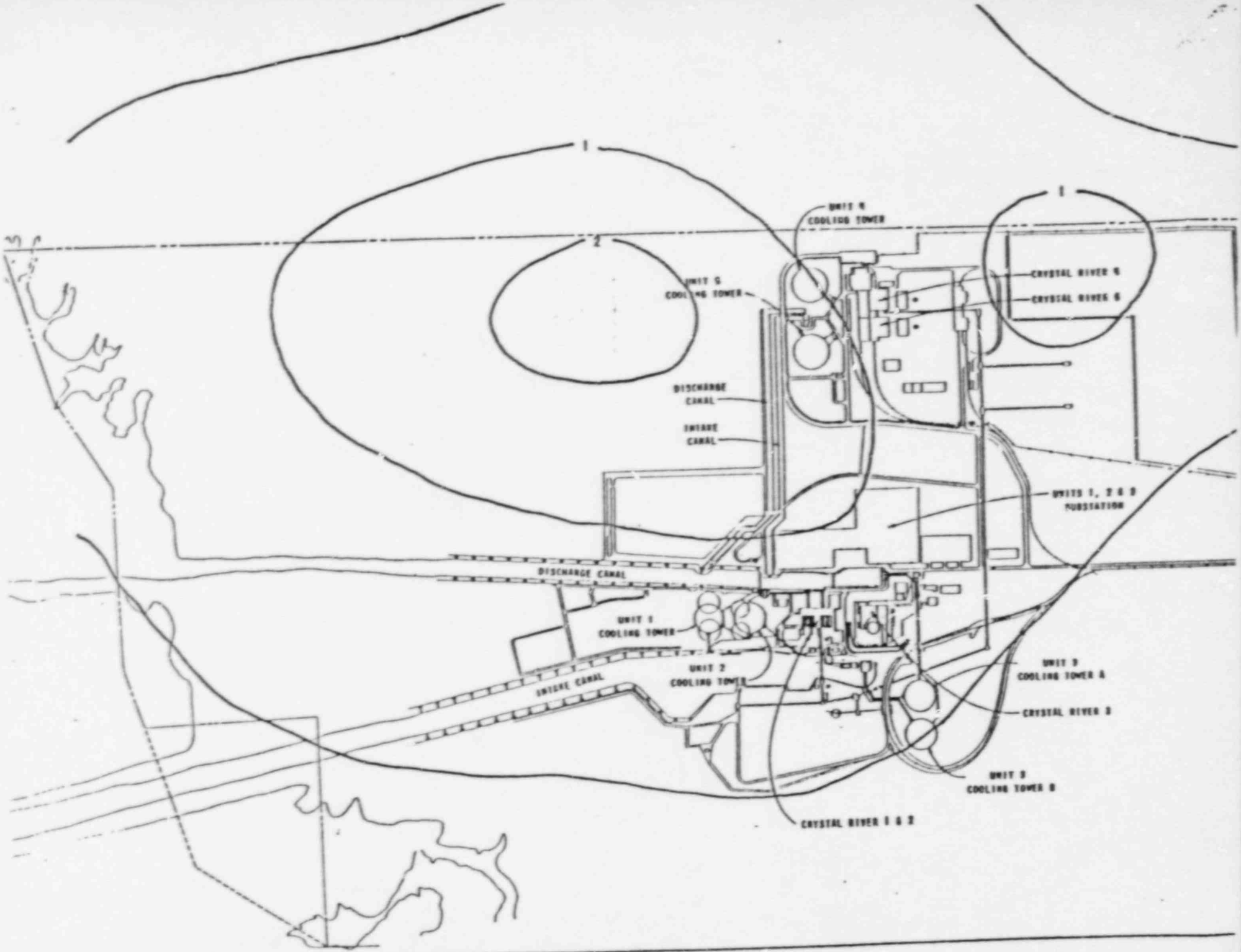

FIGURE 2
Originial Permitted Salt Deposition: Units 4 and 5 at Drift Rate of 0.0005%, No Helper Towers

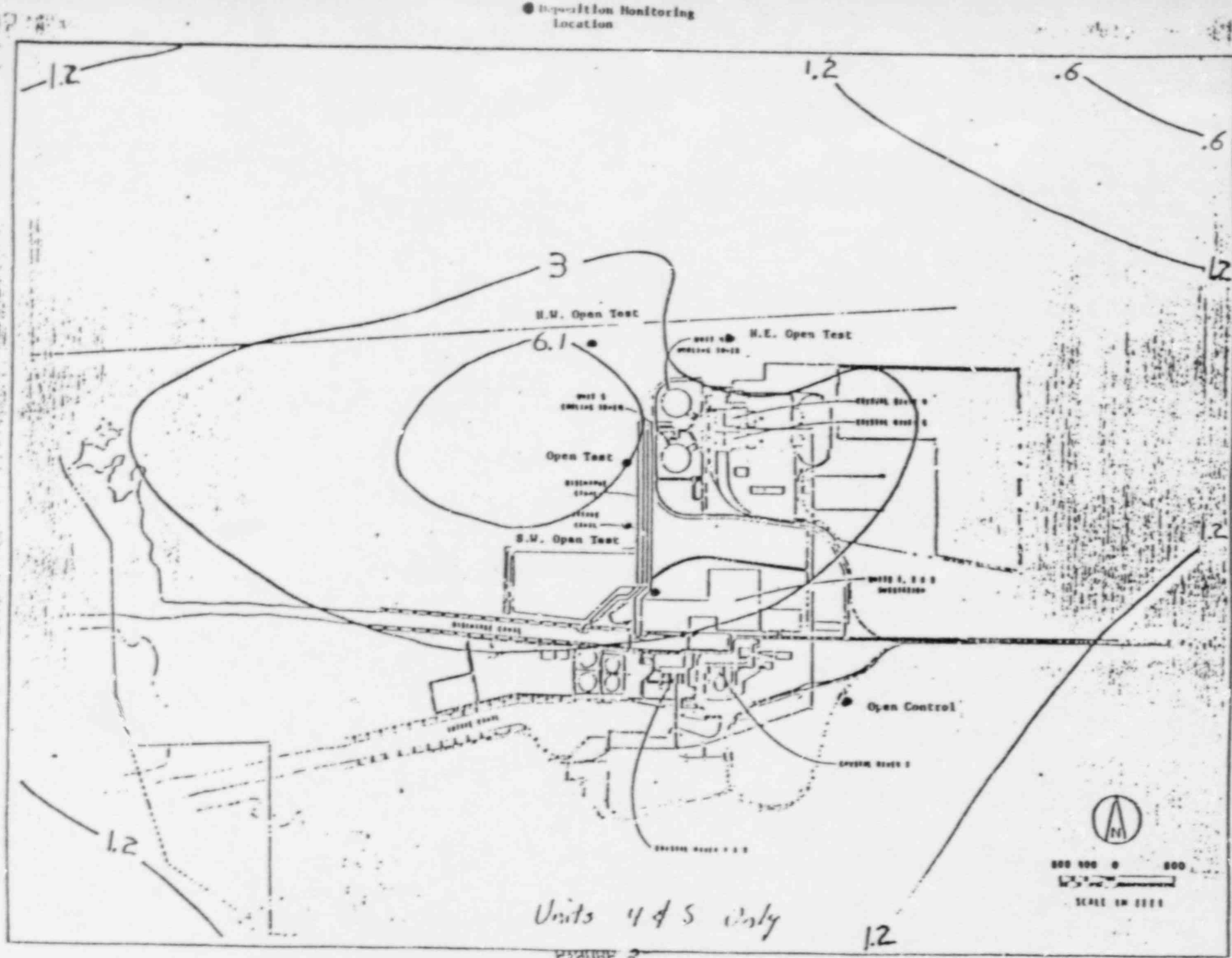

FIGURE 2

Predicted Annual Salt Deposition (g/m^2) from existing conditions for Cooling Tower Units 4 and 5, 32,000 ppm total dissolved solids in cooling water.

The open bucket method is used to collect the salt deposition at Crystal River.* Measurements of the salt collected in the buckets are made monthly and the data are reported as annual deposition rates. Table 2 displays the measured annual deposition rates as reported in the 1985/86 and 86/87 annual Salt Drift Deposition Monitoring Reports. The annual monitoring periods are from October 1985 through September 1986 (for the 1985/86 annual report) and October 1986 through September 1987 (for the 1986/87 annual report).

Table 1

Predicted Annual Salt Deposition

(Values reported in g/(m²-yr))

	Units 4 and 5[1]	Total[2]	Dry Total[3]
Open Test	6.1	12.3	9.8
NW Open Test	5.9	12.1	9.6
NE Open Test	2.7	8.9	6.4
SW Open Test	5.3	11.5	9.0
Open Control	2.2	8.4	5.9

1 Extrapolated from Figure 3.
2 Includes the Average Annual Background Deposition (6.2 g/m²-yr).
3 Includes the Average Annual Background Dry Salt Deposition (6.2 g/(m²-yr) - 2.5 g/(m²-yr) from rainfall).

Table 2

Annual Measured Total Deposition

	1985/86 g/m²	1986/87 g/m²
Open Test	7.9	7.5
NW Open Test	10.3	6.0
NE Open Test	13.4	6.7
SW Open Test	9.7	7.6
Open Control	7.8	4.1

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*Crystal River Salt Drift Annual Report 1983-84, Applied Biology, Inc., May 7, 1986.

The measured annual salt deposition at the monitoring sites reported in the 86/87 annual report are all less than the total deposition predicted by the model for those locations. For the 85/86 monitoring period all the monitoring sites, except the NE Open Test site, had measured deposition rates which were higher than the model's predicted rates. Tables 3 and 4 list the measured deposition rates for the two monitoring periods, the average predicted deposition rates, and the percent difference between the modeled rates and the measured rates. Note that the model predicts the NW Open Test to receive 36% greater salt deposition than the NE Open Test site would receive, but the NE Open Test site received higher salt deposition than the NW Open Test site for both monitoring periods.

Table 3

Modeled Deposition vs Measured Deposition (1985/86)

Monitoring Location	Measured Deposition (g/m^2-yr)	Modeled Deposition (g/m^2-yr)	Percent Difference [(mod/meas) - 1] x 100%
Open Test	7.9	12.3	56
NW Open Test	10.3	12.1	17
NE Open Test	13.4	8.9	-34
SW Open Test	9.7	11.5	19
Open Control	7.8	8.4	7

Table 4

Modeled Deposition vs Measured Deposition (1986/87)

Monitoring Location	Measured Deposition (g/m^2-yr)	Modeled Deposition (g/m^2-yr)	Percent Difference [(mod/meas) - 1] x 100%
Open Test	7.5	12.3	64
NW Open Test	6.0	12.1	102
NE Open Test	6.7	8.9	33
SW Open Test	7.6	11.5	51
Open Control	4.1	8.4	105

Figure 4 shows the expected annual salt deposition from Unit 4 and 5 cooling towers at a drift rate of 0.0023%.* Figure 5 shows the expected annual salt deposition from Units 4 and 5 cooling towers (at a drift rate of 0.0023%) and the helper cooling towers for Units 1-3 (at a drift rate of 0.002%).[9]

In conducting its evaluation of potential salt drift impacts, EPA selected a worst case scenario more critical than the one used by KBN in its June 1988 report. The EPA analysis assumed: 1) continuous operation of the existing and proposed cooling towers for Units 1-5 during the summer months (June through September) where KBN used an operating factor of 81% for Units 4 and 5, 2) a salt drift quantity for Units 4 and 5 cooling towers based on a total dissolved solids (TDS) concentration (i.e. the amount of salt in the circulating water) of 38,000 parts per million (ppm) where KBN used 32,000 ppm, 3), a salt drift quantity for Units 1-3 based on TDS of 32,000 ppm where KBN used 29,100 ppm, and 4) a worst case natural salt deposition of 6.2 g/m^2-yr where KBN used 5.1 g/m^2-yr. The TDS concentrations used by EPA are the highest measured historical values from the tower with the maximum concentrations during the month with the highest values since the Unit 4 cooling tower began operation. The TDS concentration for Units 1-3 cooling towers is lower than the TDS for the Units 4 and 5 cooling towers because Units 1-3 towers use nonrecirculating cooling towers and will not concentrate solids in the circulating water as much as recirculating towers (Units 4 and 5 towers) do. Table 5 lists the daily salt deposition rates at worst case short duration conditions as noted above. These daily deposition rates are used in the Vegetation Impact Analysis presented later in this report.

