

**SUPPLEMENT
PERMIT RENEWAL APPLICATION
PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM GENERATING STATION
NJPDES PERMIT NO. NJ0005622**

VOLUME II OF II

MARCH 4, 1993

**DRAFT FACT SHEET/STATEMENT OF BASIS
DRAFT NJPDES PERMIT NO. NJ0005622
SALEM GENERATING STATION**

New Jersey Department of Environmental Protection and Energy
Division of Water Resources
Bureau of Industrial Discharge Permits
CN-029
Trenton, New Jersey 08625
(609) 292-4860

PUBLIC NOTICE

NOTICE OF: CONSIDERATION OF SECTION 316 VARIANCE REQUEST,
INTENT TO REVIEW EXISTING NEW JERSEY POLLUTANT
DISCHARGE ELIMINATION SYSTEM/DISCHARGE TO SURFACE
WATER (NJPDES/DSW) PERMIT NJ0005622, AND NOTICE OF
PUBLIC HEARING

Notice is hereby given that the New Jersey Department of
Environmental Protection and Energy, Division of Water Resources
proposes to renew the existing NEW JERSEY POLLUTANT DISCHARGE
ELIMINATION SYSTEM/DISCHARGE TO SURFACE WATER (NJPDES/DSW) Permit
NJ0005622 to restrict and control the cooling water intake and
the discharge of pollutants to the Delaware River, classified as
Zone 5, from:

Public Service Electric and Gas Company
Salem Nuclear Generating Station
Lower Alloways Creek Township
Salem County, New Jersey

This notice, in accordance with N.J.A.C. 7:14A-8.1 and 7:14A-9.3
is being given to inform the public that the NJDEPE has prepared
a Draft NJPDES Permit Renewal (NJPDES Permit No. NJ0005622) which
contains conditions necessary to implement the provisions of
Section 316 of the Clean Water Act and of the "Regulations
Concerning The New Jersey Pollutant Discharge Elimination System"
(N.J.A.C. 7:14A-1 et seq.), which were promulgated pursuant to
the authority of the New Jersey "Water Pollution Control Act"
(N.J.S.A. 58:10A-1 et seq.).

The applicant operates a three-unit electric generating station
(SIC number 4911). Units No. 1 and 2 are nuclear-powered
pressurized water reactors each rated at about 1,100 MWe and
operate with a once-through cooling water system. Unit No. 3 is
an air-cooled combustion turbine rated at about 40 MWe.

The Department issued a draft renewal permit for this facility on
October 3, 1990. This issuance provides public notice of the
Department's intent to reissue a draft permit based on an
administrative record which now includes information and data
presented in comments to the 1990 draft permit and permittee's
1993 renewal application supplement.

This draft permit proposes to authorize the discharge of pollutants to Zone 5 of the Delaware. This draft permit also proposes to incorporate the Department's determinations with respect to the permittee's request for a variance from surface water quality standards for heat and temperature pursuant to Section 316(a) of the Federal Water Pollution Control Act, 33 USC Section 1251 et seq. ("Clean Water Act") and, further, the Department's determination pursuant to Section 316(b) of the Clean Water Act as to whether the Station's cooling water system is the best technology available for minimizing adverse environmental impacts.

The facility has been classified as a major discharger by the New Jersey Department of Environmental Protection and Energy in accordance with the United States Environmental Protection Agency's (USEPA) rating criteria.

This is an existing facility, and issuance of a NJPDES Permit is the regulatory mechanism which ensures that discharges of pollutants are in compliance with applicable standards. The draft permit contains those conditions necessary to restrict the discharge of pollutants and protect the public health and environment.

Any water quality-based effluent limitations that are included in the final permit shall be adopted as an amendment to the Statewide Water Quality Management Program Plan established under N.J.A.C. 7:15 without further adoption proceedings.

DSNs 481-486 discharge wastewater composed of once-through non-contact cooling water as well as limited quantities of non-radioactive liquid waste and radioactive liquid waste effluent. DSN 48C (an internal monitoring point) discharges approximately 0.26 MGD of treated regenerate wastewater consisting of chemical, steam generator, floor drains and analytical equipment wastewater. DSN 487B discharges approximately 0.002 MGD of wastewater consisting of stormwater, auxiliary boiler blow down, and systems leakage to DSN 487. DSN 487 also discharges stormwater runoff. DSNs 489A and 489B both discharge approximately 0.003 MGD of wastewater consisting of stormwater and systems leakage to DSN 489. DSN 489 also discharges stormwater runoff.

The thermal component of the discharge from DSNs 481-486 is subject to effluent limitations under Section 301 of the Clean Water Act and Section 6 of the New Jersey Water Pollution Control Act. This draft permit proposes to grant the permittee's thermal variance request under Section 316(a) and proposes thermal effluent limitations consistent with the Station's existing once-

through cooling water system: maximum effluent temperature 43.3°C (October-May and 46.1°C (June-September); maximum differential temperature 15.3°C and total facility heat of 30,600 MBTU/hr.

The draft permit proposes Special Conditions requiring: intake screen modifications; an intake flow limitation; a wetlands restoration, enhancement and preservation program; a fish migration impediment elimination program; the conduct of sound deterrent feasibility study; and the conduct of a biological monitoring program. These Special Conditions are required to reduce and minimize environmental impacts related to the Station's cooling water system pursuant to Section 316(b) of the Clean Water Act. These Special Conditions should result in improved survival of impinged organisms and incrementally increased productivity of fish thereby minimizing the effects of losses due to Station operations. Upon implementation of the Special Conditions in the Draft Permit, the Department finds that the cooling water intake structure reflects the best technology available for minimizing adverse environmental impact pursuant to Section 316(b).

The draft document prepared by the NJDEPE is based on the administrative record which is on file at the offices of the NJDEPE, Division of Water Resources, located at 401 East State Street, in the City of Trenton, Mercer County, New Jersey. It is available for inspection by appointment, between 8:30 a.m. and 4:00 p.m., Monday through Friday. Appointments for inspection of the file may be scheduled by submitting a written request to _____ . Copies of the draft permit may be obtained for a nominal charge by contacting the Department.

A copy of the draft permit is also available for inspection at the following locations:

Salem Free Public Library
120 West Broadway
Salem, NJ 08079

Newark Public Library
5 Washington Street
Newark, NJ 07101-0630

Cumberland County Library
800 East Commerce Street
Bridgeton, NJ 08302

NJDEPE will hold non-adversarial public hearings to solicit public comment on the draft permit on _____, 1993 from _____ p.m. to _____ p.m. and _____ p.m. to _____ p.m. at:

Pennsville Memorial High School (Auditorium)
111 South Broadway
Pennsville, New Jersey

and in Cumberland County on _____, 1993 from _____ p.m.
to _____ p.m. and from _____ p.m. to _____ p.m. at:

The permittee/applicant and other interested persons will have the opportunity to present and submit information and comment in favor of or in opposition to the proposed terms and conditions stated in the Draft Permit. The Hearing Officer shall have reasonable discretion in the conduct of the hearing. Among other things, the Hearing Officer may set limits upon the time allowed for oral statements, may require submission of specified statements or types of statements to be in writing, and/or may allow reasonable extension of the comment period by so stating at the hearing. Unless extended, the public comment period in this notice shall close on _____, 199__.

Interested persons may submit written comments on the draft document to the Assistant Director, Wastewater Facilities Management Element, at the NJDEPE address cited above. All comments must be submitted by the close of the public comment period. All persons, including the applicant, who believe that any condition of this draft document is inappropriate or that the Department's tentative decision to issue this draft permit is inappropriate, must raise all reasonably ascertainable issues and submit all reasonably available arguments and factual grounds supporting their position, including all supporting material, by the close of the public comment period. All comments submitted by interested persons in response to this notice, within the time limit, will be considered by the NJDEPE with respect to the permit. After the close of the public comment period, the Department will issue or deny the permit. The Department will respond to all significant and timely comments when a final decision is issued. The applicant and each person who has submitted written comments will receive notice of the NJDEPE's final decision.

If any interested person including the applicant/permittee fails to raise any reasonably ascertainable issues at this time, such person shall be deemed to have waived the right to raise or contest any such issues in any subsequent adjudicatory hearing or appeal. All supporting materials shall be included in full and

may not be incorporated by reference, unless they are already part of the administrative record in the same proceeding, or consist of State or Federal statutes and regulations, USEPA documents of general applicability, or other generally available reference materials.

Additional information concerning the draft permit may be obtained between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday from Richard Hyjack at (609) 292-4860.

Dennis Hart
Assistant Director
Wastewater Facilities Management Element

**DRAFT FACT SHEET/STATEMENT OF BASIS
DRAFT NJPDES PERMIT NO. NJ0005622
SALEM GENERATING STATION**

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
WASTEWATER FACILITIES REGULATION ELEMENT
401 EAST STATE STREET
CN-029
TRENTON, NEW JERSEY 08625

FACT SHEET
FOR
DRAFT NJPDES PERMIT RENEWAL
INCLUDING SECTION 316(a) VARIANCE DETERMINATION
AND SECTION 316(b) "BTA" DECISION

NJPDES Permit No. NJ0005622

DATE:

Name and Address of Applicant: Public Service Electric and
Gas Company
80 Park Plaza
P. O. Box 570
Newark, New Jersey 07101

Name and Address of Facility
Where Discharge Occurs: Salem Generating Station
Artificial Island
Lower Alloways Creek Township
Salem County, New Jersey

Receiving Water: Delaware River

Classification: Zone 5

FACT SHEET

I. INTRODUCTION

The Federal Water Pollution Control Act (the "Clean Water Act" or "CWA"), 33 U.S.C. 1251 et seq., authorizes federal and state agencies to regulate discharges of pollutants to surface waters through the National Pollutant Discharge Elimination System ("NPDES") permit program. The United States Environmental Protection Agency ("USEPA"), which originally administered the NPDES program for New Jersey, delegated program authority to the New Jersey Department of Environmental Protection and Energy ("NJDEPE" or "Department") in 1982. The NJDEPE implements the NPDES program through the New Jersey Pollutant Discharge Elimination System (NJPDES) regulations (N.J.A.C. 7:14A-1 et seq.) which were promulgated pursuant to the authority of the New Jersey Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.).

Public Service Electric and Gas Company ("PSE&G" or the "Company" or "Permittee") is the operator of the Salem Generating Station ("Salem" or the "Station"). PSE&G shares ownership of the Station with Philadelphia Electric Company, Delmarva Power and Light Company, and Atlantic Electric Company. Salem's discharges to surface water are regulated pursuant to NJPDES permit No.

NJ0005622, first issued to PSE&G by the USEPA in 1974. Pursuant to the requirements of N.J.A.C. 7:14A-2.1, PSE&G applied in June 1990 for a renewal of the NJPDES permit for the Station. In addition to supplying the required information relating to characterization of its discharges, PSE&G's application renewed the Company's request for a variance from New Jersey's thermal surface water quality standards for the Station's once through cooling water discharge pursuant to Section 316(a) of the CWA and N.J.S.A. 58:10A-1 et seq. Under Section 316(a), a variance from a thermal standard may be granted if an alternative limit will "assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water." At the time PSE&G filed its permit renewal application, the NJDEPE had under review pursuant to Section 316(b) of the CWA, a best technology available demonstration relative to the Station's cooling water intake system. Under Section 316(b) of the CWA, the location, design, construction, and capacity of cooling water intake structures must reflect the best technology available for minimizing adverse environmental impact.

In October 1990, the Department issued a draft NJPDES permit ("1990 Draft Permit") denying PSE&G's request for a variance pursuant to Section 316(a) and restricting and controlling the operation of the cooling water intake and the discharge of heat to the Delaware

River through flow and temperature limitations that could only have been met by retrofitting the Station with a closed cycle cooling system. The Department's determination was made after a consideration of PSE&G's 1974 Section 316(a) variance request filed with the USEPA, (as updated in 1975, 1978 and 1979) (hereinafter "Variance Request") and PSE&G's 1984 Section 316(b) Demonstration. In addition to thermal effluent limitations provisions and an intake structure determination requiring retrofitting the Station with a closed cycle cooling system, the 1990 Draft Permit contained a number of new or revised effluent limitations and associated terms and conditions for other wastewater constituents.

The Department received and considered comments from PSE&G and numerous other interested parties, including the USEPA, concerning the 1990 Draft Permit. These comments primarily focused on the Department's determination concerning PSE&G's Section 316(a) Variance Request. PSE&G's comments ("PSE&G's Comments" or "1991 Comments") contained information, data and arguments not previously included in the administrative record relevant to the Section 316 determinations. PSE&G's Comments raised questions concerning certain information, data and assumptions that formed the basis for the 1990 Draft Permit decision that recirculating cooling towers are the Best Available Technology ("BAT") for controlling the thermal component of the discharges at the Station and the Best

Technology Available ("BTA") for minimizing adverse environmental impacts resulting from the impingement and entrainment of aquatic species by the Station's cooling water system.

On March 4, 1993, PSE&G filed a supplement to the Company's June 1990 Permit Application ("1993 Application Supplement") incorporating by reference certain of the additional data and information presented in the Company's 1991 Comments and proposing special conditions for a draft NJPDES permit ("Draft Permit"). The special conditions propose certain modifications to the intake screens, a limitation on the volume of intake flow, a program to restore and enhance wetlands in the Delaware River Basin, a fish migration barrier removal program, a study to determine the feasibility of sound as a fish deterrent, and the conduct of a baywide biological monitoring program ("Special Conditions"). The 1993 Application Supplement included a Technical Appendix which generally provides the technical and scientific basis for the Special Conditions. The 1993 Application Supplement also proposed effluent limitations and associated terms and conditions essentially similar to those contained in the Station's 1989 NJPDES permit and the performance of an Effluent Characterization Study and, as required, a Dilution Study.