Six scenarios are evaluated in this report reflecting six different sets of operating conditions and associated salt drift. The first scenario is the original permit conditions; Units 4 and 5 cooling towers operating at a 0.0005%, and Units 1-3 using once through cooling. The second scenario is the existing conditions at Crystal River; Unit 4 cooling tower operating at 0.0005% drift rate, and Unit 5 operating at a drift rate of 0.0023%, and Units 1-3 using once through cooling. Scenario 3 is increasing the drift rate of Unit 4 and leaving all other conditions the same. This scenario corresponds to FPC's request to change the permitted drift rate to 0.0023% for the cooling towers for both Units 4 and 5. Scenario 4 is the addition of the proposed helper cooling towers to the original permit conditions; Units 1-3 cooling towers operating at a drift rate of 0.002% each, and Units 4 and 5 cooling towers operating at a drift rate of 0.0005% each. Scenario 5 is the addition of the proposed helper cooling towers to the existing conditions; Unit 4 cooling tower drift rate being 0.0005%, Unit 5 cooling tower drift rate being 0.0023%, and Units 1-3 cooling towers drift rates being 0.002% each. Scenario 6 is increasing of Unit 4 drift rate and adding the proposed helper cooling towers; Units 4 and 5 cooling towers drift rates being 0.0023% each, and Units 1-3 cooling towers drift rates being 0.002% each.

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*Submittal to EPA revising salt deposition contours, KBN/FPC, June 1988.

[9]Ibid.

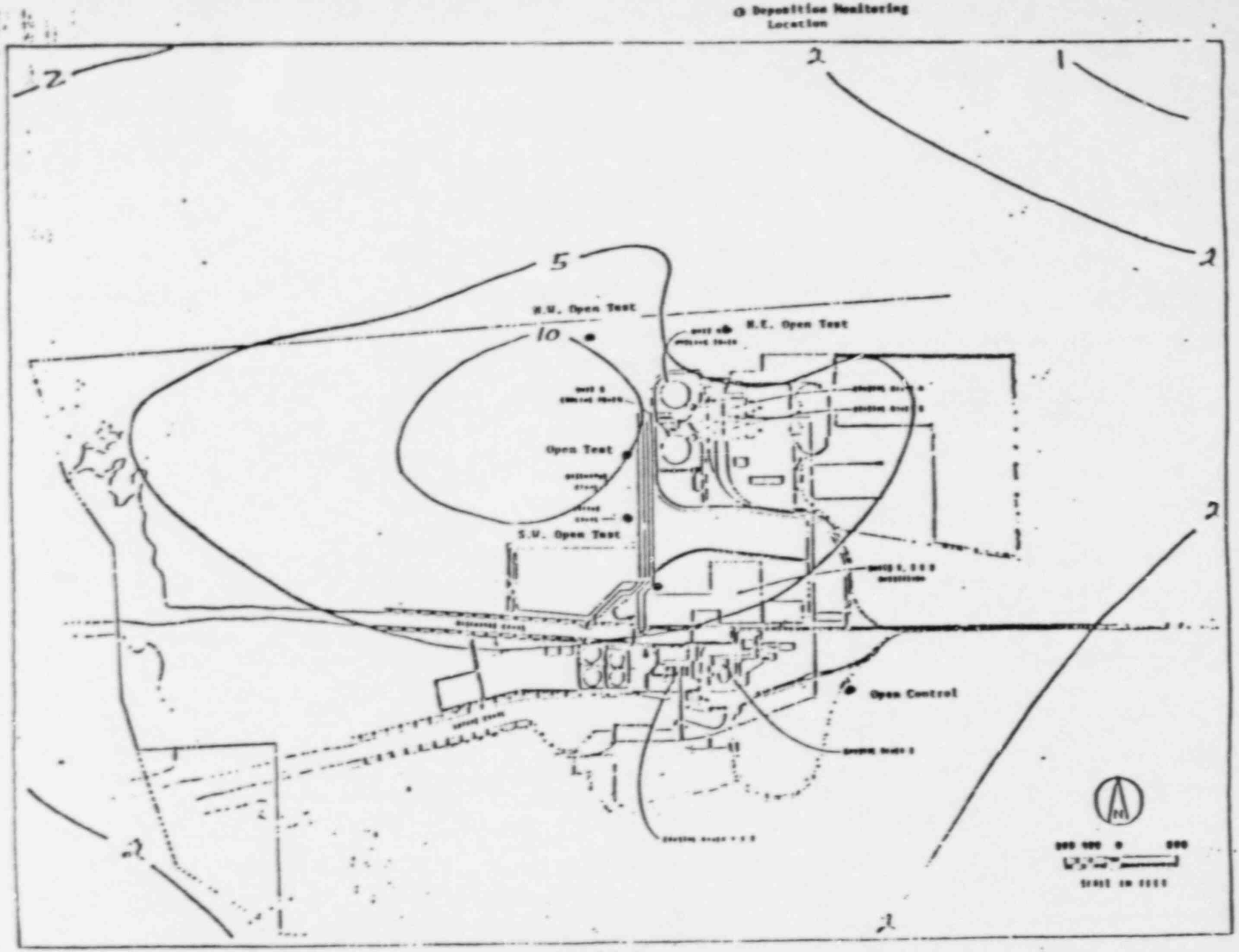

FIGURE 4

Annual Salt Deposition (g/m^2) predicted from Model for Units 4 and 5 Cooling Towers at 0.0023%, Drift Rate, 32,000 ppm Total Dissolved Solids. (Proposed change to Unit 4).

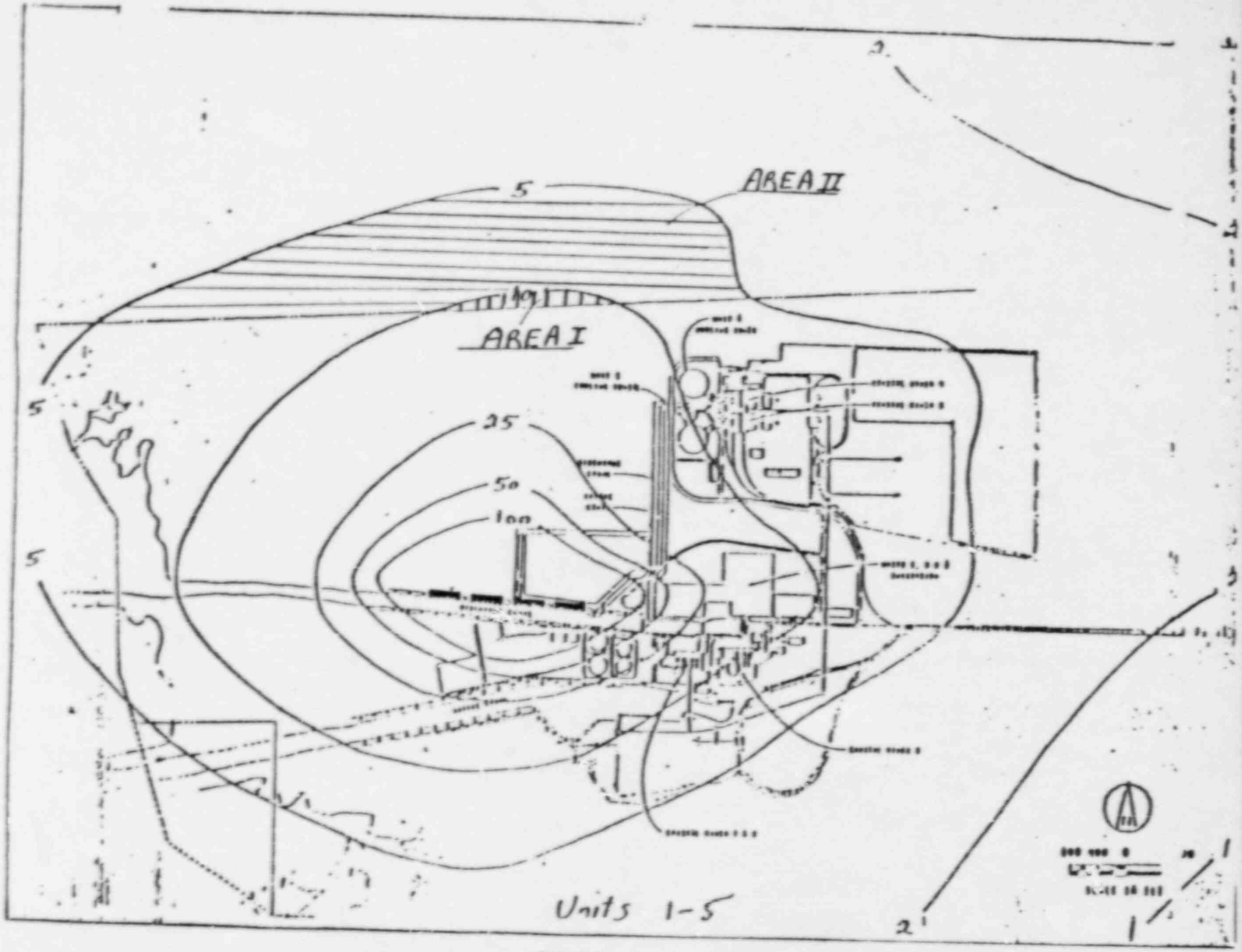

FIGURE 5
Proposed maximum Deposition: Units 4 and 5 at Drift Rate of 0.0023%, Helper Cooling Towers at 0.002%

Table 5

Crystal River Units 1-5 Cooling Towers
Worst-Case Daily Deposition Rates

(g/m^2-day)

A. Deposition at northern property line on Figure 5 (Used for Area I assessment)

Scenario	Units 4 & 5	Units 1-3	Background	Total
1	0.009	0.0	0.010	0.019
2	0.024	0.0	0.010	0.034
3	0.040	0.0	0.010	0.050
4	0.009	0.028	0.010	0.047
5	0.024	0.028	0.010	0.062
6	0.040	0.028	0.010	0.078

B. Deposition at the 5 g/m^2-yr contour north of the plant on Figure 5

Scenario	Unit 4 & 5	Units 1-3	Background	Total
1	0.003	0.0	0.010	0.013
2	0.010	0.0	0.010	0.020
3	0.016	0.0	0.010	0.026
4	0.003	0.009	0.010	0.022
5	0.010	0.009	0.010	0.029
6	0.016	0.009	0.010	0.035

C. Deposition at an average of A and B (Used for Area II Assessment)

Scenario	Unit 4 & 5	Units 1-3	Background	Total
1	0.006	0.0	0.010	0.016
2	0.017	0.0	0.010	0.027
3	0.028	0.0	0.010	0.038
4	0.006	0.019	0.010	0.035
5	0.017	0.019	0.010	0.046
6	0.028	0.019	0.010	0.057

D. Deposition at the 2 g/m^2-yr contour north of Area II

Scenario	Unit 4 & 5	Units 1-3	Background	Total
1	0.001	0.0	0.010	0.011
2	0.004	0.0	0.010	0.014
3	0.006	0.0	0.010	0.016
4	0.001	0.004	0.010	0.015
5	0.004	0.004	0.010	0.018
6	0.006	0.004	0.010	0.020

Description of Scenarios:

1: Permitted drift rate, both towers at 0.0005%
2: Existing conditions, Unit 4 tower at 0.0005% and Unit 5 tower at 0.0023%
3: Requested drift rate increase for Unit 4 tower to 0.0023%
4: Scenario 1 with Units 1-3 helper towers at drift rate of 0.002%
5: Scenario 2 with Units 1-3 helper towers at drift rate of 0.002%
6: Scenario 3 with Units 1-3 helper towers at drift rate of 0.002%

VEGETATION IMPACT ANALYSIS

This section of the report describes the indigenous vegetation at Crystal River and provides an analysis of the impact of salt deposition (described in the previous section) on the vegetation of two areas north of the plant. These areas (shown on Figure 5 as Areas I and II) are selected because they are the land off of FPC property predicted to have the greatest impact from the salt deposition from the cooling towers.

Figure 6 shows the biotic communities that are found in Areas I and II.[11] Table 6 lists the percentages of the types of vegetation found in the biotic communities.[12] Using Table 6 and Figure 6, Area I and II can be described by area, types of vegetation, and the sensitivity of the vegetation to salt. The vegetation in area north of Area II is primarily planted pine, however due to the distance from the FPC power facility, detailed figures and biotic information is not available.

Area I is a 15-20 acre crescent shaped tract of Hollins Corp. land adjacent and just north of the FPC northern property boundary. Area I vegetation is coastal hydric hammock which is a mixture of isolated hammock areas and wetland forests. The most abundant species found in the hydric and coastal hydric communities are very salt tolerant, defined as very tolerant, tolerant and high resistance species. The next most common species are the low resistance species, and the least common species are moderate resistance species.

Area II is a 250-300 acre tract of Hollins Corp. land containing 110-130 acres of coastal hydric hammock, 55-65 acres of salt marsh, 55-65 acres of planted pine, 25-35 acres of mixed vegetation and evergreen scrub, and approximately 5 acres of fresh water marshes. Salt marsh is made up of 100% of species that have a very high tolerance to salt. The planted pine community at Crystal River comprises mostly plants that have a moderate resistance to salt. Plants with high resistance to salt damage are the next most common type of vegetation in the pine plantation, and low resistance species are the least common. The mixed vegetation and evergreen scrub communities are a mix of the coastal hydric hammock, mesic hammock, and the planted pine communities and display vegetation sensitivity that is a combination of the three other biotic communities, mostly moderate and high resistance species with the remainder being low resistance species.

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[11] EPA superimposed the contour lines from Figure 5 (herein) over Figure 2-1 from Environmental Assessment of Salt Drift Impacts of Florida Power Corporation Crystal River Units 1,2,3,4 & 5 with Natural Draft Cooling Towers, KBN, August, 1986. Figure 2-1 represents the biotic communities at Crystal River.

[12] Ibid.

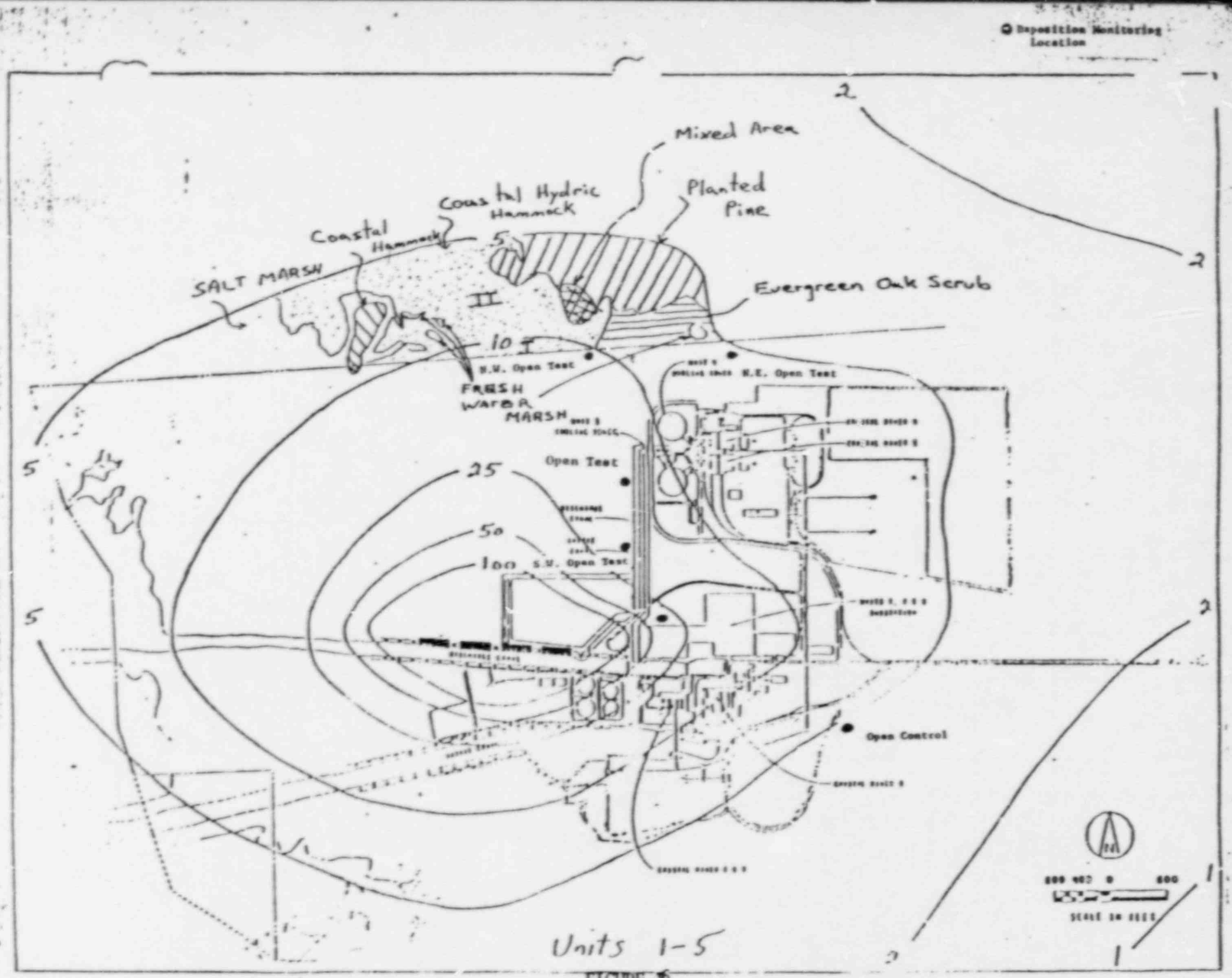

FIGURE 6
Areas Affected by Proposed Maximum Deposition

Table 6

Population Percentages* of Vegetation Species at Crystal River

(Overstory/Understory)*

Biotic Community	Resistance Levels: Very Tolerant, Very High, High	Moderate	Low	Very Low, Intolerant
Coastal and Coastal Hydric Hammock	82.4 %	7.3 %	10.3 %	0.0 %
Mesic and Hydric Hammock	50.9 %	33.5 %	15.6 %	< 0.5 %
Pine Flatwoods and Pine Plantation	13.6 %	86.4 %	0.0 %	0.0 %
Freshwater Marsh	The freshwater and saltwater marshes do not contain an overstory/understory vegetation level.			
Saltwater Marsh				

(Shrubs and Herbaceous Species)**

Biotic Community	Resistance Levels: Very Tolerant, Very High, High	Moderate	Low	Very Low, Intolerant
Coastal and Coastal Hydric Hammock	64.7 %	11.8 %	23.5 %	< 0.5 %
Mesic and Hydric Hammock	52.8 %	16.7 %	30.4 %	< 0.5 %
Pine Flatwoods and Pine Plantation	38.3 %	46.8 %	14.9 %	< 0.5 %
Freshwater Marsh	37.0 %	31.5 %	31.5 %	< 0.5 %
Saltwater Marsh	100 %	0 %	0 %	0 %

* Overstory/understory are two different layers in a plant community. Tall trees, such as cypress and oak, comprise the overstory, and trees of medium height, such as dogwood and maple, comprise the understory.

** The shrubs and herbaceous species are the low lying plants in the community. Grasses, bushes and other short vegetation make up this level of plant communities.

* For overstory/understory, percentages are of Total Importance Value Index. Importance value is a parameter used in quantifying vegetation population data; importance value = the sum of the relative density, relative dominance, and relative frequency of a species.

For shrubs and herbaceous species percentages are of Total Ground Cover.

The biota in the Crystal River area is made up of a majority of salt tolerant species (see Table 6). The overstory/understory vegetation level contains more salt tolerant vegetation than the low-lying species. This could be expected since the natural salt drift of the region (from the Gulf of Mexico) is carried on the prevailing winds and will tend to impact the overstory/understory vegetation more than the shrubs and herbaceous species. The less salt resistant species have developed more readily at the ground because the upper level of vegetation provides a shield from salt deposition for the ground cover vegetation. The two marsh communities do not contain an overstory/understory. The saltwater marsh, due to its highly saline water and its proximity to the Gulf of Mexico, comprises 100% salt resistant species. The freshwater marsh communities contain approximately one third each of high, moderate and low resistance species.

In accordance with their NPDES permit, FPC has maintained and conducted vegetation and salt deposition monitoring programs since approximately 1979. Additionally, a vegetation survey was included in work done for the Site Certification Application (FPC, 1977). The vegetation monitoring consists of monthly inspections of tagged individual plants at selected locations, quarterly aerial infrared photography of the area in a one mile radius circle around the FPC site, and quarterly biotic inspections of the monitoring locations. The locations used for the deposition monitoring are used for the vegetation monitoring (see Figure 1). KBN Engineering and Applied Sciences, Inc. (KBN) was contracted by FPC to prepare quarterly and annual salt deposition monitoring reports for the 1985/86 and 1986/87 periods. The two annual reports conclude that, although few symptoms of salt accumulation damage were documented, there were no consistent patterns or symptoms of salt accumulation damage to the vegetation in the Crystal River area. The reports also state that the indigenous vegetation was generally in good condition. The reports from the previous years also documented that there was no salt damage discovered by the vegetation monitoring.

KBN included in their June 1988 report a grouping of plant species by their relative resistance to salt accumulation damage. The groups ranged from very intolerant to very tolerant. Data was provided for the ranges of salt accumulation which would be expected to cause threshold damage to the plants and damage to 50% of their leaves (50% leaf damage). These accumulation levels were used to determine how long salt deposition could be tolerated on the plants before threshold and 50% leaf damage might occur. The levels expected to cause damage through accumulation have been determined through laboratory and highly controlled field experimentation. The threshold damage level is when the vegetation starts to show signs of stress. The 50% leaf damage level is when 50% of the vegetation's leaves are showing symptoms of stress. Salt accumulation damage is often evidenced by necrosis. Table 7 lists these plant groups and the average salt accumulation levels needed to produce threshold damage and 50% leaf damage to the species in the groups. For brevity, the lists of the species found in the groups have been replaced by a representative species for each group. These representative species were chosen because they are found in the biotic communities at Crystal River.