In light of the information presented in the public comments on the 1990 Draft Permit and PSE&G's 1993 Application Supplement, the Department has reconsidered the decision to require that the Station be retrofitted with closed cycle cooling. As a result of this reconsideration, the Department is issuing this draft NJPDES permit for the Station which proposes measures as BTA under Section 316(b) which will minimize adverse environmental impact and, further, will assure the protection and propagation of a balanced, indigenous population in the Delaware River. This Draft Permit proposes to grant PSE&G a variance from thermal surface water quality standards and requires PSE&G as BTA under Section 316(b) to: make certain intake modifications; limit intake flow; restore and enhance wetlands in the Delaware River Basin; fund a fish migration barrier removal program; conduct a feasibility study on the use of sound as a fish deterrent; and, conduct a bay-wide biological monitoring program, all as more specifically described in the Special Conditions of the Draft Permit.

As indicated above, the 1990 Draft Permit contained a number of new or revised effluent limitations and associated terms and conditions. Many of those permit limits were predicated on the conditions of the 1990 Draft Permit requiring PSE&G to retrofit the Station with a closed cycle cooling system. As this Draft Permit proposes to allow PSE&G to retain the existing once through cooling

water system, it also proposes to incorporate the effluent limits and associated terms and conditions of the Station's existing 1989 NJPDES Permit, applicable to the once through cooling water system, and proposes requiring PSE&G to complete an Effluent Characterization Study, Chronic Toxicity Characterization Study and, as required, a Dilution Study. Upon submission of the final reports for the Effluent Characterization Study, Chronic Toxicity Characterization Study and, if required, the Dilution Study, the Department will determine whether water quality based effluent limitations are required or additional modified permit conditions are necessary. In this Draft Permit, the Department has also modified the Station's existing 1989 permit to change certain monitoring requirements, address treatment system upgrades, and make certain administrative corrections or amendments to update standard permit terms and conditions.

This Draft Permit is being issued pursuant to N.J.A.C. 7:14A-1, et seq. These regulations authorize the Department to issue a new draft permit upon a determination that any information, data, or argument presented during the comment period raises significant factual and/or legal issues concerning the permit or upon the presentation of new information.

II. DESCRIPTION OF FACILITY

The Salem Generating Station is located on the southwestern side of Artificial Island on the eastern shore of the Delaware River ("River" or "Estuary") in Salem County, New Jersey. The Station lies about 50 miles northwest of the mouth of the Delaware Bay and 30 miles southwest of Philadelphia (See Figure 1 on Page 17). The River in the area of the Station is approximately 2.5 miles wide. The tidal flow of the River past the Station is approximately 400,000 cubic feet per second or 259,000 million gallons per day ("MGD"). The River in the vicinity of the Station is characterized by the physical conditions of fluctuating salinity, high tidal current velocity and high turbidity.

The Station consists of three electric generating units. Units No. 1 and No. 2 are nuclear-powered, pressurized water reactors, each rated at about 1,100 MWe (3,400 MWt). Unit No. 3 is an air-cooled combustion turbine rated at about 40 MWe. Unit No. 3 is used as a peaking and emergency standby generator and has no discharge to surface water. Units No. 1 and No. 2 use a once through cooling water system and are operated as baseload electrical generating units. The Salem units were proposed in 1966 and construction was started in 1968. Salem Units No. 1 and No. 2 have been in

operation for more than a decade, beginning commercial operation in 1977 and 1981, respectively.

Four basic steps are involved in the production of electricity at Salem (See Figure 2 on Page 18). Fission in the nuclear reactors heats high purity water in each unit's primary loop system. Heat is then transferred in a heat exchanger (steam generator) to a secondary loop system, creating steam. The steam is used to drive turbines so that some of the energy in the steam is converted to mechanical energy. The turbines are connected to generators that convert the mechanical energy of the rotating turbines into electrical energy. River water is used to cool the steam exhausted from the turbines and condense the steam in the secondary loop system back into high purity water. This process is known as non-contact cooling because the River water does not mix with the Station's steam. The condensed high purity water is returned from the condensers to the steam generators to be converted again into steam to continue to drive the turbines. The River water that passes through the condensers for non-contact cooling of the secondary steam loop is discharged back to the River.

In addition to the discharge of non-contact cooling water, the Station discharges other effluents including low volume waste streams and storm water as discussed in more detail below.

III. DESCRIPTION OF WASTEWATER DISCHARGES AND INTAKES

A. Station Outfalls

The Station can discharge approximately 3,200 MGD of once through, non-contact condenser cooling water through six submerged pipes or outfalls designated as DSNs 481-486. This non-contact cooling water exits from the six discharge pipes at a rapid velocity at the bottom of the River (at a depth of 33 feet) about 500 feet offshore. The high velocity causes rapid mixing of the cooling water with the River water.

Radioactive liquid waste, as permitted by the United States Nuclear Regulatory Commission ("USNRC"), and non-radioactive liquid waste mix with the cooling water and discharge to the River through DSNs 481, 482, 484 and/or 485. Radioactive liquid waste, which averages approximately 0.017 MGD, meets USNRC discharge limitations and conditions. The non-radioactive liquid waste, which averages approximately 0.26 MGD, is treated and monitored at an internal monitoring point, DSN 48C, prior to mixing with the cooling water and discharging to the River through DSNs 481, 482, 484 and/or 485.

The Station has other regulated outfalls or monitoring locations that also discharge to the Delaware River. These outfalls include

DSNs 487, 487B, 488, 489, 489A, 489B, 490 and 491. DSN 487B discharges approximately 0.002 MGD of wastewater consisting of stormwater, auxiliary boiler blowdown, and systems leakage to DSN 487, after treatment by oil/water skimming. DSNs 489A and 489B each discharge approximately 0.003 MGD of wastewater consisting of stormwater and systems leakage to DSN 489, after treatment by oil/water skimming. In addition to the discharges discussed above, DSNs 487, 488, 489, 490, and 491 discharge stormwater runoff from the Station.

A site map that illustrates all intake and discharge points is presented in Figure 3 on Page 19.

B. Circulating Water Intake System

The Circulating Water System ("CWS") intake, located at the southwestern side of Artificial Island, supplies water to cool the condensers of Salem Units No. 1 and No. 2. The intake structure includes 12 separate intake bays (six for each of the two Salem units). Water enters the intake bays through mechanically cleaned trash racks (one per bay), each approximately 11 feet wide and 51 feet long. The trash racks are constructed of 0.5 inch wide steel bars on 3.5 inch centers; the size of the slot opening is 3 inches.

After passing through the trash rack, water, debris, and some aquatic organisms are drawn onto and through an uninterrupted linkage of continuously operating vertical traveling screens (3/8 inch mesh panels) (See Figure 4 on page 20). The screens normally rotate continuously at 0.9 inch/second. Faster screen rotation speeds are used at times of high debris loadings. The traveling screens are equipped with Ristroph-type fish buckets fitted to the base of each screen panel. The buckets are designed to prevent aquatic organisms caught or impinged on the screens from falling back into the screen bay and becoming re-impinged. Fish and small debris collected on the screens fall into the buckets as each screen panel is lifted above the water for cleaning. The organisms remain in a water-filled bucket as the screen panel is rotated over the top of the screen assembly where a low pressure spray washes the organisms into a fish return system. High pressure sprays are then utilized to remove remaining debris from the screens. Fish and debris washed from the screens are returned through bi-directional sluices to the Estuary on either the north or south side of the intake, depending upon the direction of tidal flow, thereby allowing the tidal current to carry the fish and debris away from the intake.

A vertical wet-pit CWS pump, having a design flow of 185,000 gallons per minute ("gpm") (266 MGD), is located in each of the 12

CWS intake bays. When all 12 pumps are in service the design withdrawal capacity of this intake is 3,197 MGD, which represents approximately 1.2% of the River's daily tidal flow past Salem.

C. Service Water Intake System

The Service Water System ("SWS") intake, a nuclear safety-related system, supplies water to cool the heat exchangers and coolers used in conjunction with the reactors, generators, and auxiliary equipment. The SWS intake is located approximately 490 feet upstream (north) from the CWS intake. It consists of 12 intake bays arranged in groups of three and alternating between Units No. 1 and 2. Water enters the bays through mechanically cleaned trash racks constructed of 0.5 inch wide steel bars on 3.5 inch centers, so that the size of the slot opening is 3 inches. After passing through the trash rack, water is drawn through conventional vertical traveling screens (3/8 inch mesh). A 10,875 gpm (15.7 MGD) vertical, deepwell turbine pump is located in each of the 12 intake cells. With all twelve pumps in service, the design withdrawal capacity of this intake is 188 MGD.

IV. DESCRIPTION OF DRAFT PERMIT CONDITIONS

The existing/proposed effluent limitations, effluent sampling analytical data and other pertinent information are described in the Permit Summary Tables (see Pages 21-28). Also included is a summary of the basis for each effluent limitation and other conditions in the Draft Permit.

V. WATER QUALITY BASED PERMIT LIMITS (if applicable)

The Department requires additional information on the character of the Permittee's effluent before determining whether water quality based effluent limitations (non-thermal) ("WQBELs") are necessary. The Draft Permit requires the Permittee to perform an Effluent Characterization Study, a Chronic Toxicity Characterization Study and a Dilution Study. Upon receipt of the results of these studies, the Department may develop and apply WQBELs if required under applicable laws and regulations.

VI. PROCEDURES FOR REACHING A FINAL DECISION ON THE DRAFT PERMIT

The procedures for reaching a final decision on the Draft Permit are set forth in N.J.S.A. 58:10A-7, N.J.A.C 7:14A-7.1 et seq. and N.J.A.C. 7:14A-8.1 et seq. Included in the procedures are

requirements for the submission of comments by the close of the comment period, scheduled dates and procedures for a non-adversarial public hearing, and other procedures for participation in the final agency decision.

N.J.S.A. 58:10A-7 provides that applicants/permittees/interested parties who believe the Department's tentative decision is inappropriate must raise all reasonably ascertainable arguments and factual grounds supporting their position on these issues, including all supporting material, by the close of the public comment period. If the applicant/permittees/interested party fails to raise any reasonably ascertainable issues at this time, it is deemed to have waived the right to raise or contest any such issues in any subsequent adjudicatory hearing or appeal. All supporting materials must be included in full and may not be incorporated by reference, unless they are already part of the administrative record in the same proceeding, or consist of State or Federal statutes and regulations, USEPA documents of general applicability, or other generally available reference materials.

VII. NJDEPE CONTACT

Additional information concerning the revised Draft Permit may be obtained between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday, by contacting Richard Hyjack in the Bureau of Standard Permits at 609-292-4860.