Table 7

Accumulation Levels Causing Damage
To Various Species at Crystal River

	Threshold Damage (g/m^2)	50% Leaf Damage (g/m^2)
Very Tolerant (Marsh Elder)	> 4	> 10
High Resistance (Live Oak)	3	7
Moderate Resistance (Slash Pine*)	.7	2.5
Low Resistance (Red Maple)	.3	.8
Very Intolerant (Flowering Dogwood)	0.04	.2

* Slash Pine is the predominant species found at the Crystal River Planted Pine area. Virginia Pine is listed as moderately resistant to salt accumulation damage and Pitch Pine is listed as highly resistant to salt accumulation damage. Slash Pine was chosen to be moderately resistant to give the analysis a conservative bias.

Table 8

Time Between Rainfall Events

Days Between Rainfall Events*	Number of Occurrences	Number of Occurrences Equal to or Longer
0	171	368
1	55	197
2	39	142
3	25	103
4	16	78
5	17	62
6	9	45
7	9	36
8	4	27
9	2	23
10	4	21
11	3	17
12	2	14
13	1	12
14	2	11
15	0	9
16	0	9
17	1	9
18	1	8
19	3	7
20	0	4
21	0	4
22	2	4
23	0	2
24	0	2
25	0	2
26	0	2
27	1	2
28	0	1
29	0	1
30	0	1
31	1	1

* Rainfall events 0.11 inches/hr or greater.

This data as provided by KBN is for the four summer months (June, July, August, September) for the following ten years: 1974, 75, 78, 79, 81, 82, 83, 84, 85, and 1986.

The KBN report of June 1988 discusses how rainfall events of 0.11 inch/hr or greater will wash accumulated salt residue from the leaves of the plants and presents an analysis of determining how often it must rain to prevent various salt deposition rates to reach accumulation levels that cause threshold damage and 50% leaf damage. Table 8 lists the number of occurrences for ten years, during the summer months, that the time between rainfall events was equal to and/or longer than 1 day through 31 days.[13]

The deposition rates (modeled and measured) for the operating conditions of the 1985/86 and 86/87 monitoring periods are used in the same analysis that KBN used in the June 1988 report. The results of the calculations are listed in Table 9 along with the salt deposition rates (from Tables 3 and 4 and corrected for salt deposition from rainfall) displayed as daily deposition rates. Also included in Table 9 are the number of occurrences during the summer months of 1986 (i.e. during the 85/86 monitoring period) when the time between rainfall events was equal to or longer than the calculated times ("dry periods") necessary for salt deposition to accumulate to the levels which might cause threshold and 50% leaf damage to vegetative species with low and moderate resistance to salt accumulation. The data for the summer months of 1987 (i.e. during the 86/87 monitoring period) have not been made available.

From the impact analysis, vegetation damage from salt accumulation greater than threshold damage to low resistance species should not have occurred in the 1985/86 monitoring period. This corresponds to the results of the vegetation monitoring. Since threshold damage is very difficult to recognize in field studies, it is understandable that no consistent patterns of salt accumulation damage to the indigenous vegetation have been found at Crystal River. And, although the modeled deposition rates were different than the measured deposition rates, the rates predicted by the model would not have caused damage greater than threshold damage to low resistance species.

The daily deposition rates listed in Parts A and C of Table 5 are used in an analysis identical to the one used by KBN. Table 10 lists for each operation scenario, the number of days between rainfall events needed to cause threshold damage and 50% leaf damage to species in Area I that have low and moderate resistance to salt accumulation. Table 11 lists the same information for the species in Area II. The two tables also list the number of times that "dry periods" equal to or longer than that required for the two levels of impact have occurred in the ten years of rainfall data in Table 8. Species more resistant to salt accumulation damage than moderately resistant species are not listed because the shortest time between rainfall events to cause threshold damage to high resistance species is 39 days, a very low probability event during the summer months in Florida, and an event that did not occur during the ten years of record used for the analysis.

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[13]Surface Observations at Tampa, FL National Weather Service Station (#12842).

The deposition rates listed in Tables 10 and 11 include a natural daily dry salt deposition of 0.010 g/m²-day (6.2 g/m²-yr ÷ 365 days/yr). The deposition rates used for the Area II analysis are taken from Part C of Table 5. The deposition rates presented in Part C are averages of Parts A and B. The salt deposition represented by the contour lines in Figure 5 change gradually from one contour line to the next. Area II is large enough that the average of the two contour lines (from Figure 5) is more representative of the deposition rate than either the higher or the lower figure. Area I, on the other hand, is not very large and is close enough to the contour line that using the deposition rate of that contour line is appropriate.

Table 9

Vegetation Impact Analysis
For the 85/86 and 86/87 Monitoring Periods

Damage Causing Salt Accumulation Levels
(g/m^2)

Monitoring Locations & Salt Deposition Rate[1] (g/m^2-day)	Low Resistance Species				Moderate Resistance Species			
	Threshold (0.3)		50% leaf damage (0.8)		Threshold (0.7)		50% leaf damage (2.5)	
	Days[2]	Occur[3]	Days	Occur	Days	Occur	Days	Occur
Open Test								
Modeled (0.027)	11	3	30	0	26	0	93	0
Meas. 85/86 (0.015)	20	0	54	0	47	0	169	0
Meas. 86/87 (0.014)	22	-	58	-	51	-	182	-
NW Open Test								
Modeled (0.026)	11	3	30	0	27	0	95	0
Meas. 85/86 (0.021)	14	3	37	0	33	0	117	0
Meas. 86/87 (0.010)	30	-	80	-	73	-	261	-
NE Open Test								
Modeled (0.018)	17	1	46	0	40	0	143	0
Meas. 85/86 (0.030)	10	4	27	0	23	0	84	0
Meas. 86/87 (0.012)	24	-	70	-	61	-	217	-
SW Open Test								
Modeled (0.025)	12	3	32	0	28	0	101	0
Meas. 85/86 (0.020)	15	2	41	0	35	0	127	0
Meas. 86/87 (0.014)	21	-	57	-	50	-	179	-
Open Control								
Modeled (0.016)	19	1	49	0	43	0	155	0
Meas. 85/86 (0.015)	21	0	55	0	48	0	172	0
Meas. 86/87 (0.004)	68	-	182	-	160	-	570	-

[1] The measured deposition rates listed in Tables 3 and 4 are reduced by 2.5 g/m^2-yr, the annual salt deposition contributed as rainfall, then divided by 365 days/yr.

[2] Days : Indicates the number of days without rainfall for salt deposition to accumulate to the indicated levels which might cause damage.

[3] Occur: Indicates the number of occurrences when damage may have occurred in the summer months of the monitoring period. For example, at the measured deposition rate at the SW Open Test site, threshold damage could have occurred two times because there were two dry periods that lasted 15 days or longer in the summer months in 1986. The 85/86 data is used with the deposition rates predicted by the model.

- : Indicates that the rainfall data has not been made available.

Table 10

Area I
Vegetation Impact Analysis

Salt Deposition Rate (g/m²-day)	Low Resistance Species: Threshold (0.3) Days[1]	Low Resistance Species: Threshold (0.3) Occur[2]	Low Resistance Species: 50% Leaf (0.8) Days	Low Resistance Species: 50% Leaf (0.8) Occur	Moderate Resistance Species: Threshold (0.7) Days	Moderate Resistance Species: Threshold (0.7) Occur	Moderate Resistance Species: 50% Leaf (2.5) Days	Moderate Resistance Species: 50% Leaf (2.5) Occur
Damage-Causing Accumulation Levels (g/m²)								
Scenario 1* 0.019	16	9	42	0	37	0	122	0
Scenario 2 0.034	9	23	24	2	21	4	74	0
Scenario 3 0.050	6	45	16	9	14	11	50	0
Scenario 4 0.047	6	45	17	9	15	9	53	0
Scenario 5 0.062	5	62	13	12	11	17	40	0
Scenario 6 0.078	4	78	10	21	9	23	32	0

1. Days: indicates how many days are needed between rainfall events to reach the indicated accumulation levels that might cause damage.

2. Occur: indicates the number of occurrences in the ten years of record that the calculated time between rainfall events occurred. For example, at the deposition rate of Scenario 4 (0.047 g/m²-day) it would require six days without rain- fall for the salt accumulation to reach the level that would cause threshold damage to low resistance species. There have been forty-five occurrences of dry periods six days or longer in the ten years of record.

* Scenarios and deposition rates as presented in Table 5.

Table 11

Area II
Vegetation Impact Analysis

Damage-Causing Accumulation Levels
(g/m^2)

Salt Deposition Rate (g/m^2-day)	Low Resistance Species: Threshold (0.3) Days[1]	Low Resistance Species: Threshold (0.3) Occur[2]	Low Resistance Species: 50% Leaf Dam. (0.8) Days	Low Resistance Species: 50% Leaf Dam. (0.8) Occur	Moderate Resistance Species: Threshold (0.7) Days	Moderate Resistance Species: Threshold (0.7) Occur	Moderate Resistance Species: 50% Leaf Dam. (2.5) Days	Moderate Resistance Species: 50% Leaf Dam. (2.5) Occur
Scenario 1* 0.016	19	7	50	0	44	0	156	0
Scenario 2 0.027	11	17	30	1	26	2	93	0
Scenario 3 0.038	8	27	21	4	18	8	66	0
Scenario 4 0.035	9	23	23	2	20	4	71	0
Scenario 5 0.046	7	36	17	9	15	9	54	0
Scenario 6 0.057	5	62	14	11	12	14	44	0

1. Days: indicates how many days are needed between rainfall events to reach the indicated accumulation levels that might cause damage.

2. Occur: indicates the number of occurrences in the ten years of record that the calculated time between rainfall events occurred. For example, at the deposition rate of Scenario 4 (0.035 g/m^2-day) it would require nine days without rainfall for the salt accumulation to reach the level that would cause threshold damage to low resistance species. There have been twenty-three occurrences of dry periods nine days or longer in the ten years of record.

* Scenarios and deposition rates as presented in Table 5.

The data from Tables 10 and 11 are used to assess the impacts to Areas I and II vegetation. Each Scenario is presented and described, and the impacts are presented as how frequently the two different types of damage (threshold and 50% leaf damage) may occur. The terms used to describe potential damage frequency include four ranges of the number of occurrences during the ten years of record that the time between rainfall events was long enough to cause damage.

rarely: means that there were 1 to 4 occurrences

occasionally: means that there were 5 to 14 occurrences

regularly: means that there were 15 to 24 occurrences

often: means that there were 25 or greater occurrences

The salt deposition rates are predicted for worst case conditions. The impact period is during the summer months with elevated operating factors and higher salt concentrations in the circulating water. The measured deposition rates were less than the modeled rates in nine out of ten cases (Tables 3 and 4), implying the model presents worst case. Most of the biotic communities being impacted have upper vegetation levels that contain majorities of salt tolerant species which provide shielding for the more salt sensitive species in the groundcover vegetation level. For these reasons, the actual damage is expected to be less than predicted by this worst case analysis.

Area I Evaluation

The data for this impact evaluation is presented in Table 10. Area I is 15 to 20 acres of Hollins Corporation land at the northern property boundary of the FPC Crystal River Complex. Coastal hydric and hydric hammock are the vegetative communities found in Area I. The overstory/understory vegetation of these communities are predominantly composed of salt tolerant species. The majority of the low resistance species found in the hydric and coastal hydric communities are found in the low lying vegetation level. The impacts to the majority of the low resistance species will be less due to the shielding effect of the upper level vegetation.

Scenario 1, original permit conditions, Units 4 and 5 cooling tower drift rates = 0.0005% and no helper towers: The analysis predicts occasional (7 occurrences in ten years of data) threshold damage to low resistance species.

Scenario 2, existing conditions, Unit 4 cooling tower drift rate = 0.0005%, Unit 5 cooling tower drift rate = 0.0023% and no helper towers: The analysis predicts regular (23 occurrences in ten years of data) threshold damage and rare (2 occurrences in ten years of data) 50% leaf damage to low resistance species. Rare (4 occurrences in ten years of data) threshold damage to moderate resistance species is predicted.

Scenario 3, increasing the drift rate of Unit 4 cooling tower, Units 4 and 5 cooling tower drift rate. = 0.0023% and no helper towers: The analysis predicts threshold damage to low resistance species often (45 occurrences in ten years data). Occasional (9 occurrences in ten years of data) 50% leaf damage is predicted for low resistance species. Occasional (11 occurrences in ten years of data) threshold damage to moderate resistance species is also predicted.

Scenario 4, adding the helper cooling towers to the original permit conditions, Units 4 and 5 cooling tower drift rates = 0.0005% and Units 1-3 cooling tower drift rates = 0.0023%: The analysis predicts threshold damage to low resistance species often (45 occurrences in ten years of data). Occasional (9 occurrences in ten years of data) 50% leaf damage is predicted for low resistance species. Occasional (9 occurrences in ten years of data) threshold damage to moderate resistance species is also predicted.

Scenario 5, adding the helper cooling towers to the existing conditions, Units 4 cooling tower drift rate = 0.0005%, Unit 5 cooling tower drift rate = 0.0023%, Units 1-3 cooling tower drift rates = 0.002%: The analysis predicts often (62 occurrences in ten years of data) occurrences of threshold damage and occasional (12 occurrences ten years of data) occurrences of 50% leaf damage to low resistance species. Regular (17 occurrences in ten years of data) threshold damage to moderate resistance species is predicted.

Scenario 6, increasing the drift rate of Unit 4 and adding the helper towers, Units 4 and 5 cooling tower drift rates = 0.0023% and Units 1-3 cooling tower drift rates = 0.002%: The analysis predicts often (78 occurrences in ten years of data) occurrences of threshold damage and regular (17 occurrences in ten years of data) occurrences of 50% leaf damage to low resistance species. Regular (23 occurrences in ten years of data) threshold damage to moderate resistance species is predicted.

Area II Evaluation

Table 11 lists the data used in this evaluation. Area II is 280 to 300 acres of Hollins Corporation land north of Area I. The impacts to the biotic communities with overstory/understory vegetation levels will be less than the impacts described below. However, the ten acres of freshwater marshes found in Area II do not have an upper vegetation level. The impact of the salt drift on the low resistance species will not be reduced by shielding from taller plants. This impact may cause a species shift in the marshes. Over time salt tolerant species may become more abundant and there may be fewer low resistance plants.

Scenario 1, original permit conditions, Units 4 and 5 cooling tower drift rates = 0.0005% and no helper towers: The analysis predicts occasional (seven occurrences in ten years of data) threshold damage to low resistance species. No other damage from operating at permitted drift rates is predicted.

Scenario 2, existing conditions, Units 4 and 5 cooling tower drift rates = 0.0005% and 0.0023%, respectively, and no helper towers: The analysis predicts regular (seventeen occurrences in ten years of data) threshold damage and rare (one in ten years of data) 50% leaf damage to low resistance species. Rare (two occurrences in ten years of data) threshold damage to moderate resistance species is predicted.

Scenario 3, increasing drift rate of Unit 4 cooling tower, Units 4 and 5 cooling tower drift rates = 0.0023% and no helper towers: The analysis predicts threshold damage to occur often (27 occurrences in ten years of data) and 50% leaf damage to occur rarely (4 occurrences in ten years of data) to low resistance species. Occasional (8 occurrences in ten years of data) threshold damage to moderate resistance species is predicted.

Scenario 4, adding the helper towers to the original permit conditions, Units 4 and 5 cooling tower drift rates = 0.0005% and Units 1-3 cooling tower drift rates = 0.002%: The analysis predicts regular (23 occurrences in ten years of data) threshold and rare (two occurrences in ten years of data) 50% leaf damage to low resistance species. Rare (4 occurrences in ten years of data) threshold damage to moderate resistance species is predicted.

Scenario 5, adding the helper cooling towers to the existing conditions, Units 4 and 5 cooling tower drift rates = 0.0005% and 0.0023%, respectively, and Units 1-3 cooling tower drift rates = 0.002%: The analysis predicts threshold damage to occur often (32 occurrences in ten years of data) and 50% leaf damage to occur occasionally (9 occurrences in ten years of data) to low resistance species. Occasional (9 occurrences in ten years of data) threshold damage to moderate resistance species is predicted.

Scenario 6, increasing the drift rate of Unit 4 and adding the helper cooling towers, Units 4 and 5 cooling tower drift rates = 0.0023% and Units 1-3 cooling tower drift rates = 0.002%: The analysis predicts threshold damage to occur often (62 occurrences in ten years of data) and 50% leaf damage to occur occasionally (11 occurrences in ten years of data) to low resistance species. Occasional (14 occurrences in ten years of data) threshold damage to moderate resistance species is predicted.

Other Areas

Salt deposition north of Area II can be assumed to be the same as the deposition described in Part B of Table 5 for areas close to the 5 g/m^2-yr contour line and approach the deposition described in Part D of Table 5 for areas closer to the 2 g/m^2-yr contour line. The 2 g/m^2-yr contour line is not completely drawn on the figures that accompany this report. Salt deposition from the cooling towers will decrease with distance from the cooling towers until it reaches a negligible level. The area between the 5 and 2 g/m^2-yr contour lines and north of the FPC property boundary is estimated to be between 1,000 and 2,000 acres. Planted pine is the predominant biotic community. Salt marsh and coastal hydric and hydric hammock comprise the rest of the area between the 2 and 5 g/m^2-yr contour lines.

In the same method used for Areas I and II, the deposition rates from Part B of Table 5 is used to evaluate the impacts to the vegetation outside of and closely adjacent to Area II. Likewise the deposition rates from Part D of Table 5 will be used to evaluate impacts to areas close to the 2 g/m²-yr contour line.

Scenario 1 of Part B, permitted conditions, Units 4 and 5 cooling tower drift rates = 0.0005% and no helper towers: The analysis predicts rare (2 occurrences in ten years of data) occurrences of threshold damage to low resistance species. There is no other damage predicted for this scenario.

Scenario 2 of Part B, existing conditions, Unit 4 cooling tower drift rate = 0.0005%, Unit 5 cooling tower drift rate = 0.0023% and no helper towers: The analysis predicts occasional (9 occurrences in ten years of data) threshold damage to low resistance species. There is no other damage predicted for this scenario.

Scenario 3 of Part B, increasing the drift rate of Unit 4, Units 4 and 5 cooling tower drift rates = 0.0023% and no helper towers: The analysis predicts occasional (14 occurrences in ten years of data) threshold damage and rare (1 occurrence in ten years of data) occurrences of 50% leaf damage to low resistance species. The analysis predicts rare (2 occurrences in ten years of data) occurrences of threshold damage to moderate resistance species.

Scenario 4 of Part B, adding the helper towers to original permit conditions, Units 4 and 5 cooling towers drift rates = 0.0005%, Units 1-3 cooling towers drift rates = 0.002%: The analysis predicts occasional (11 occurrences in ten years of data) threshold damage to low resistance species. There is no other damage predicted for this scenario.

Scenario 5 of Part B, adding helper towers to existing conditions, Unit 4 cooling tower drift rate = 0.0005%, Unit 5 cooling tower drift rate = 0.0023%, Units 1-3 cooling tower drift rates = 0.002%: The analysis predicts regular (21 occurrences in ten years of data) threshold damage and rare (1 occurrences in ten years of data) 50% leaf damage to low resistance species. The analysis predicts rare (2 occurrences in ten years of data) of threshold damage to moderate resistance species.

Scenario 6 of Part B, adding helper towers and increasing drift rate of Unit 4, Units 4 and 5 cooling tower drift rates = 0.0023%, Units 1-3 cooling tower drift rates = 0.002%: the analysis predicts regular (23 occurrences in ten years of data) threshold damage and rare (2 occurrences in ten years of data) 50% leaf damage to low resistance species. The analysis predicts rare (4 occurrences in ten years of data) threshold damage to moderate resistance species.

The damage described above is at the 5g/m²-yr contour line. The salt deposition and the potential for damage is reduced as the distance from the cooling towers is increased. The damage described below, is at the 2 g/m²-yr contour.

Scenario 1 of Part D, permitted conditions, Units 4 and 5 cooling towers drift rates = 0.0005% and no helper towers: The analysis predicts rare (2 occurrences in ten years of data) threshold damage to low resistance species. There is no other damage predicted for this scenario.

Scenario 2 of Part D, existing conditions, Unit 4 drift rate = 0.0005%, Unit 5 drift rate = 0.0023% and no helper towers: The analysis predicts rare (4 occurrences in ten years of data) threshold damage to low resistance species. There is no other damage predicted for this scenario.

Scenario 3 of Part D, increasing Unit 4 cooling tower drift rate, Units 4 and 5 cooling tower drift rates = 0.0023% and no helper towers: The analysis predicts occasional (7 occurrences in ten years of data) threshold damage to low resistance species. There is no other damage predicted for this scenario.

Scenario 4 of Part D, adding helper towers to permitted conditions, Units 4 and 5 cooling towers drift rates = 0.0005% and Units 1-3 cooling towers drift rates = 0.002%: The analysis predicts rare (4 occurrences in ten years of data) threshold damage to low resistance species. There is no other damage predicted for this scenario.

Scenario 5 of Part D, adding helper towers to existing conditions, Unit 4 cooling towers drift rate = 0.0005%, Unit 5 cooling tower drift rate = 0.0023% and Units 1-3 cooling towers drift rates = 0.002%: The analysis predicts occasional (9 occurrences in ten years of data) threshold damage to low resistance species. There is no other damage predicted for this scenario.

Scenario 6 of Part D, adding helper towers and increasing Unit 4 cooling tower drift rate, Units 4 and 5 cooling towers drift rates = 0.0023% and Units 1-3 cooling towers drift rates = 0.002%: The analysis predicts occasional (9 occurrences in ten years of data) threshold damage to low resistance species. There is no other damage predicted for this scenario.

SOIL IMPACTS ANALYSIS

The EIS and the SCA described the soils and geology of the Crystal River area (see Figure 7).[14] Studies using irrigation water of various salt concentrations have shown that sensitive crops (e.g. corn, tomatoes) displayed no adverse reactions to irrigation with water having salt concentrations up to 500 parts per million (ppm).[15]

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[14]Environmental Impact Statement Florida Power Corporation Crystal River Units 4 and 5, EPA Region IV, EAB, NEPA Compliance Section, July 1980

[15]Quality Criteria for Water, EPA, July 1984.