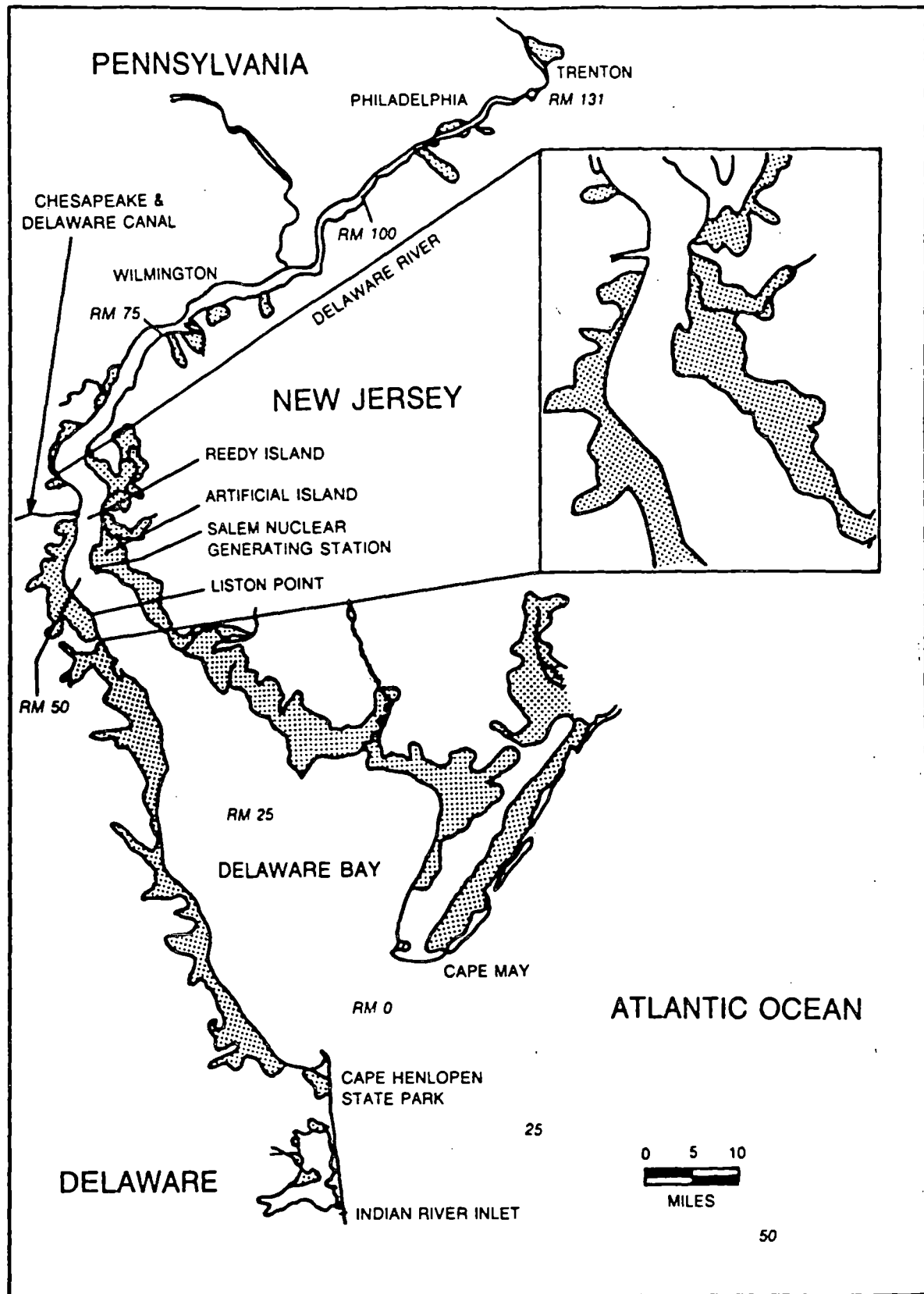


FIGURE 1

DRAFT - FOR DISCUSSION PURPOSES ONLY

SIMPLIFIED STEAM ELECTRIC CYCLE

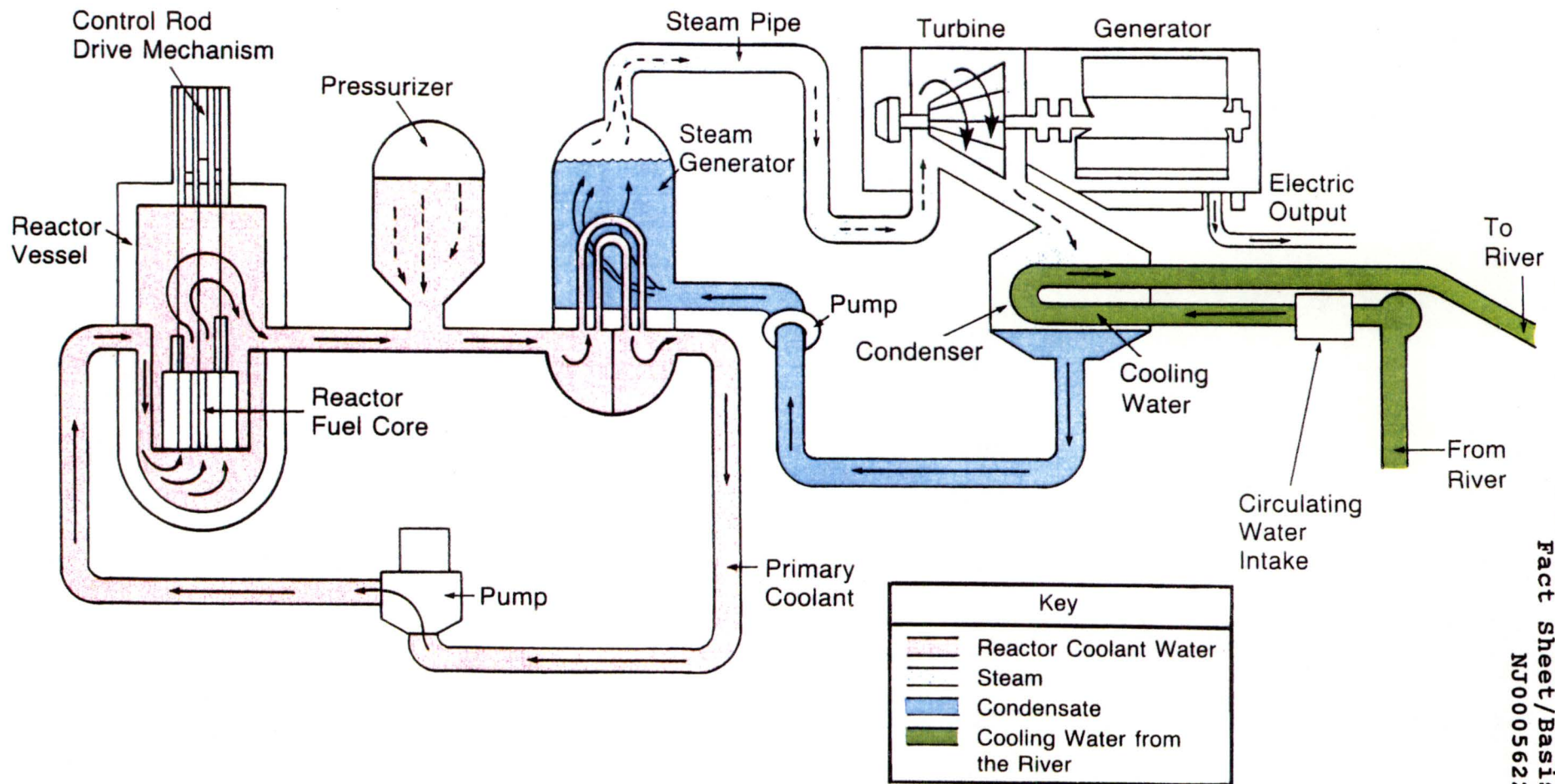


Figure 2

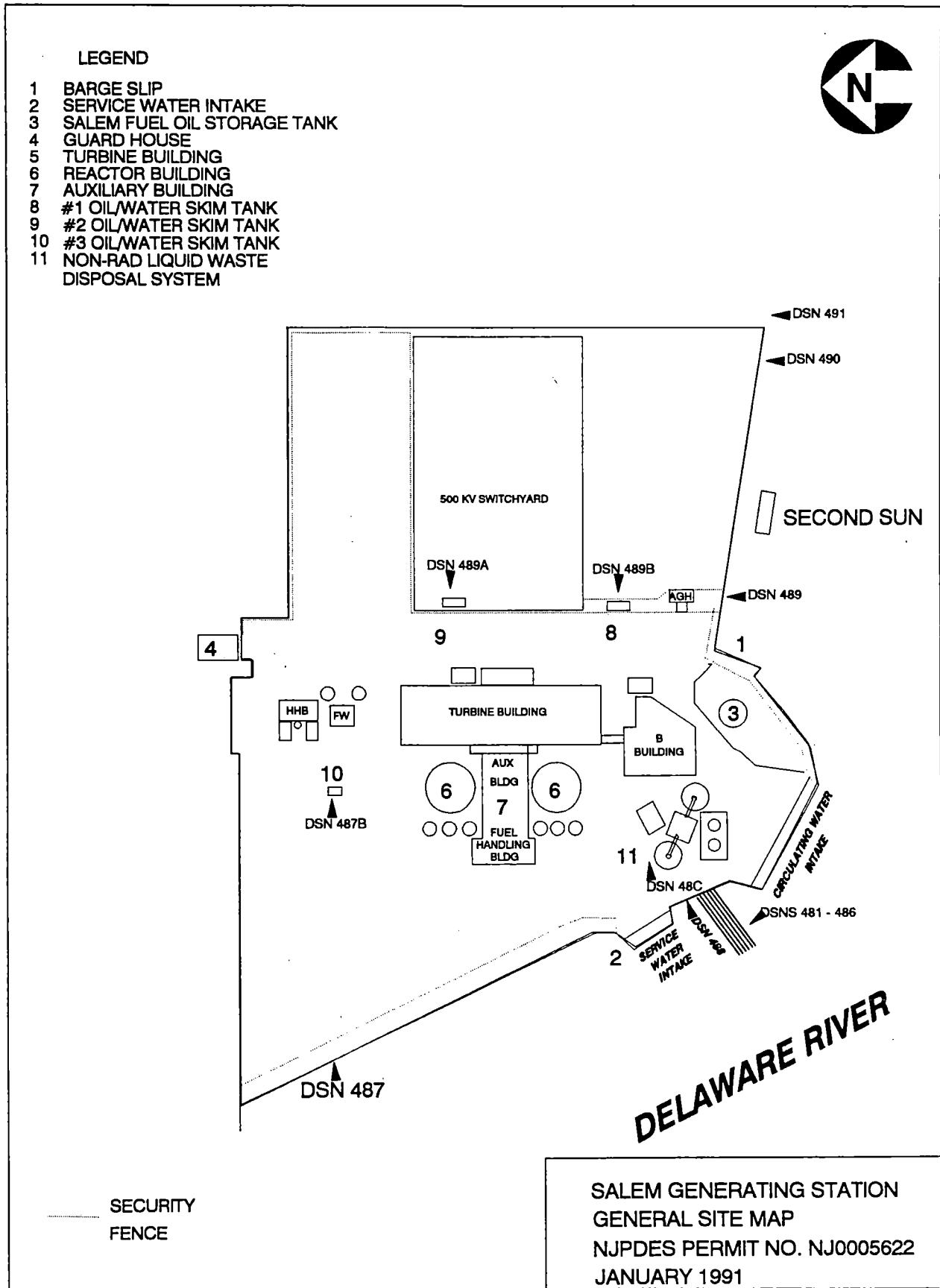


Figure 3

RISTROPH MODIFIED VERTICAL TRAVELING SCREEN

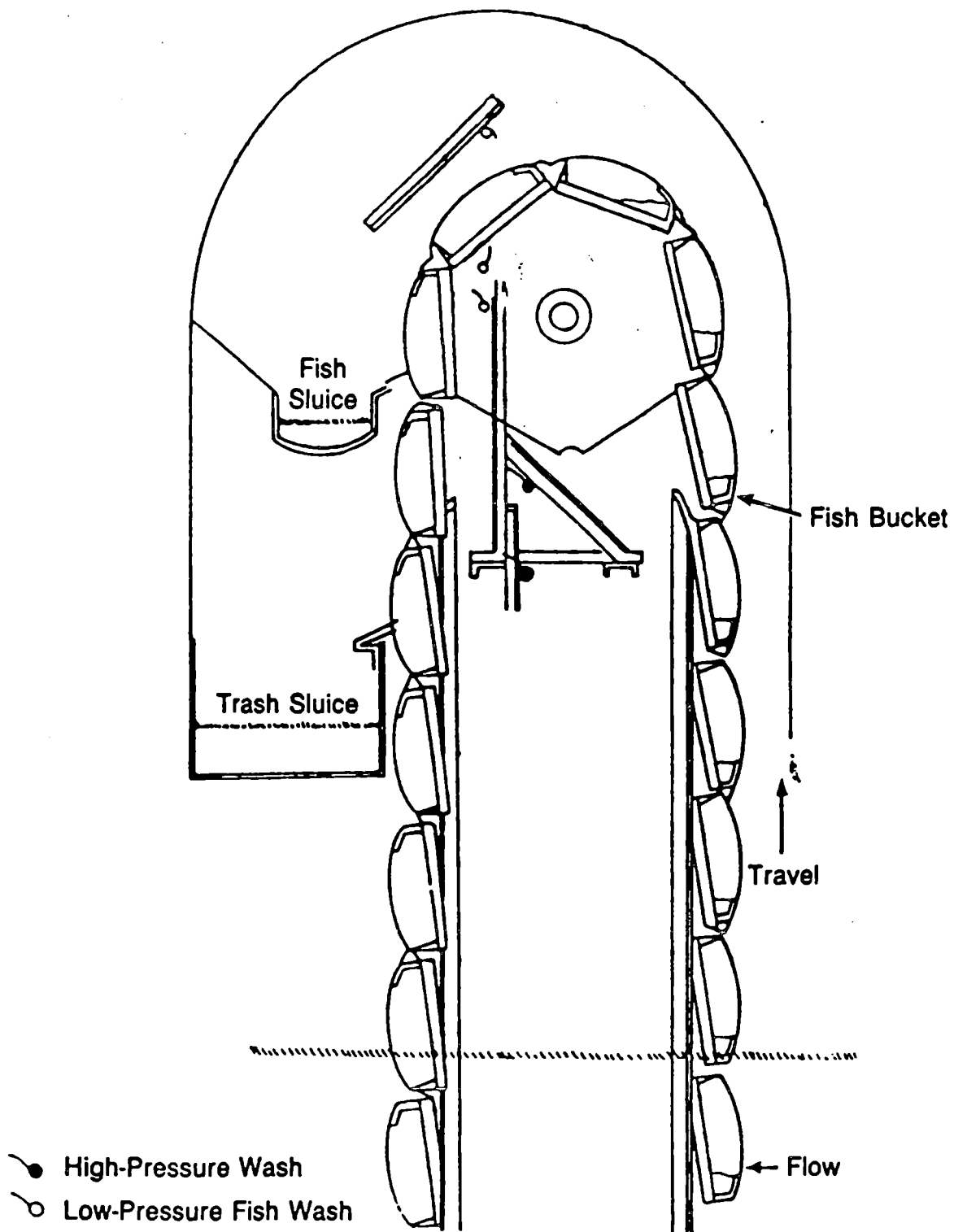


FIGURE 4

DRAFT - FOR DISCUSSION PURPOSES ONLY

PERMIT SUMMARY TABLE

Company: PSE&G - Salem Generating Station

Permit No.: NJ0005622

Discharge Serial No.: 481,482,483,484,485,486

Latitude: 39N 28m 15s

Longitude: 75W 32m 30s

Receiving Stream: Delaware River

Wastewater Type: Non-contact cooling water, NRIWDS effluent and RLW effluent

Parameter (all values are in mg/l unless otherwise stated)	Available Data			Technology Based Limits		State & DRBC Regulations		Existing Permit Condition		Draft Permit Effluent Limit	
	Long-Term AVG	DLY MAX	# Samples	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX
Total Influent Flow (MGD)		(1)		---	---	---	---	---	---	3,024	NL
Effluent Flow (MGD) (2)		(1)		---	---	---	---	NL	NL	NL	NL
Temperature - Influent °C (3)		(1)		---	---	---	---	NL	NL	NL	NL
Temperature - Effluent °C (3)		(1)		---	---	---	---	NL	46.1(5)	NL	46.1(5)
Temperature - Difference °C (3)		(1)		---	---	---	---	NL	15.3	NL	15.3
Heat, Facility (MBTU/hour) (4)		(1)		---	---	---	---	NL	30,600	NL	30,600
Total Residual Chlorine (2)		(1)		---	0.2	---	---	0.3	0.5(6)	0.3	0.5(6)
Total Organic Carbon	---	2.4	1(7)	---	---	---	---	---	---	---	---
COD	---	21	1(7)	---	---	---	---	---	---	---	---
BOD	---	2.6	1(7)	---	---	---	---	---	---	---	---
Total Suspended Solids	---	40	1(7)	---	---	30	100	---	---	---	---
pH Range (S.U.)(2)		(7)		6.0-9.0		---	---	6.0-9.0		6.0-9.0	
Ammonia	---	0.16	1(7)	---	---	35	---	---	---	---	---
Acute Toxicity (%)	---	---	---	---	---	---	---	---	---	LC50 ≥ 50%(8)	
Chronic Toxicity (NOEC, %EFF)	---	---	---	---	---	---	---	---	---	NL(9)	NL(9)
Boron	---	0.24	1(7)	---	---	---	---	---	---	---	---
Copper, Total	---	0.004	1(7)	---	---	---	0.2	---	---	---	---
<p>(1) See Permit Summary Table, DMR Data, for DSNs 481-486.</p> <p>(2) These limitations apply to each outfall, DSNs 481-486.</p> <p>(3) These limitations apply to each unit, DSNs 481-483 (FAC A) and DSNs 484-486 (FAC B).</p> <p>(4) These limitations apply to the combined facility discharge, DSNs 481-486 (FAC C).</p> <p>(5) This limitation shall apply from June 1 through September 30; from October 1 through May 31, the maximum limitation shall be 43.3°C.</p> <p>(6) These limitations shall apply when only service water system non-contact cooling water is discharged. When circulating water system non-contact cooling water is discharged, the maximum limitation shall be 0.2 mg/l.</p> <p>(7) Data reported on Form 2C-V in Application dated June 1, 1990.</p> <p>(8) Acute Toxicity limitation of LC50 ≥ 50% is the minimum limitation and is equivalent to 2TUa's (Acute Toxicity Units) maximum.</p> <p>(9) Chronic Toxicity is reported as a minimum and is performed in conjunction with the Effluent Characterization Study.</p> <p>NOTE: NL denotes "Not Limited" with both monitoring and reporting required.</p>											