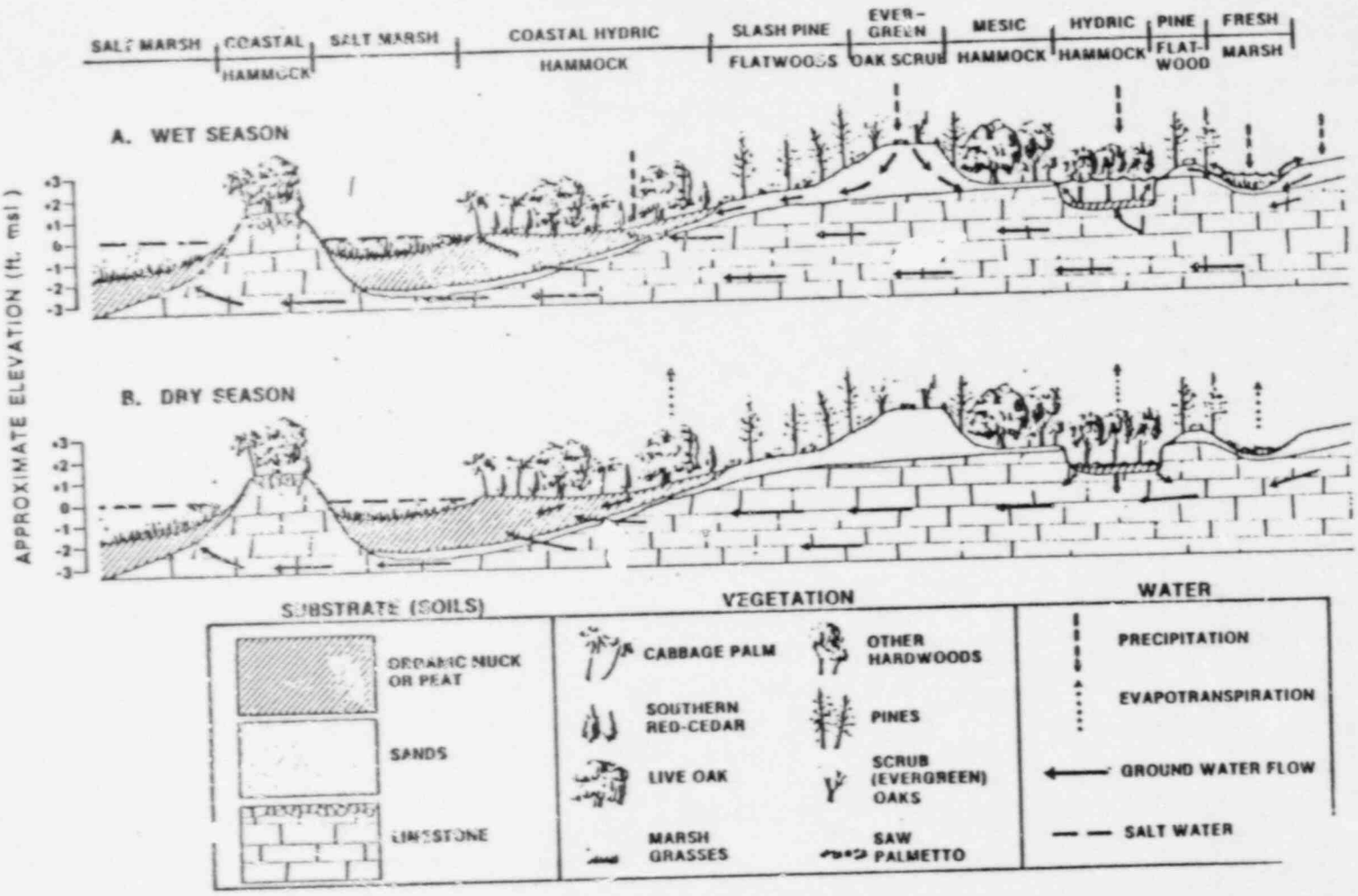

Figure
CONCEPTUALIZED PLANT/SOIL/WATER RELATIONSHIPS OF THE PROPOSED PLANT SITE

SOURCE: ENVIRONMENTAL SCIENCE AND ENGINEERING, INC., 1977

FLORIDA POWER CORPORATION

PROPOSED
CRYSTAL RIVER UNITS 4 & 5

CITRUS COUNTY, FLORIDA

FIGURE 7

Similar studies have shown that soils in arid and semiarid climates display no adverse conditions or build up of inorganic constituents from irrigation with water having salt concentrations up to 480 ppm.[16] Humid climates, like those similar to the Crystal River area, have mitigating effects on salt accumulation impacts on soil.

To address the concerns of salt accumulation in soil, a salt solution can be simulated by assuming to dissolve the annual salt deposition into the annual net rainfall. Then, this simulated salt solution can be applied to the soil. A worst case scenario would be to maximize the salt deposition and minimize the net rainfall. The average annual rainfall in the Crystal River area is 50 inches per year.[17] The evapotranspiration rate for that part of Florida ranges from 44 to 48 inches per year.[18] The worst case scenario would require 19.2 g/m^2-yr of salt (6.2 g/m^2-yr background salt deposition plus 13.0 g/m^2-yr maximum proposed salt deposition due to salt drift at FPC northern property boundary) dissolved into a net rainfall of two inches per year to yield a "solution" of 347 ppm salt in water. This value is below the concentrations needed to cause adverse impacts on soils in arid and semiarid regions.

SURFACE WATER IMPACTS

The geology at Crystal River is one of sandy soil intermixed with limestone formations (see Figure 7). In some places the limestone is very near the surface and can create pockets of sandy soil that are separated from the main body of soil. This separation also includes the groundwater that is entrained in the soil. The groundwater in the area is hydraulically affected by the Gulf of Mexico and in areas close to the shore the groundwater can become brackish. However, the pockets separated by the limestone will hold freshwater and support freshwater hammock vegetation species.

The hydraulic characteristics of the freshwater pockets, as shown in Figure 7, are not isolated but are interactive with the main body of ground water and the seasonal changes in precipitation. During dry periods the water in the freshwater hammocks tends to drain through the limestone due to the lowering of the groundwater table. The freshwater marshes become dry. During wet periods, the hammocks will fill with water from the groundwater table and the marshes tend to overflow.

To consider a worst case scenario, the freshwater pockets can be assumed to be entirely isolated and the salt water solution from the SOIL IMPACTS ANALYSIS can be "poured" into the freshwater pockets. This maximum solution of 347 ppm should have no adverse affects to the water or the vegetation in the freshwater pockets.

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[16] Land Treatment of Municipal Wastewater, Army Corps of Engineers, 1977.

[17] Water Atlas of United States, Geraghty, Miller et al, 1976.

[18] Ibid.

It is expected that the freshwater pockets do not concentrate salt. They interact with the groundwater (i.e. they are not entirely isolated), there is a net positive rainfall in the area, and the salt water impacting them is not very concentrated in salt. However, because the freshwater pockets are very complex systems, it is recommended that baseline data be collected and a monitoring program be installed to determine the impacts that may occur to the freshwater pockets.

CONCLUSIONS AND RECOMMENDATIONS

The current salt deposition at Crystal River has not been shown to be causing damage to the indigenous vegetation. Either of the two proposed changes to the operating conditions (i.e. increasing the drift rate of Unit 4 cooling tower and the addition of helper cooling towers for Units 1-3) will increase the total salt deposition to levels that may occasionally cause serious (i.e. 50% leaf damage) damage to plant species with low resistance to salt in Areas I and II. The combined effect of the two proposed changes results in a salt deposition rate that may regularly cause threshold damage to moderate resistance species on a small portion of Hollins Corporation land (Area I). It is expected that there will be no observable damage to the vegetation north of Area II.

The analysis is presented on a worst-case basis. The measured salt deposition has been less than amounts predicted by the model. It is likely that the salt deposition will be less than the amount used in the analysis. Additionally, the natural division of the plant species in the biotic communities (overstory, understory, and groundcover) will reduce the amount of salt impacting the species with low tolerance to salt accumulation damage.

The freshwater marshes, comprising only five acres, do not have the advantage of the shielding effect of upper vegetation levels. This relatively small amount of wetlands should not be destroyed by the salt deposition impacts, but a species shift may occur causing the more salt tolerant plant species to slowly comprise more of the freshwater marshes.

There should be no adverse impacts to soils from the salt deposition of any of the proposed changes or the combination of the two. The amount of salt being deposited is below levels shown to be safe to soils. The same can be said regarding the concentration of salt in the non-saline surface waters. The surface waters of concern, the freshwater pockets, have interaction with the groundwater, and in the event that they become isolated, the salt being deposited in the freshwater is not sufficient to cause salt concentrations in the water which would be expected to cause damage to the vegetation growing in the freshwater pockets.

In summation, implementing either or both of the proposed operational changes at Crystal River has been predicted to result in adverse impacts to the environs of the area. These impacts are expected to be localized and affect only the most sensitive species. Also, this analysis is believed to overestimate the amount of damage.

EPA believes that the benefit derived from the improvement of the aquatic habitat and the improved efficiency of the cooling towers substantially outweighs the potential adverse impacts to the local area's terrestrial vegetation. Over 800 acres of aquatic habitat will be improved to meet water quality standards. This area's estuarine waters are important resources which must be protected under the requirements of the Clean Water Act and Florida Water Quality Standards. The uncertain loss or damage to low resistance species on 300 acres or less, although of concern, is not considered sufficient to allow continuance of violations of water quality standards or the continuance of low efficiency use of the cooling tower for Unit 4.

Due to the uncertainty surrounding this analysis and to assure that significant impacts do not occur, the following conditions should be placed on the EPA, PSD permit modifications for Units 4 and 5:

A. Florida Power Corporation shall continue the existing vegetation impact and salt deposition monitoring program. Florida Power Corporation shall submit to EPA Region IV and FDER, by no later than October 31, 1988, a plan to expand and modify the existing monitoring program. This expanded monitoring program must be approved by FDER and EPA and shall include the following:

1. An increase in the number of deposition monitors and monthly vegetation monitoring locations to include a representative number of freshwater marshes and coastal hammock and coastal hydric hammock communities.

2. Initiation of a soil salt sampling program which includes obtaining baseline soil salt concentration data by sampling soil at representative locations.

3. Initiation of a surface water salt sampling program which includes obtaining baseline surface water salt concentration data by sampling water in a representative number of freshwater marshes.

4. Inclusion of deposition, soil, fresh water, and vegetation monitoring stations on appropriate portions of Hollins Corp. land.

5. Collection of data to more accurately determine the natural background deposition at Crystal River.

B. In the event that significant damage to terrestrial plants occurs, FPC shall immediately report such findings to EPA and the FDER. Within 90 days thereafter, FPC shall submit to EPA and FDER an assessment of the damage, options to reduce the impact, and a proposed course of action to correct the damage. Upon the direction of the EPA or FDER, FPC shall implement corrective action.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

DATE: SEP 1 1988 PUBLIC NOTICE NO. 88FL036D

NOTICE OF NPDES PERMIT DETERMINATIONS

Company: Florida Power Corporation
Location: St. Petersburg, FL
NPDES Permit No. FL0000159
Permit Issuance Date: SEP 1 1988
Permit Effective Date: OCT 1 1988

After due consideration of the facts applicable to the above-named facility and the requirements and policies expressed in the Clean Water Act and appropriate regulation, the Regional Administrator has determined that the National Pollutant Discharge Elimination System permit should be issued in accordance with the tentative determinations previously announced.

The permit will be effective on the date given above provided that no request for an adjudicatory hearing and/or legal decision is granted by the Agency. If such a request is granted, all contested provisions of the permit will be stayed pending final Agency action. All uncontested provisions of the permit will become effective on the effective date given above.

REQUEST FOR ADJUDICATORY HEARING AND/OR LEGAL DECISION

Any interested person may submit a request for an adjudicatory hearing and/or legal decision within ten (10) days of the receipt of this notice. The request and two copies thereof must be submitted to the Regional Hearing Clerk, Environmental Protection Agency, 345 Courtland Street, N.E., Atlanta, Georgia 30365. The submission of the request will be within the time period if mailed by Certified Mail before the tenth day. The request must:

(i) State the name and address of the person making such request;

(ii) Identify the interest of the requestor which is affected by the proposed issuance, denial or modification of the permit contained in the determination of the Regional Administrator;

(iii) Identify any persons whom the request represents;

(iv) Include an agreement by the requestor to be subject to examination and cross-examination and to make any employee or consultant of such requestor or other person represented by the requestor available for examination and cross-examination at the expense of such requestor or such other person upon the request of the Presiding Officer, on his own motion, or on the motion of any party.

(v) State with particularity the reasons for the request;

(vi) State with particularity the issues proposed to be considered at the hearing; and

(vii) Include proposed terms and conditions which, in the judgment of the requestor, would be required to carry out the intendment of the Act.

Additional information on adjudicatory hearings and legal decisions is found at Title 40 Code of Federal Regulations, Section 125.36, 39, Federal Register 27081.

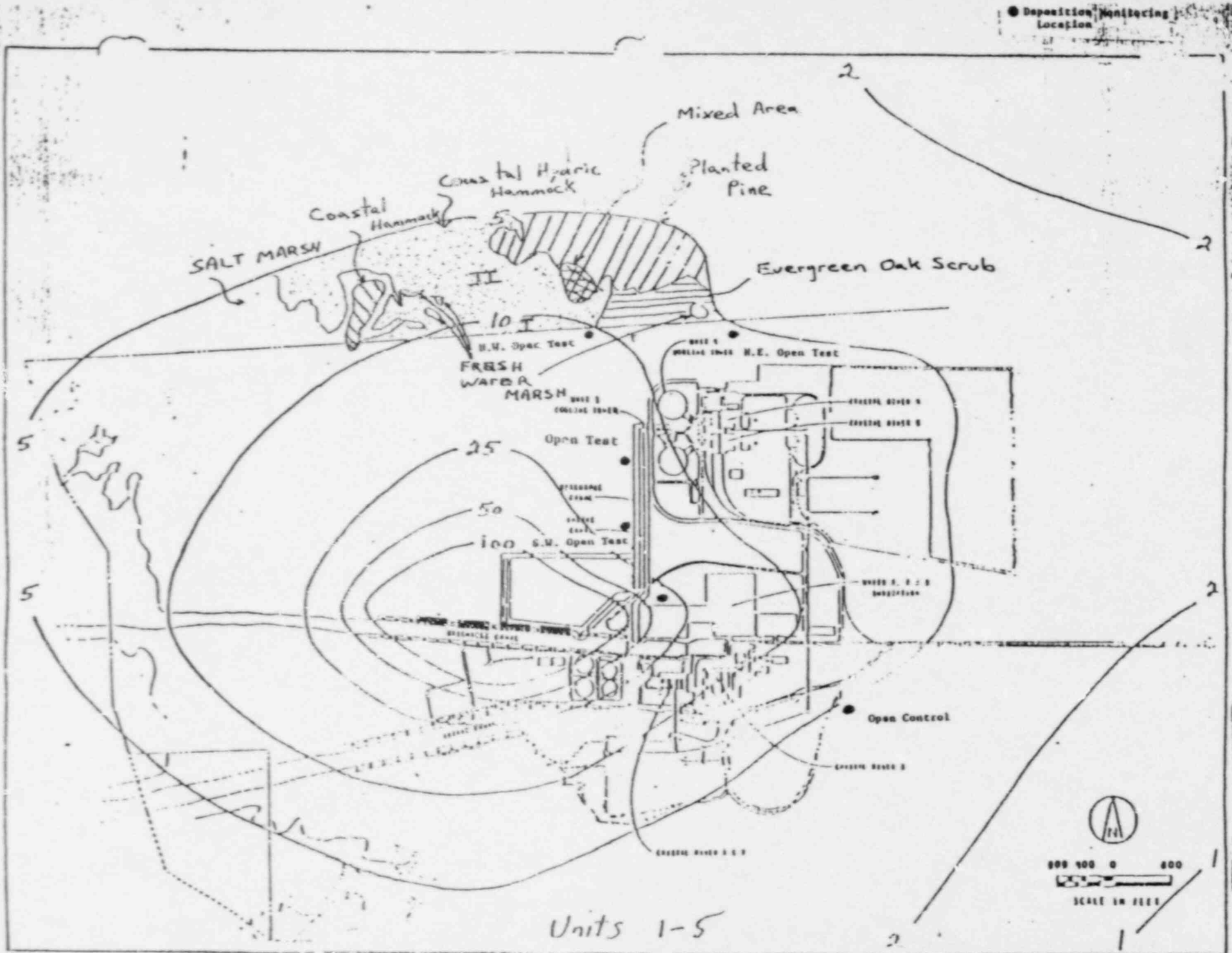

FIGURE 1
Areas Affected by Proposed Maximum Deposition

September 1, 1988

RESPONSE
TO WRITTEN COMMENTS
CRYSTAL RIVER POWER PLANT
UNITS 1, 2, AND 3
NPDES NO. FL0000159

1. Dixie M. Hollins and Louie N. Adcock, Hollins Corporation, 6/30/88.

A. p 1. Description of Hollins Corporation holding was provided.

Response: Comments noted.

B. p 2. Comments submitted on February 17, 1987, were reaffirmed insofar as they apply to the revised alternative thermal controls.

Response: Comment noted.

C. p 2, 3, and 4. Opined that EPA response to previous comments did not adequately address the rehabitation of submerged lands. Disagreed with EPA conclusions as to the area affected by the discharge and to whether the impact was due to heat. Questioned whether the thermally impacted area can be restored even if the thermal discharge is reduced; since they opine that much of the damage results from silt deposition from the Cross Florida Barge Canal and Crystal River Plant dikes and spoil islands.

Response: Construction activities on the Cross Florida Barge Canal (CFBC) ceased in the general period of 1964. About this time, Florida Power Corporation was constructing the intake and discharge canals for their Crystal River Units 1 and 2. EPA agrees that these construction activities undoubtedly induced some level of added turbidity and silt deposition in Crystal Bay. Similarly, erosion of the newly created spoil islands bordering the CFBC and the plant discharge dike added to the initial turbidity and deposition load. EPA believes that this initial turbidity and silt load has diminished over time. For example, shallow shoreline of some spoil islands associated with the barge canal has since been colonized by emergent marsh plants which will mediate shore erosion effects of wave action. The early effects of the probable turbidity and deposition on aquatic life, particularly the attached macroalgae and seagrasses, remain unknown. Evidence collected since 1974, however, indicates that turbidity and silt deposition effects originating from these man-made structures are not responsible for the major loss of attached plant communities in the discharge area of Crystal Bay. Crystal River Units 1, 2, and 3 became operational in 1966, 1969, and 1977, respectively. With the proposed construction of Unit 3, the Crystal Bay area became the focus of intensive physical, chemical and biological studies. Results of these studies (1974) clearly demonstrated the presence and distribution of bottom attached macroalgae and seagrasses in Crystal Bay which included the intake and discharge areas. With Unit 3 placed into operation in 1977, and during the following years of operation 1978-1983, approximately 800 acres of previously vegetated bottom habitat in the discharge became devoid of seagrasses and macroalgae (Crystal River 316 Demonstration Study, 1983-1984). With the operation of Units 1, 2, and 3, water temperatures of 91.4°F (33°C) to 96.8°F (36°C) were common occurrence in the discharge area, particularly in the 800 acre zone of bay bottom previously reported (1974) as supporting attached plants. These observed temperatures far exceed the thermal tolerance of macroalgae and the optimum temperature range of seagrasses.

Turbidity values in the discharge zone associated with the operation of Units 1, 2, and 3 averaged between 5 and 6 Nephelometric Turbidity Units (NTU) during the 1983-84 316 demonstration study. During this same period, turbidity in the non-thermal area of Crystal Bay south of the seven-mile dike averaged between 4 and 5 NTU. The apparent slight increase in turbidity in the discharge zone could easily be related to resuspension effects from the area which was devoid of attached plants. Under some storm conditions when winds are directly onshore, resuspension effects in the discharge area (which is devoid of plants) become more apparent as shown in the 316 demonstration. One of the numerous ecological benefits of an attached plant community is stabilization of the substrate. The difference in the turbidity regime of the discharge area and the non-thermal area of Crystal Bay was not significant. The non-thermal area supports an abundance of attached macroalgae and seagrasses.

From the period of 1974-1984, the sediment composition of the bay bottom both within the discharge and non-thermal areas was studied. The proportions of silt, clay, and sand fraction of the sediments for either area remained the same and unchanged during the study period. Hence, disproportionate silt deposition in the discharge area is not apparent when considering the silt or clay component of the sediments associated with the non-thermal area south of the seven-mile dike. The non-thermal area presently supports an abundance of attached macroalgae and seagrasses.

Based upon the above discussions and results of the 316 demonstration study, there is no evidence that turbidity or siltation are factors responsible for the measured loss of approximately 800 acres of attached macroalgae and seagrasses in the discharge area. Excessive discharge temperatures are considered by EPA to be responsible for the measured loss of this important marine habitat and associated animals.

The installation of the proposed helper cooling towers will result in a discharge temperature regimen similar to thermal conditions prior to the operation of Unit 3. Since the substrate, i.e. sediment quality, of the area appears unchanged from the of non-thermal areas supporting seagrasses and macroalgae, EPA expects recolonization by attached plants will occur. The Florida Power Corporation will be required to supplement recolonization should the natural process be ineffective.

D. p 2. Opined that the EPA response to previous comments did not adequately weigh concerns for the accumulation of salt drift residue in amounts which may ultimately cause chloride contamination and impact to indigenous flora and fauna. Disagreed with EPA conclusions that the salt drift will not impact plants adjacent to the site on both FPC and Hollins land.

Response: EPA has conducted an independent assessment[1] of salt deposition impacts and concluded that there should be no adverse impacts to the indigenous fauna of the area and no long term significant impacts to the vegetation. As indicated below, some short duration impacts may occur. EPA evaluated vegetation types reported as ranging from very tolerant to intolerant and divided into two plant community types: overstory/understory (e.g. live oaks, pine trees) and shrubs and herbaceous species (e.g. holly bush, marsh grass). The EPA analysis

[1] U.S. Environmental Protection Agency, Office of Policy and Management, Region IV, Assessment of Salt Deposition Impacts at Crystal River, August 31, 1988.

utilized a worst case scenario which was more critical than that used by FPC[2] and assessed potential impacts using short-term drift deposition rates (one to 10-day periods) as if they were occurring continuously over the entire four-month summer period of helper tower operation.