PERMIT SUMMARY TABLE
DMR DATA

Discharge Numbers: 481, 482, 483, FAC A
484, 485, 486, FAC B
FAC C

Parameter (all values are in mg/l unless otherwise stated)	DSN 481			DSN 482			DSN 483			DSN 484			DSN 485			DSN 486			
	AVG (2)	MAX (3)	NO (4)	AVG (2)	MAX (3)	NO (4)	AVG (2)	MAX (3)	NO (4)	AVG (2)	MAX (3)	NO (4)	AVG (2)	MAX (3)	NO (4)	AVG (2)	MAX (3)	NO (4)	
Effluent Flow (MGD)	442	533	C	424	533	C	347	533	C	348	533	C	368	533	C	350	533	C	
Total Residual Chlorine	0.01	0.21	546	0.01	0.95	546	0.01	0.20	546	0.01	0.30	546	0.01	0.30	546	0.01	0.23	546	
pH Range (S.U.) (MIN/MAX)	6.3	8.1	182	6.5	8.2	182	6.5	8.2	182	6.1	8.2	182	6.3	8.5	182	6.1	8.7	182	
FAC A (5)										FAC B (6)									
Temperature, Influent °C	14.0 AVG			28.5 MAX			Continuous			13.7 AVG			27.9 MAX			Continuous			
Temperature, Effluent °C	22.8 AVG			37.7 MAX			Continuous			22.1 AVG			38.1 MAX			Continuous			
Temperature, Differential, °C	7.6 AVG			15.3 MAX			Continuous			8.2 AVG			15.3 MAX			Continuous			
FAC C (7)																			
Heat (MBTU/hour)	12,794 AVG						29,835 MAX						Continuous						
(1) Data as reported on Discharge Monitoring Reports for the period January 1, 1989 through June 30, 1992.																			
(2) AVG is long-term average.																			
(3) MAX is daily maximum.																			
(4) NO is number of samples reported; C indicates continuous monitoring.																			
(5) FAC A is the combined discharge from Unit No. 1 including DSNs 481, 482, and 483.																			
(6) FAC B is the combined discharge from Unit No. 2 including DSNs 484, 485, and 486.																			
(7) FAC C is the combined discharge from the facility including DSNs 481, 482, 483, 484, 485, and 486.																			

PERMIT SUMMARY TABLE

Company: PSE&G - Salem Generating Station

Permit No.: NJ00000022

Discharge Serial No.: 48C

Latitude: N/A (4)

Longitude: N/A (4)

Receiving Stream: N/A (4)

Wastewater Type: Treated regenerant wastewater, chemical drains, analytical equipment wastewater, steam generator drains and floor drains.

Parameter (all values are in mg/l unless otherwise stated)	Available Data			Technology Based Limits		State & DRBC Regulations		Existing Permit Condition		Draft Permit Effluent Limit	
	Long-Term AVG	DLY MAX	# Samples	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX
Flow (MGD)	0.2	0.9	C(1)	---	---	---	---	NL	NL	NL	NL
Petroleum Hydrocarbons	0.3	7.4	84(1)	---	---	10	15	10	15	10	15
Total Organic Carbon	4.9	102	50(1)	---	---	---	---	---	---	NL	50
Chemical Oxygen Demand	14.8	162	84(1)	---	50	---	---	NL	100	---	---
BOD	---	2.4	1(6)	---	---	---	---	---	---	---	---
Total Suspended Solids	8.2	58	84(1)	30	100	30(2)	---	30(2)	100	30(2)	100
pH Range (S.U.)				6.0-9.0		---	---	6.0- 9.0(3)		6.0-9.0(3)	
Ammonia	22.1	79.6	84(1)	---	---	35	---	35	70	35	70
Acute Toxicity (%)	86	100	16(1)	---	---	---	---	LC50 \geq 50% (7)		---	---
Chromium, Hex	0.03	0.05	6(1)	---	---	---	---	---	---	---	---
Copper, Total	0.07	0.31	7(5)	---	---	---	---	---	---	---	---
Iron, Total	0.45	2.2	7(5)	---	---	---	---	---	---	---	---
Lead, Total	---	0.004	1(6)	---	---	---	---	---	---	---	---
Nickel, Total	---	0.09	1(6)	---	---	---	---	---	---	---	---
Nitrate-Nitrite	---	0.011	1(6)	---	---	---	---	---	---	---	---
Phenols, Total	---	0.008	1(6)	---	---	---	---	---	---	---	---
Phosphorus	---	0.9	1(6)	---	---	---	---	---	---	---	---
Sulfate	---	10,000	1(6)	---	---	---	---	---	---	---	---
Sulfide	---	1.9	1(6)	---	---	---	---	---	---	---	---
Total Organic Nitrogen	---	6	1(6)	---	---	---	---	---	---	---	---
Zinc, Total	0.03	0.16	7(5)	---	---	---	---	---	---	---	---
(1) Data reported on Discharge Monitoring Reports for the period January 1, 1989 through June 30, 1992. (2) Also, TSS shall not exceed 45 mg/l as a 7-day average. (3) pH shall be monitored and reported at the respective outfall DSNs 481, 482, 484, and/or 485. (4) Internal waste stream discharging through DSNs 481, 482, 484, and/or 485. (5) Data reported on Discharge Monitoring Reports for the period January 1, 1989 through March 31, 1989 and also data reported on 2C-V in Application dated June 1, 1990. (6) Data reported on Form 2C-V in Application dated June 1, 1990. (7) Acute toxicity limitation of LC50 \geq 50% is the minimum limitation and is equivalent to 2Tua's (Acute Toxicity Units) maximum. NOTE: NL denotes "Not Limited" with both monitoring and reporting required. C indicates continuous monitoring.											

PERMIT SUMMARY TABLE

Company: PSE&G - Salem Generating Station Permit No.: NJ0005622 Discharge Serial No.: 487
 Latitude: 39N 27m 45s Longitude: 75W 32m 00s Receiving Stream: Delaware River
 Wastewater Type: Effluent from DSN 487B, stormwater, groundwater, and flood pump discharge.

Parameter (all values are in mg/l unless otherwise stated)	Available Data		Technology Based Limits		State & DRBC Regulations		Existing Permit Condition		Draft Permit Effluent Limit(5)	
	DLY MAX	# Samples	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX
Flow (MGD)	0.04	3(1)	---	---	---	---	NL	NL	---	---
Petroleum Hydrocarbons(3)	0	3(1)	---	---	10	15	10	15	---	---
Total Organic Carbon(3)	-2	2(1)	---	---	---	---	---	---	---	---
COD(3)	2	3(1)	---	---	---	---	NL	100	---	---
BOD	9	1(4)	---	---	---	---	---	---	---	---
Total Suspended Solids(3)	-73	3(1)	---	---	30(2)	---	30(2)	100	---	---
pH Range (S.U.) (MIN/MAX)	7.0/7.6	3(1)	6.0-9.0		6.0-9.0		6.0-9.0		---	---
Ammonia	0.205	1(4)	---	---	---	---	---	---	---	---
Cadmium, Total	0.004	1(4)	---	---	---	---	---	---	---	---
Chromium, Total	0.006	1(4)	---	---	---	---	---	---	---	---
Copper, Total	0.004	1(4)	---	---	---	---	---	---	---	---
Lead, Total	0.003	1(4)	---	---	---	---	---	---	---	---
Mercury, Total	0.0019	1(4)	---	---	---	---	---	---	---	---
Phenols, Total	0.068	1(4)	---	---	---	---	---	---	---	---
Zinc, Total	0.04	1(4)	---	---	---	---	---	---	---	---
(1) Data reported on Discharge Monitoring Reports for the period April 1, 1989 through June 30, 1992. (2) TSS shall not exceed 30 mg/l as a 30-day average and 45 mg/l as a 7-day average. (3) These parameters are reported as the net concentration discharged relative to the receiving waterbody. (4) Data reported on Form 2C-V in application dated June 1, 1990. (5) This discharge shall no longer be a monitored outfall. NOTE: NL denotes "Not Limited" with both monitoring and reporting required.										

PERMIT SUMMARY TABLE

Company: PSE&C Salem Generating Station Permit No.: NJ0005622 Discharge Serial No.: 487B
 Latitude: 39N 27m 45s Longitude: 75W 32m 00s Receiving Stream: Delaware River
 Wastewater Type: Stormwater, Equipment Drains, Aux Boiler Blowdown, Floor Drains

Parameter (all values are in mg/l unless otherwise stated)	Available Data			Technology Based Limits		State & DRBC Regulations		Existing Permit Conditions		Draft Permit Effluent Limit	
	Long-Term AVG	DLY MAX	# Samples	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX
Flow (MGD)(3)	0.002	0.002	39(1)	--	--	--	--	NL	NL	NL	NL
Temperature-Effluent °C	25.8	56.7	39(1)	--	--	--	43.3	NL	43.3	NL	43.3
Petroleum Hydrocarbons	0.6	5.3	39(1)	--	--	10	15	10	15	10	15
Total Organic Carbon	1.9	6.5	28(1)	--	--	--	--	--	--	NL	50
COD	10.5	75	39(1)	--	--	--	--	NL	100	--	--
BOD	--	15	1(4)	--	--	--	--	--	--	--	--
Total Suspended Solids	3.2	28	39(1)	--	--	30(2)	--	30(2)	100	30(2)	100
pH Range (S.U.)(MIN/MAX)	6.8	8.0	39(1)	6.0-9.0		6.0-9.0		6.0-9.0		6.0-9.0	
Ammonia	--	0.47	1(4)	--	--	--	--	--	--	--	--
Cadmium, Total	--	0.002	1(4)	--	--	--	--	--	--	--	--
Copper, Total	--	0.003	1(4)	--	--	--	--	--	--	--	--
Phenols, Total	0.083	0.18	4(5)	--	--	--	--	--	--	--	--
(1) Data reported on Discharge Monitoring Reports for the period April 1, 1989 through June 30, 1992. (2) TSS shall not exceed 30 mg/l as a 30-day average and 45 mg/l as a 7-day average. (3) Flow is calculated based on non-precipitation related estimated discharge plus the calculated precipitation related discharge for the reporting period. (4) Data reported on Form 2C-V in Application dated June 1, 1990. (5) Data reported on Form 2C-V in Application Supplement dated January 10, 1991. NOTE: NL denotes "Not Limited" with both monitoring and reporting required.											

PERMIT SUMMARY TABLE

Company: PSE&G - Salem Generating Station

Permit No.: NJ0005622

Discharge Serial No.: 489

Latitude: 39N 27m 45s

Longitude: 75W 32m 00s

Receiving Stream: Delaware River

Wastewater Type: Effluent From DSN 489A and DSN 489B and Stormwater

Parameter (all values are in mg/l unless otherwise stated)	Available Data		Technology Based Limits		State & DRBC Regulations		Existing Permit Condition		Draft Permit Effluent Limit(4)	
	DLY MAX	# Samples	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX
Flow (MGD)	0.01	3(1)	---	---	---	---	NL	NL	NL	NL
Petroleum Hydrocarbons(3)	6.8	3(1)	---	---	10	15	10	15	10	15
Total Organic Carbon(3)	-0.3	2(1)	---	---	---	---	---	---	NL	50
COD(3)	5	3(1)	---	---	---	---	NL	100	---	---
BOD	36	1(5)	---	---	---	---	---	---	---	---
Total Suspended Solids(3)	-41.8	3(1)	---	---	30(2)	---	30(2)	100	30(2)	100
pH Range (S.U.) (MIN/MAX)	7.1/7.6	3(1)	6.0-9.0		6.0-9.0		6.0-9.0		6.0-9.0	
Ammonia	1.18	1(5)	---	---	---	---	---	---	---	---
Cadmium, Total	0.005	1(5)	---	---	---	---	---	---	---	---
Chromium, Total	0.004	1(5)	---	---	---	---	---	---	---	---
Copper, Total	0.017	1(5)	---	---	---	---	---	---	---	---
Lead, Total	0.004	1(5)	---	---	---	---	---	---	---	---
Phenols	0.096	1(5)	---	---	---	---	---	---	---	---
Zinc, Total	0.08	1(5)	---	---	---	---	---	---	---	---
<p>(1) Data reported on Discharge Monitoring Reports for the period April 1, 1989 through June 30, 1992 for the outfall specified in the 1989 NJPDES permit.</p> <p>(2) TSS shall not exceed 30 mg/l as a 30-day average and 45 mg/l as a 7-day average.</p> <p>(3) These parameters are reported as the net concentration discharged relative to the receiving waterbody.</p> <p>(4) These limitations and conditions shall apply upon commencement of operation of the Oil Water Separator System. Until this Oil Water Separator System is installed and operational, this discharge shall not be a monitored outfall.</p> <p>(5) Data reported on Form 2C-V in application dated June 1, 1990.</p> <p>NOTE: NL denotes "Not Limited" with both monitoring and reporting required.</p>										