The majority or the species that make up the overstory/understory in the Crystal River site area are high and moderate resistant plants with the majority of the low resistance species located in the groundcover layer of the plant community[2]. The Crystal River area contains a negligible amount of salt intolerant vegetation[2]. Figure 1 shows the location and the types of the biotic communities located near the Crystal River that are potentially subject to salt drift impact.

The potential damage to vegetation has been divided into two types of damage; threshold damage and 50% leaf damage. Threshold damage is when the plant being impacted begins to show signs of stress. Threshold damage caused by salt deposition is difficult to identify in field studies because there are usually other sources of stress impacting the vegetation. The 50% leaf damage level of stress caused by salt deposition is evidenced by 50% of the leaves of the plants being damaged. Necrosis is a common a sign of salt damage.

The current vegetation monitoring program has not found any consistent symptoms of salt damage to the plants at Crystal River.

Area I (See Figure 1) is a 15-20 acre portion of land that will receive the greatest salt deposition not on FPC property. The vegetation in Area I is coastal and coastal hydric hammock. The upper levels of vegetation in Area I are mostly high resistance species. These taller plants will receive the majority of the salt deposition and will shield the low-lying vegetation from the salt deposition. The low resistance species are most common in the groundcover level of vegetation. The salt deposition has the potential of causing 50% leaf damage to low resistance species; however, the shielding effect of the tall vegetation will reduce the amount of salt deposited on the low resistance species and the associated damage to those species. There may be threshold damage to moderate resistance species in Area I. However, this potential damage should not be observable.

The largest area of impact, Area II, is 250-300 acres that is comprised of plant communities that have an overstory/understory, except for the freshwater marshes. The overstory/understory species, being taller than the groundcover vegetation, will receive a majority of the salt deposition, thus shielding the low-lying species. The salt deposition has the potential of causing 50% leaf damage to low resistance species. However, the shielding effect of the taller vegetation will reduce any potential impacts from salt deposition. There may be occasional threshold damage to moderate resistance species, although this damage should be unobservable.

There are about five acres of freshwater marshes in Area II that do not contain a canopy and will receive the full salt deposition. The species in the freshwater marshes are about one third each of low, moderate, and high resistance species. The salt deposition may cause damage to the low resistance species which might result in a shift of the plant population toward a higher percentage of more salt tolerant species. There should be no observable impacts north of Area II.

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[2] KBN Engineering and Applied Sciences, Inc., Environmental Asssessment of Salt Drift Impacts from Florida Power Corporation Crystal River Plant, June 1988.

E. p 2. Opined that there have been inadequate data accumulated to determine definitely whether or not accumulation of salt drift will kill plant species in the hammock areas and fresh water marshes or contaminate those areas or substantially change the chemical balance and make them uninhabitable to indigenous flora and fauna.

Response: See Response D. The monthly vegetation monitoring data has shown no evidence of damage due to salt drift. The resistance levels of the various species in the Crystal River area used for predicting impacts to the vegetation have been determined through laboratory experiments and from data obtained via field observations. The model used to estimate the salt deposition rates is considered to be state-of-the-art and generally predicted higher salt deposition rates than were measured at the site, thus offering a further factor of safety.

A study using irrigation water of various salt concentrations showed that sensitive crops (e.g. corn) displayed no adverse reaction to irrigation water with salt concentrations up to 500 ppm[3]. In arid and semiarid climates, soils have shown no adverse conditions or build-up of inorganic constituents from irrigation water with salt concentrations up to 480 ppm[4]. The concentration of salt that could exist from the maximum projected drift rate at the northern FPC property line dissolved in the minimum net rainfall has been calculated to be less than 350 ppm[5]. Although the hammocks are somewhat isolated from the predominant hydrogeologic conditions, the isolation is not total (solution channels exist or overflow occurs during high rainfall periods). However, even if the hammocks or marshes were totally isolated, a concentration of 350 ppm of salt should have no impact on the water or plants. Therefore, no damage is expected to soil, groundwater, or plants due to uptake of this water.

F. p 2. Interpreted the KBN Reports to indicate that a significant impact will occur on a portion of the Hollins property for periods of rainfall separated by 10 days or more and further that there will be damage to the plant life in the area but that there would be some opportunity for "a recovery" of the damage during years with greater than normal rainfall. Does not want damage that needs to be recovered from.

Response: See Response D. The time between rainfall events is not the only important variable in determining impacts to vegetation on Hollins property. The natural shielding that the canopy vegetation gives to the low-lying species is of great importance. The canopy vegetation is made up of mostly salt tolerant species. These tall plants should not be damaged by the salt deposition.

G. p 2. Opined that the permit does not restrict the months of operation of the towers and that such limitations should be included in the permit to minimize drift deposition.

Response: Inclusion of such a condition in the permit is not considered necessary since the economics of the system will dictate minimum use consistent with meeting permitted temperature limitations. Operation of the helper cooling tower system will raise operating costs and will result in lost power (for pumps and motors) which could otherwise be sold.

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3 U.S. Environmental Protection Agency, Quality Criteria for Water, July 1976.
4 U.S. Army Corps of Engineers, Land Treatment of Municipal Wastewater, 197?
5 U.S. Environmental Protection Agency, Office of Policy and Management, Region IV, Assessment of Salt Deposition Impacts at Crystal River, August 31, 1988.

H. p 3. Reiterated previous comments on impacts and damage caused by construction of the Cross Florida Barge Canal when experts had previously indicated that there would be none.

Response: Comments noted.

I. p 4. Opined that the towers should not be installed due to the potential for salt drift damage to currently viable lands; i.e., accept the damage to a relatively small area of submerged land rather than expending tremendous sums in experimention, which may result in damage to many acres of upland, while not ensuring the rehabilitation of the presently impacted area.

Response: Over 800 acres of aquatic habitat will be improved to meet Florida Water Quality Standards requirements by the proposed action. Potential, though not expected to be observable, impacts to land offsite from FPC property would be limited to an area of not more than 300 acres. The Clean Water Act (CWA) requires compliance with Florida Water Quality Standards, and EPA cannot issue a permit which will not meet those standards unless a variance is granted under Section 316(a) of the CWA, which is applicable to thermal discharges only. That section provides that any alternative limitations on the thermal component of the discharge must assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the body of water into which the discharge is made. It follows that EPA cannot issue a permit which does not address the damage caused by the discharge. See, Decision of the General Counsel No. 58, In Re Bethlehem Steel Corporation, March 29, 1977 (the Administrator must independently interpret and apply state water quality standards to ensure compliance with Section 301(b)(1)(c) of the CWA). EPA has tentatively determined that the alternative thermal limitations associated with helper cooling towers are consistent with Section 316(a) and Florida Water Quality Standards requirements. Also see previous responses.

J. p 3. Indicated concern that portions of the Hollins property are underlain with near surface lime rock formations and other areas where deeper lime rock layers produce basins (isolated wetland areas of both marsh and hardwood hammock) in which surface waters are not flushed by surface rainfall to the Gulf and in which salt will accumulate and result in long term damage.

Response: See Response E.

K. p 3 and 5. Indicated that the FPC proposal does not provide for establishment of a monitoring program for salt drift deposition to document baseline soil conditions or measure deposition, vegetation, or accumulation in the soils.

Response: Although no impacts to soil and freshwater are expected, EPA plans to modify the existing NPDES and PSD permits for Units 4 and 5 in the near future[6]. FPC will be required to increase the number of deposition and vegetation monitoring stations included in the approved monitoring program to include a representative number of hammock areas and freshwater marshes. The monitoring program will also be modified to include initiation of soil and freshwater sampling to establish baseline salt concentrations, measure future concentrations, and evaluate changes which could impact vegetation prior to the impacts becoming

[6] U.S. Environmental Protection Agency, Office of Policy and Management, Region IV, Assessment of Salt Deposition Impacts at Crystal River, August 31, 1988.

visibly evident. Additionally permit conditions will require FPC to continue its evaluation of impacts and to implement corrective actions if significant damage occurs. Such action could include the installation of more efficient drift eliminators.

K. p 3. Indicated that the KBN Reports indicate impact to FPC owned land will occur and increased corrosion and associated maintenance costs will will be cause by the helper towers.

Response: The greatest impact on FPC land due to salt drift will occur on areas previously impacted by the construction and operation of the power plant or on existing salt marsh, which will not be further impacted. Some impact to sensitive vegetation may occur in limited areas. Tower locations will be selected to minimize to an acceptable level the impacts of salt drift on plant equipment.

2. Patsy Y. Baynard, Florida Power Corporation, 6/30/88.

A. pp 1-2. Reduction of Heat. (1) FPC continues to believe that discharges have not caused substantial damage. (2) FPC supports the helper cooling tower alternate if thermal reduction is required. (3) Cost information previously submitted was summarized.

Responses: (1) EPA continues to disagree with the FPC position. (2) and (3) Comments noted.

B. p 2. Seagrass Planting. FPC expressed doubt that the area will support seagrass even after thermal reductions; however, they do not oppose the permit requirements for monitoring seagrass recovery and replanting, if necessary, to the extent of the agreed $1.35 million (1988 dollars) and requests that permit include the maximum dollar amount.

Response: EPA believes that both natural and replanted seagrass growth will be successful in a significant portion of the thermally impacted area, but agrees that regrowth in the nearshore area of maximum continued thermal impact will probably not occur. Limits to expenditures have been approved in previous correspondence and do not require inclusion in the permit.

C. pp 2-3. Entrainment/Impingement. FPC continues to disagree with the EPA tentative Section 316(b) findings and determinations; but agrees that there are no cost-effective technologies to modify the intake structures. FPC does not object to the flow reduction or fish hatchery provisions of the draft permit.

Response: Comments noted.

D. pp 3-4. Specific Comments.

(1) p 3. FPC proposed that the limitation on total residual oxidants (chlorine) be changed to 0.08 mg/l based on selection of the naked goby (juvenile) Gobiosoma bosei as the appropriate sensitive species rather than the Atlantic and tidewater silversides, tentatively selected in the Fact Sheet. FPC has requested a mixing zone for this parameter from the FDER and has requested that the approved mixing zone requirements be included in the permit.

Response: EPA maintains that use of toxicity data for the silversides rather than the naked goby is appropriate to assure compliance with toxicity requirements of the Florida Water Quality Standards and has retained an effluent limitation of 0.05 mg/l in the permit. Consistent with the State 401 Certification, EPA has included the approved mixing zone designations in the permit.

(2) p 3. Errors in proposed limitation and reporting requirements for temperature rise in the draft permit were noted.

Response: Corrections have been made.

(3) p 3-4. FPC requested that the phrase "time of total residual oxidant release" be used instead of "time of chlorine addition" for once-through cooling water. Additionally FPC requested that each unit and each of the helper cooling tower discharges be allowed a 120 minute/day period for release of TRO and the effluent limit be 0.08 mg/l.

Response: The phrase "time of total residual oxident release" has been included in the permit and monitoring requirements have been changed accordingly. Effluent Guidelines in 40 CFR Part 423 limit the discharge of TRO from a generating unit to 120 minutes per day. This period has been divided between the once-through cooling water discharges to the discharge canal and the helper cooling tower discharges to the discharge canal. As noted in Item 2.D(1), the effluent limit has been retained at 0.05 mg/l.

(4) p 4. FPC has requested that discharge of TRO be allowed from OSN 006.

Response: The requested change has been made to the permit along with inclusion of monitoring requirements. Intake pumps for OSN 006 are located in close proximity to the once-through cooling water intake pumps serving Unit 3 and may contain a slight carryover of TRC from chlorination of the cooling water.