PERMIT SUMMARY TABLE

Company: PSE&G Salem Generation Station Permit No.: NJ0005622 Discharge Serial No.: 489A
 Latitude: 39N 27m 45s Longitude: 75W 32m 00s Receiving Stream: Delaware River
 Wastewater Type: Treated Stormwater, Turbine Sumps, and Transformer Drains

Parameter (all values are in mg/l unless otherwise stated)	Available Data			Technology Based Limits		State & DRBC Regulations		Existing Permit Condition		Draft Permit Effluent Limit(3)	
	Long-Term AVG	DLY MAX	# Samples	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX
Flow (MGD)	0.003	0.003	39(1)	---	---	---	---	NL	NL	NL	NL
Petroleum Hydrocarbons	1	9	39(1)	---	---	10	15	10	15	10	15
Total Organic Carbon	2.8	6.1	28(1)	---	---	---	---	---	---	NL	50
COD	22.3	78	39(1)	---	---	---	---	NL	100	---	---
BOD	---	14	1(4)	---	---	---	---	---	---	---	---
Total Suspended Solids	4	27	39(1)	---	---	30(2)	---	30(2)	100	30(2)	100
pH Range (S.U.) (MIN/MAX)	6.3	8.2	39(1)	6.0-9.0		6.0-9.0		6.0-9.0		6.0-9.0	
Ammonia	---	0.54	1(4)	---	---	---	---	---	---	---	---
(1) Data reported on Discharge Monitoring Reports for the period April 1, 1989 through June 30, 1992. (2) TSS shall not exceed 30 mg/l as a 30-day average and 45 mg/l as a 7-day average. (3) The limitations and conditions shall only apply until installation and operation of the Oil Water Separator System at DSN 489. At that time, DSN 489A will not be an outfall. (4) Data reported on Form 2C-V in application dated June 1, 1990. NOTE: NL denotes "Not Limited" with both monitoring and reporting required.											

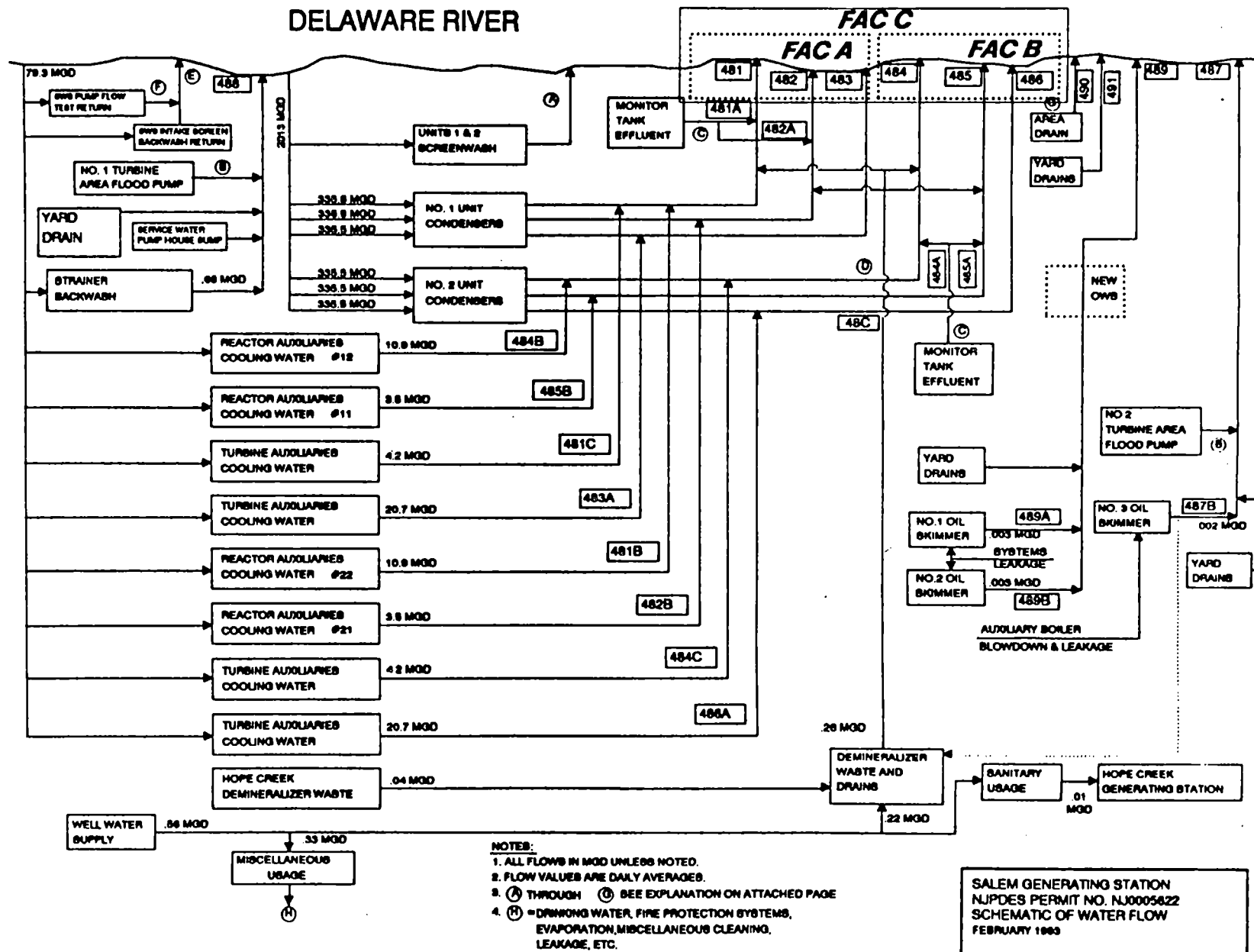
PERMIT SUMMARY TABLE

Company: PSE&G - Salem Generating Station Permit No.: NJ0005622 Discharge Serial No.: 489B
 Latitude: 39N 27m 45s Longitude: 75W 32m 00s Receiving Stream: Delaware River
 Wastewater Type: Treated stormwater, turbine sumps, and transformer drains.

Parameter (all values are in mg/l unless otherwise stated)	Available Data			Technology Based Limits		State & DRBC Regulations		Existing Permit Condition		Draft Permit Effluent Limit(4)	
	Long-Term AVG	DLY MAX	# Samples	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX	MON AVG	DLY MAX
Flow (MGD)	0.003	0.003	39(1)	---	---	---	---	NL	NL	NL	NL
Petroleum Hydrocarbons	2.7	24	39(1)	---	---	10	15	10	15	10	15
Total Organic Carbon	4.3	11	28(1)	---	---	---	---	---	---	NL	50
COD	33.1	94	39(1)	---	---	---	---	NL	100	---	---
BOD	---	7.5	1(3)	---	---	---	---	---	---	---	---
Total Suspended Solids	12.6	33	39(1)	---	---	30(2)	---	30(2)	100	30(2)	100
pH Range (S.U.) (MIN/MAX)	6.6	8.5	39(1)	6.0-9.0		6.0-9.0		6.0-9.0		6.0-9.0	
Ammonia	---	1.27	1(3)	---	---	---	---	---	---	---	---
(1) Data reported on Discharge Monitoring Reports for the period April 1, 1989 through June 30, 1992. (2) TSS shall not exceed 30 mg/l as a 30-day average and 45 mg/l as a 7-day average. (3) Data reported on Form 2C-V in application dated June 1, 1990. (4) These limitations and conditions shall only apply until installation and operation of the Oil Water Separator System at DSN 489. At that time, DSN 489B will not be an outfall. NOTE: NL denotes "Not Limited" with both monitoring and reporting required.											

FIGURE 5

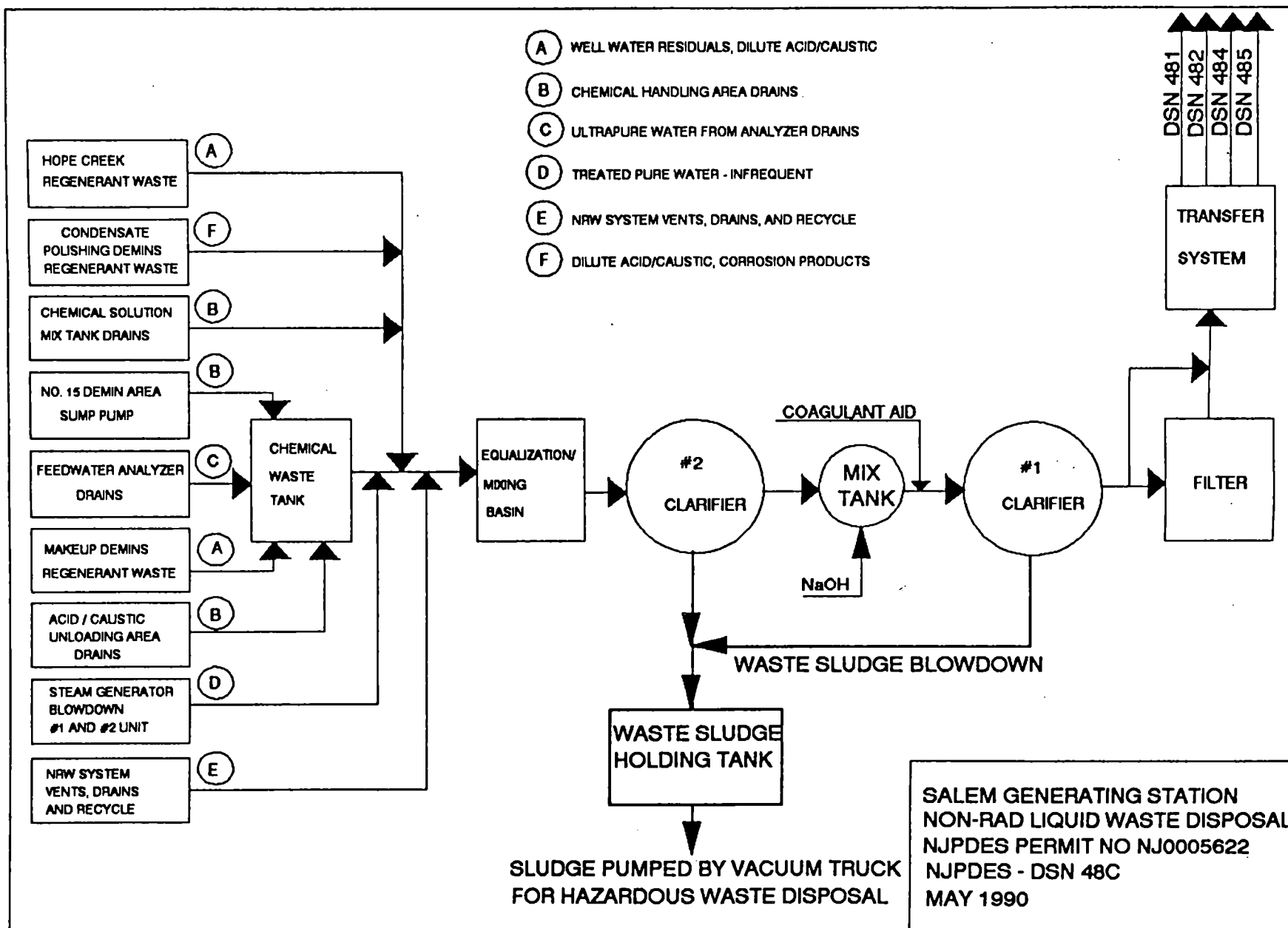
DRAFT - FOR DISCUSSION PURPOSES ONLY



**SALEM GENERATING STATION
SCHEMATIC OF WATER FLOW
EXPLANATION OF NOTES**

- A** The non-contact cooling water intake screens collect debris which enter past the trash racks. This material is washed from the intake screens with Delaware River water and returned to the Delaware River.
- B** The turbine building flood pumps are designed to remove excess water from the turbine building in the event of flooding. They are automatically energized when the level in the flood sump reaches the setpoint. This setpoint is above the operating level of the turbine building sump pumps which discharge through DSN 489A and 489B. The turbine building flood pumps are only operated in a flooding emergency except for routine testing to verify operability.
- C** Monitor Tank effluent is the discharge from the radioactive liquid waste system. The radioactive liquid waste system discharges through DSN 481, 482, 484, and/or 485. The radioactivity concentrations, quantities, and rate are regulated and limited by the US Nuclear Regulatory Commission.
- D** The Non-Radioactive Liquid Waste Disposal System (NRLWDS) treats chemical wastes from the facility and is explained in detail in this application as DSN 48C.
- E** The service water intake screens are cleaned by applying reverse flow service water and allowing the debris to be collected in a basket for disposal at a landfill and service water to discharge directly back to the Delaware River. This outfall discharges with the contribution from "F" below.
- F** The flow bypass line allows the discharge of the service water pumps to be returned directly to the Delaware River through the same outfall used for screenwash discharge for measurement of the flow from each pump. This evolution is conducted by diverting the flow from a service water pump, at a rate of approximately 12,000 gallons per minute, back to the Delaware River to allow a full flow measurement of the pump capacity. During this bypass operation, the addition of sodium hypochlorite will be terminated and the discharge to the Delaware River will be the intake water from the Delaware River.
- G** The outfall identified as DSN 490 consists only of a conduit penetrating the earthen embankment to allow precipitation runoff to flow toward the Delaware River.

Figure 6



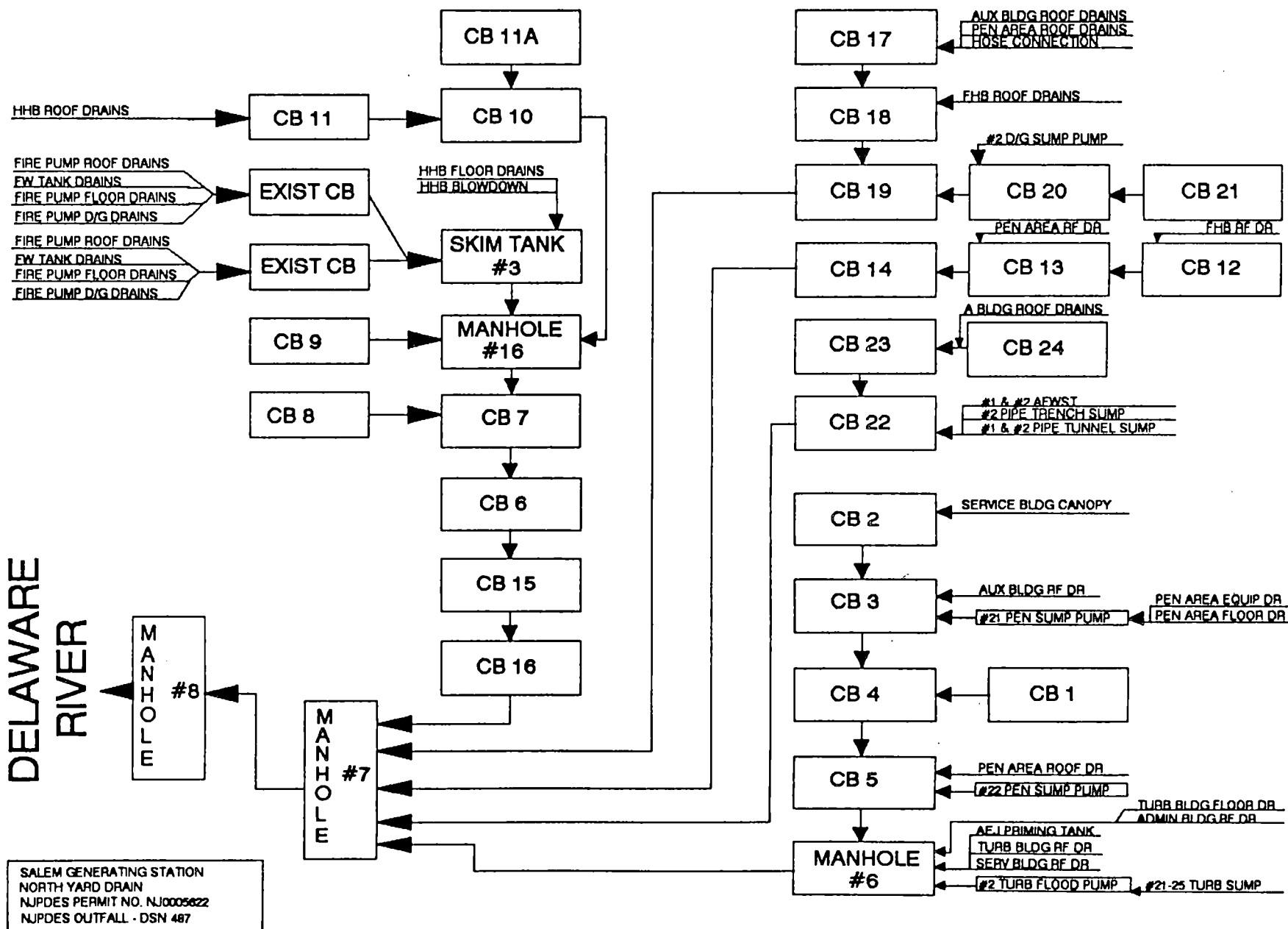


Figure 7

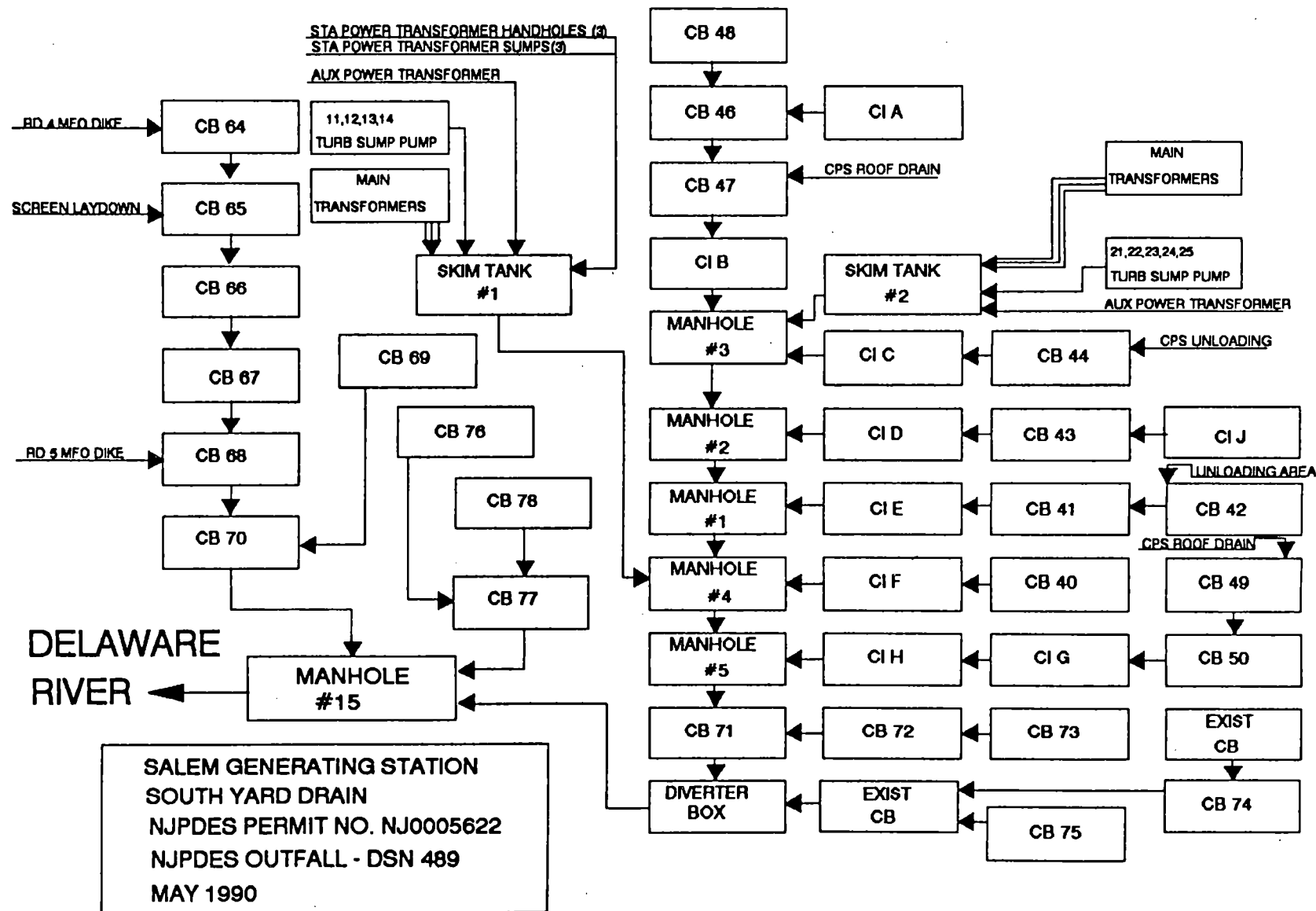


Figure 8

Figure 9

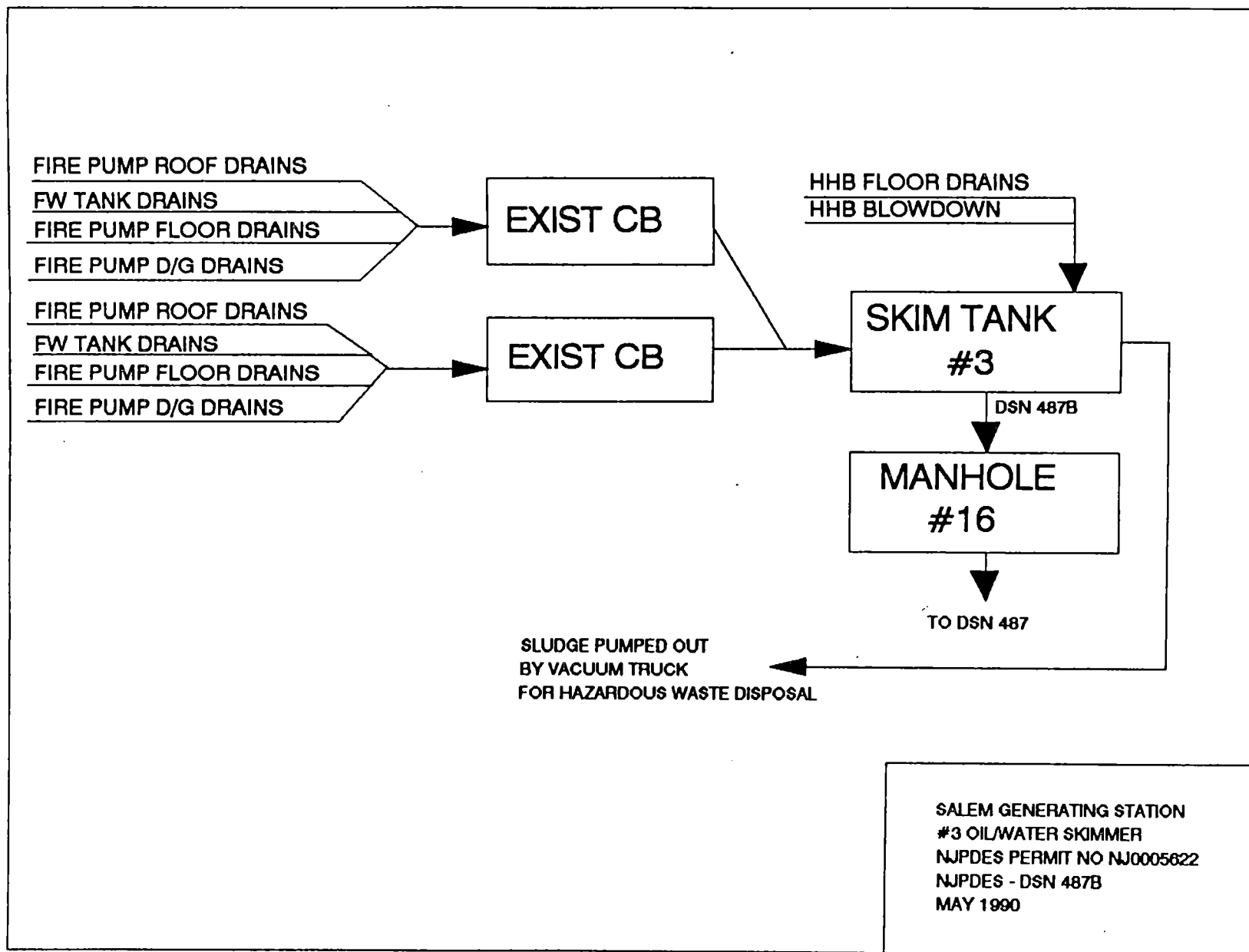
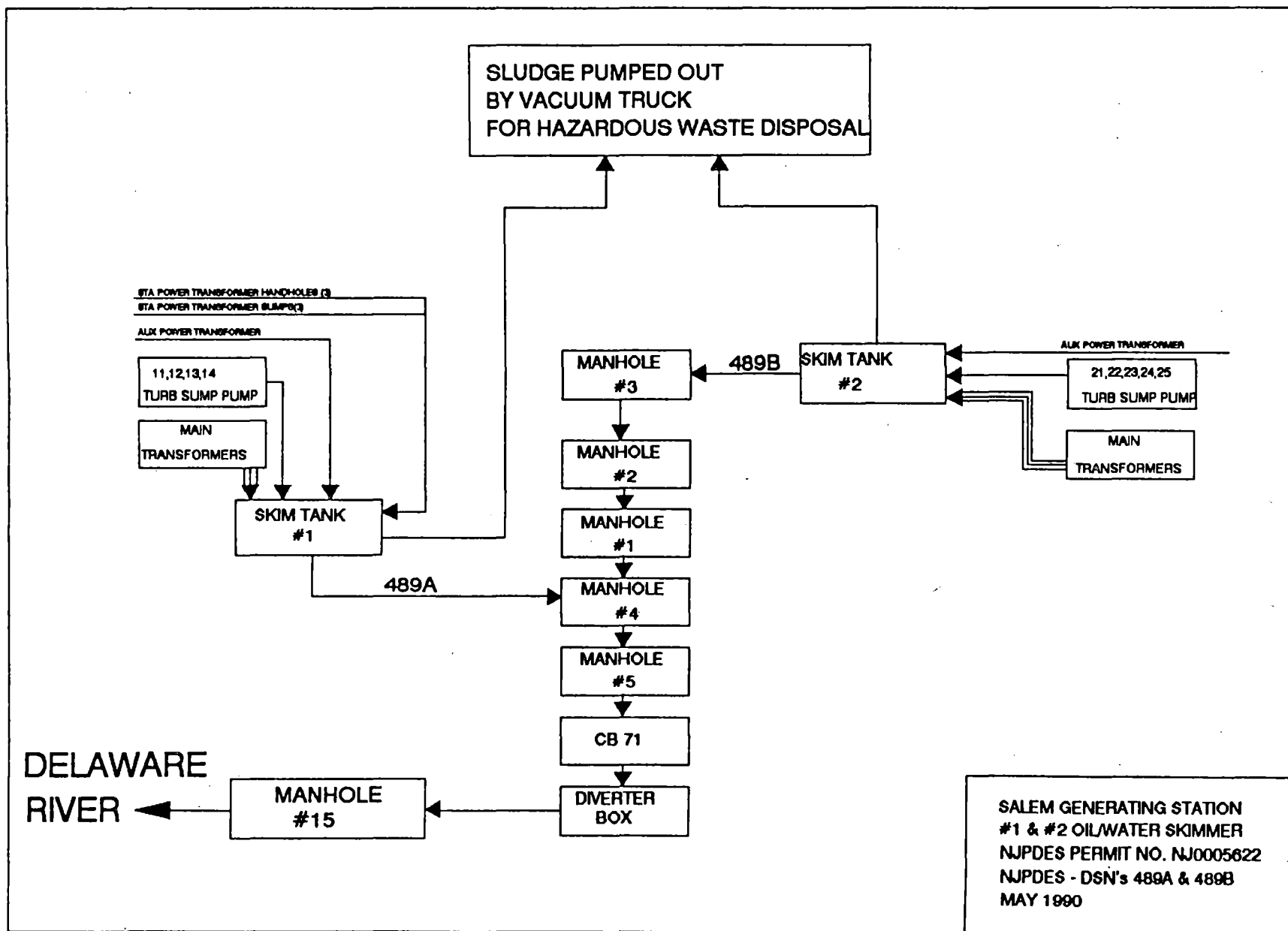
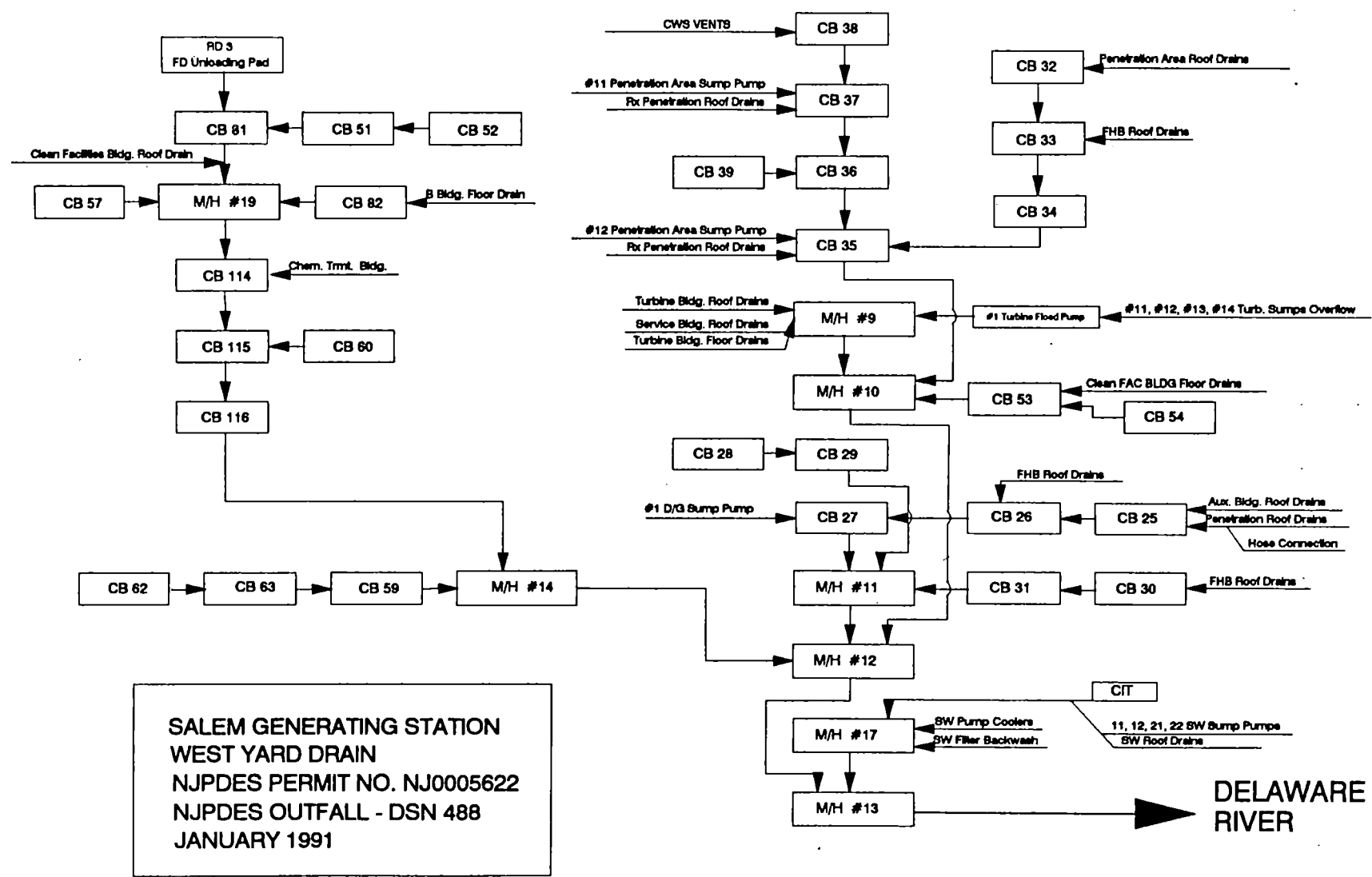


Figure 10





SALEM GENERATING STATION
WEST YARD DRAIN
NJPDES PERMIT NO. NJ0005622
NJPDES OUTFALL - DSN 488
JANUARY 1991

Figure 11

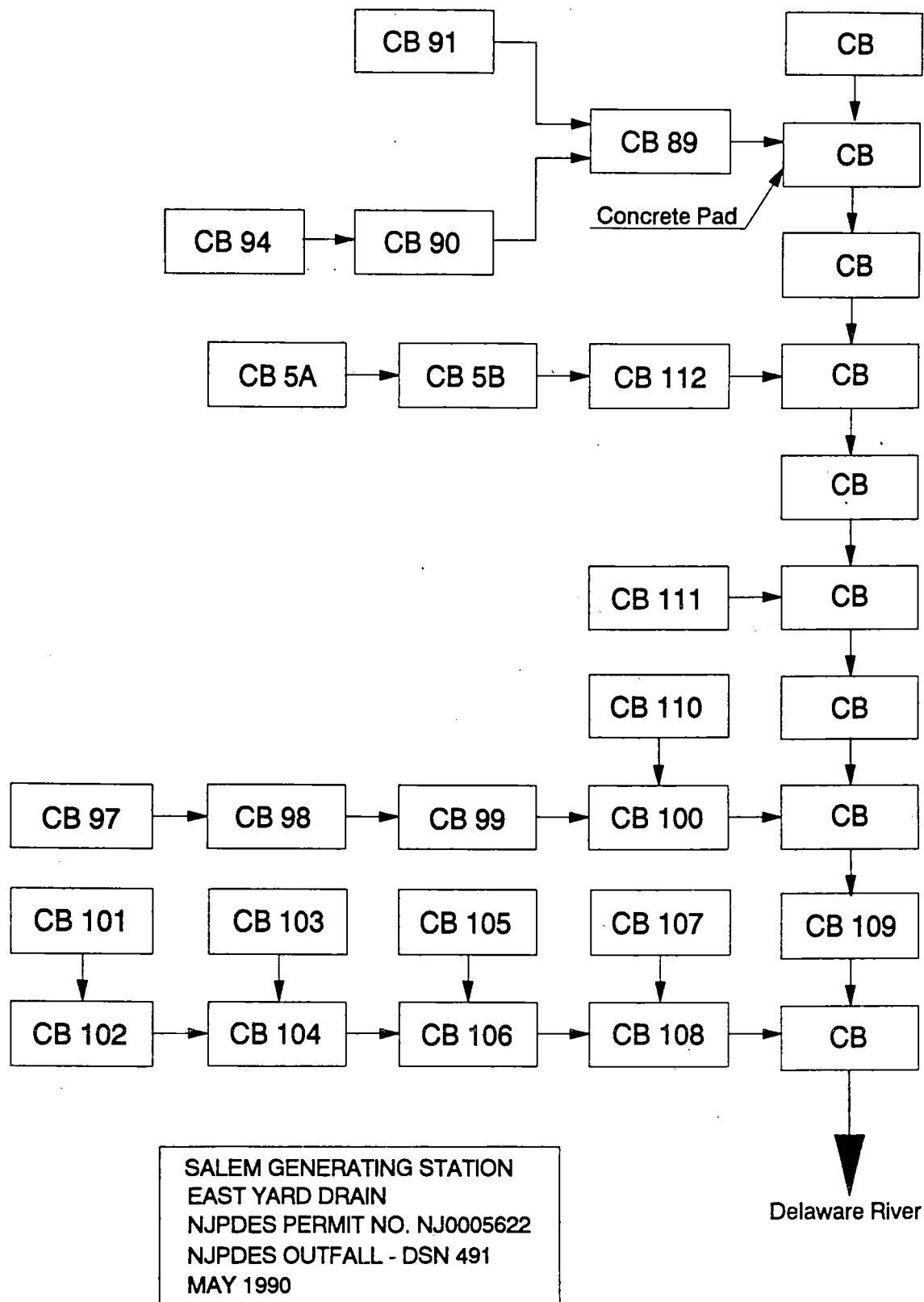


Figure 12

STATEMENT OF BASIS

REVISED DRAFT NJPDES PERMIT TO
DISCHARGE INTO THE WATERS OF
THE STATE OF NEW JERSEY

NJPDES APPLICATION NO. NJ0005622

I. DESCRIPTION OF WASTEWATER COMPONENTS

The background information presented in this section relating to the composition of the wastestreams contributing to each outfall is based on (1) the Permittee's application dated June 1, 1990 and supplements thereto dated August 31, 1990, January 10, 1991, and April 23, 1991 ("1990 Permit Application"); (2) the Department's site inspections on September 4, 1990 and February 23, 1993; (3) section II of Volume 62 of PSE&G's 1991 Comments; and (4) the 1993 Application Supplement.

Water utilization and discharges at the Station are illustrated in Figure 5 (and accompanying notes) contained on pages 29 and 30.

DSNs 481 - 486

1) Circulating Water System

As discussed in the Fact Sheet to this Draft Permit, water withdrawn from the River passes through the condensers for non-contact cooling of the secondary steam loop and is discharged back to the River. (See Figure 5) The discharge flow from DSNs 481-486 is composed primarily of wastewater from the once-through condenser cooling water. DSNs 481-486 discharge flow also includes flow from the service water system, with limited contribution from the radioactive liquid waste and non-radioactive liquid waste systems.

2) Service Water System

The service water system ("SWS") provides cooling to smaller, critical heat exchangers throughout the Station. The SWS is a nuclear safety-related system and the discharge is classified as a low volume waste stream pursuant to 40 CFR 423. Past history has demonstrated that macroinvertebrate fouling does occur in the system. The SWS is designed to allow the addition of sodium hypochlorite at the pump suction bay and/or discretely to each distribution header to control macroinvertebrate fouling. Total residual chlorine ("TRC") is limited in the permit. PSE&G's 1990

Permit Application states that the SWS has no feasible path for the addition of any other pollutant (other than sodium hypochlorite) and there are no means of monitoring the discharge before it joins with the CWS outfalls.

3) Monitor Tank Effluent

Monitor tank effluent, which is effluent of the radioactive liquid waste ("RLW") system, discharges through CWS outfalls DSNs 481, 482, 484 and/or 485 (See Figure 5). The radioactive liquid waste system collects system leakage, equipment leakage, decontamination liquids, washwaters, sample wastes, and flow from floor drains, system drains, ventilation system drains, and laboratory drains from areas of the Station that contain, or may contain, radioactive materials. These wastestreams may contain trace quantities of organics, analytical laboratory chemicals, decontamination solutions, or cleaning solutions. The primary chemicals that are used and could drain to the radioactive liquid waste system include chromates, hydrazine, and boron. These wastestreams are collected in tanks; processed to reduce radioactivity; treated with hydrogen peroxide to remove hydrazine or demineralized to remove ionic impurities, as necessary; sampled for radioactive concentrations; and, discharged in a batch mode through the CWS outfalls noted

above. The radioactive concentrations, quantities, and rate of the discharge are regulated and limited by the USNRC.

4) Non-Radioactive Liquid Waste Disposal System

The influents to the "Non-Radioactive Liquid Waste Disposal System" ("NRLWDS") are annotated in the system schematic depicted in Figure 6 on page 31 with a letter designator and include:

- a. Regenerant wastes from demineralizers utilized for producing ultrapure water at Salem and at the Permittee's adjacent facility, Hope Creek Generating Station, are routed to the NRLWDS. These wastestreams contain dilute acid and caustic regenerants, as well as impurities removed from site well water.
- b. Chemical unloading area drains, chemical feed tank drains and floor drains, and the demineralizer area sump, as well as the acid and caustic chemical unloading area drains and the ammonia filling connection drains are routed to the NRLWDS. The chemical unloading area drains can contain residuals from leakage or spillage during acid or caustic tank truck transfers and, also, precipitation. The chemical feed tanks are utilized for handling and adding feedwater treatment

chemicals, primarily ammonium hydroxide and hydrazine. The tank drains, tank overflows, and area floor drains may contain residual treatment chemicals or washwater containing dilute cleaning agents. The demineralizer sump collects spillage, leakage, overflows, floor drains, SWS sampling and leakage, analytical laboratory drains for the demineralizer plant, and tank drainage from the acid and caustic storage area. The floor drains could also contain small amounts of cleaning solutions and lubricants.

- c. Secondary analytical laboratory drains and in-line instruments that measure the purity of the process water in the feedwater cycle also drain to the NRLWDS. This small volume wastestream is primarily pure water with analytical reagents and treatment chemicals.
- d. Steam generator blowdown is an influent to the NRLWDS. The influent flow is minimal - 10 to 12 gpm. During major outage activities, steam generators can also be drained to the NRLWDS. Steam generator blowdown and drainage contain ammonia, hydrazine (most of which is converted to ammonia at normal steam generator operating temperature), and trace minerals and metals.

- e. System recycle water and discharge from the NRLWDS vents, drains, analytical laboratory drains, and floor drains are returned to the NRLWDS. This influent is essentially NRLWDS waste-water and may contain the same constituents as the other influents to the NRLWDS as well as NRLWDS treatment chemicals.
- f. Regenerant wastes from the condensate polishers are routed to the NRLWDS. The condensate polishers remove impurities from the steam cycle condensate water by demineralization. Because these polishers are regenerated using dilute acid and caustic, the regenerant wastes can contain dilute acid and caustic, impurities removed by demineralization, and treatment chemicals (ammonia and residual hydrazine).

Figure 6 depicts the flow and treatment capabilities of the NRLWDS.

Influents to the NRLWDS are collected in the equalization mixing basin where some self-neutralization of the dilute acid and caustic wastes occurs. If necessary, the wastestream may be treated with sodium hypochlorite or hydrogen peroxide to reduce the concentrations of ammonia and hydrazine. The wastestream then is normally routed through the #2 clarifier, the mix tank, the #1

clarifier, and is discharged through DSN 48C (an internal monitoring point) where it mixes with cooling water discharged through any or all of DSNs 481, 482, 484, and 485. Either or both clarifiers can be bypassed, depending on wastestream quality. The mix tank normally is used for the addition of caustic to facilitate precipitation of metals and the capability has been installed, although it is not normally used, for the addition of a coagulant aid. The mixed media filter skid is installed but not normally used.

DSNs 487 and 489

For DSN 487, the components of the influent flows consist of river water influx, precipitation runoff, roof drains, floor drains, sump pumps, No. 2 flood pump, and the effluent from the No. 3 skimmer tank (DSN 487B). For DSN 489, the components of the influent flows consist of river water influx, precipitation runoff, roof drains, floor drains, sump pumps, and the effluent from the No. 1 skimmer tank (DSN 489A), and No. 2 skimmer tank (DSN 489B). These outfalls are subject to tidal influences such that monitoring at these outfalls does not produce representative samples. As a result, pollutant contribution is currently measured on a "net" basis. The wastewater flows to these outfalls are depicted in Figure 7 on Page 32 and Figure 8 on Page 33.

DSN 487B

Influents include precipitation runoff and roof drains, along with minor intermittent flows from floor and equipment drains, and auxiliary boiler blowdown. Lubricants, chemicals, and cleaning solutions are used in limited quantities in the areas served by the equipment and floor drains. The Permittee does not, however, expect these pollutants to be measurable in the discharge. Auxiliary boiler blowdown may contain ammonia and hydrazine as these compounds are used for corrosion control. Figure 9 on Page 34 depicts the essential influents to the #3 Oil Water Skimmer which discharges through DSN 487B.

DSNs 489A and 489B

Wastewater flows to these outfalls are routed through the #1 (DSN 489A) and #2 (DSN 489B) Oil Water Skimmers. Influents to these systems include precipitation runoff, roof drains, floor drains, equipment drains, and transformer sump drains. Equipment drains, floor drains, and sumps drain areas in which limited pollutants are utilized but are not expected to contain any measurable quantities of pollutants other than those identified in PSE&G's renewal application. The chemical handling and storage areas in the facility normally drain to the chemical waste system that

discharges to the NRLWDS (DSN 48C). System leakage from components and equipment containing very dilute quantities of acid, caustic, ammonia, and hydrazine can, however, reach the turbine building sumps and be discharged through these outfalls. Figure 10 on Page 35 describes the influents to the #1 and #2 Oil Water Skimmers.

DSN 488

Influents to this outfall consist of flows from precipitation runoff, roof drains, floor drains, sump pumps, the #1 turbine building flood pump, service water sump pumps, CWS vents, residual chlorine analytical wastewater, service water strainer backwash, and river water influx. The primary contributor to the effluent flow is river water influx. Figure 11 on Page 36 depicts the influents to this outfall.

Although most pollutants are not expected to be present in the discharge, pollutants used in the area drained through this outfall could enter this system during normal operations. Sump pumps and floor drains, which drain areas in which certain pollutants are utilized, are not expected to contain any measurable quantities of pollutants other than those identified in PSE&G's 1990 Permit Application. The #1 flood pump is used for flooding emergencies and is periodically operated for testing. This discharge could

contain any of the materials used in the turbine building. The CWS vents provide pressure and vacuum relief for this system after the main condensers and prior to the point at which CWS wastewaters mix with other wastestreams.

The service water strainers are designed to remove small particles from the intake water to prevent clogging and damage to the SWS heat exchangers. The strainers are backwashed with service water to remove the collected solids, and the backwash water is discharged through this outfall. Any leakage or drainage within the building containing the service water pumps, screens, strainers, and associated equipment is directed to building sumps that are discharged through this outfall. Because sodium hypochlorite may be added at the suction side of the service water pumps, residual chlorine may be present in these discharges in small quantities.

DSNs 490 and 491

Discharges through these outfalls consist solely of precipitation runoff from areas of the property not associated with any industrial process areas. DSN 490 discharges precipitation runoff from the helicopter landing pad area. DSN 491, the East Yard Drain, discharges precipitation runoff from the employee parking

lot and an adjacent access road. Figure 12 on page 37 depicts influent flows to DSN 491.

II. DESCRIPTION OF LIMITATIONS AND CONDITIONS

Introduction

The 1990 Draft Permit contained a number of new or revised limitations and conditions for wastewater constituents other than thermal effluent limitations. Many of those new or revised limitations were predicated on NJDEPE's proposal to require PSE&G to retrofit the Station with a closed cycle cooling system. As noted above in the Fact Sheet and as discussed in greater detail below in this Statement of Basis, this Draft Permit is being issued with limitations and conditions which are consistent with the continued operation of the Station with a once through cooling water system.

As a result, the Department is revising certain non-thermal wastewater parameters at DSNs 481-486, the circulating water system discharge. For instance, because the once through cooling system will be retained, it is no longer appropriate to impose limitations for priority pollutants and other parameters based on the USEPA guidelines for cooling tower blowdown. In addition, with respect

to the limits imposed for Total Organic Carbon (TOC) and Total Suspended Solids (TSS), PSE&G's application data indicate that their presence in the discharge is attributable to concentrations of these pollutants in the Station's influent River water.

Also, in response to additional information supplied by PSE&G in the 1991 Comments (See Volume 62) and the 1993 Application Supplement, the Department is also revising the effluent limitation and conditions applicable to other outfalls. PSE&G will be required, however, to perform an Effluent Characterization Study to ascertain whether any further limits are justified beyond those proposed in this Draft Permit.

This Draft Permit also proposes technical corrections for organic oxygen-demanding constituents and ammonia for those outfalls where these limits are applied. For organic oxygen-demanding parameters, the Draft Permit proposes to limit total organic carbon (TOC), in lieu of the present limit on chemical oxygen demand (COD). This change is consistent with N.J.A.C. 7:9-5.5 and N.J.A.C. 7:9-5.8, which allow the Department to set a limit on either TOC or COD, depending on the presence of other characteristics in the wastewater, such as chlorides, that may interfere with the analysis. For ammonia, this Draft Permit proposes to specify that the limit applies to ammonia as nitrogen (N), consistent with the

Delaware River Basin Commission's ("DRBC") Administrative Manual - Part III, Water Quality Regulations May 22, 1991, as amended ("DRBC Water Quality Regulations").

Also, the Department is making limited changes to the permit requirements applicable to DSNs 487B, and 489A and 489B. Those changes are necessary to ensure consistency with the (1) re-routing of the effluent from DSN 487B to the influent of the NRLWDS (no later than December 31, 1993) and (2) installation of an oil water separator at outfall DSN 489 (no later than April 30, 1994), thereby eliminating the river water influx at Outfall DSN 489 that caused the Department to impose monitoring requirements at internal DSNs 489A and 489B in the 1989 permit modification. All effluent limitations and special conditions pertaining to the sanitary wastewater treatment plant, formerly designated as DSN 487A, have been deleted from the permit because that treatment plant was closed on April 6, 1990 in accordance with a NJDEPE-approved closure plan. All sanitary wastewater has been routed to the Hope Creek treatment plant as of January 1989.

This Draft Permit also includes additional and special conditions sections which set forth conditions deemed necessary to satisfy the intent of the Clean Water Act, the New Jersey Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.), the regulations

promulgated pursuant thereto, including 40 CFR Part 423, the NJPDES Regulations (N.J.A.C. 7:14A-1.1 et seq.) and applicable interstate regulations.

As an additional condition, the Draft Permit requires the Permittee to perform an Effluent Characterization Study to collect and provide to the NJDEPE, comprehensive data on the extent of compliance of the Station's discharges with instream water quality standards for other non-thermal water quality parameters. Upon review of these data, the Department will determine whether WQBELs are required or additional modified permit conditions are necessary.

Finally, the Department is proposing to revise some of the standard permit terms and conditions to ensure consistency with the Department's most recent regulations and permits.

OUTFALLS

A. DSNs 481 - 486

1. Background

The Station's once through, non-contact condenser cooling water is discharged through six submerged pipes or outfalls designated as

DSNs 481-486. DSNs 481-486 discharge wastewater which is composed primarily of non-contact once-through cooling water from the River which is used to cool steam exhausted from the turbines. The non-contact once-through condenser cooling water is returned to the River without the addition of any treatment chemicals. Provisions are, however, retained for the addition of sodium hypochlorite to control biofouling, upon prior notification to the Department. Limited contributions to the discharges from DSN 481-486 include wastewater from the SWS, radioactive liquid waste system and non-radioactive liquid waste system. A summary description of these limited volume wastewater streams are as follows:

a. Service Water System

The SWS, a nuclear safety related system, uses River water to cool small, critical heat exchangers throughout the plant. Past history has demonstrated that macroinvertebrate fouling does occur in the system and, as such, sodium hypochlorite is added at the pump suction bay and/or discretely to each distribution header to control macroinvertebrate fouling. Total residual chlorine ("TRC") is limited in the Draft Permit at DSNs 481 through 486 since there is no means of obtaining a representative sample of the discharge before it joins with the CWS outfalls. Sodium hypochlorite addition varies with intake water chlorine demand. The sodium

hypochlorite addition system is designed, however, to maintain 0.3 mg/l to 0.5 mg/l residual in the effluent of the SWS.

b. Monitor Tank Effluent (Radioactive Liquid Waste)

Monitor tank effluent is comprised of the wastewater from the radioactive liquid waste system. The monitor tank effluent volume is measured for each batch discharged and averages approximately 0.017 MGD. This wastewater mixes with the non-contact condenser cooling water and is discharged through DSNs 481, 482, 484, and/or 485. The radioactive liquid waste discharges are regulated and permitted by the USNRC as concerns to radioactive concentrations, quantities and rates.

c. Non-Radioactive Liquid Waste Disposal System (NRLWDS)

Wastewater from the NRLWDS is monitored at an internal monitoring point (DSN 48C) after treatment. The non-radioactive liquid waste flow from DSN 48C to DSNs 481, 482, 484 and/or 485 averages approximately 0.26 MGD and is mixed with the non-contact cooling water from the circulating water system prior to discharge to the River through DSNs 481, 482, 484, and/or 485.

Figure 5 depicts the "Schematic of Water Flow" at the Station. This figure demonstrates that the once through non-contact cooling water comprises the majority of the flow through DSNs 481-486. In that once through cooling water comprises the majority of the flow through DSNs 481-486, the Draft Permit imposes limitations at these outfalls applicable to once through cooling water.

2. Effluent Limitations and Conditions

Conditions for **EFFLUENT FLOW** are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i and are required pursuant to the NJPDES regulations and fee calculation requirements. Monitoring for effluent flow is required to be calculated for each outfall on a daily basis. Daily maximum and monthly average effluent flow in units of Million Gallons per Day (MGD) shall be reported.

Conditions for **INFLUENT TEMPERATURE** are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Facility A ("FAC A") designates the discharge from Unit #1 (DSNs 481, 482, and 483) and Facility B ("FAC B") designates the discharge from Unit #2 (DSNs 484, 485, and 486). Continuous monitoring with daily maximum and monthly average reporting is required for FAC A and FAC B.

Effluent limitations and conditions for **EFFLUENT TEMPERATURE** are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Effluent temperature shall be monitored continuously and calculated as the flow-weighted average for FAC A and FAC B. FAC A designates the discharge from Unit #1 (DSNs 481, 482, and 483) and FAC B designates the discharge from Unit #2 (DSNs 484, 485, and 486). The monthly average shall be reported for FAC A and FAC B. A daily maximum limitation of 46.1 °C from June 1 through September 30 and a daily maximum limitation of 43.3 °C from October 1 through May 31 has been imposed for FAC A and FAC B.

Effluent limitations and conditions for **DIFFERENTIAL TEMPERATURE** are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. The flow-weighted differential temperature shall be calculated daily. A daily maximum limitation of 15.3 °C is imposed for both FAC A and FAC B. A monthly average shall be reported for FAC A and FAC B. FAC A designates the discharge from Unit #1 (DSNs 481, 482, and 483) and FAC B designates the discharge from Unit #2 (DSNs 484, 485, and 486).

Effluent limitations and conditions for total **FACILITY HEAT** are consistent with the existing permit in accordance with the

provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Heat shall be calculated daily as the product of heat capacity, discharge flow, and discharge-intake temperature difference. A daily maximum limitation of 30,600 Million British Thermal Units per Hour (MBTU/Hr) has been imposed for FAC C. The monthly average shall be reported for Facility C ("FAC C"). FAC C designates the total discharge from DSNs 481, 482, 483, 484, 485, and 486.

TOTAL RESIDUAL CHLORINE (TRC) effluent limitations and conditions are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Since the addition of sodium hypochlorite to the circulating water system has not been routinely required, the permit conditions require the Permittee to notify the Department prior to reinitiating the addition of sodium hypochlorite to the circulating water system. As part of this notification, the Permittee shall provide the Department with a methodology for sodium hypochlorite addition which ensures that the discharge of TRC is consistent with the steam effluent guidelines, 40 CFR 423. If chlorination is reinitiated to the circulating water system, TRC shall be monitored at the permitted outfalls, DSNs 481-486, three times per week, each during a two (2) hour period of chlorination. The amount of TRC discharged from each permitted outfall, DSNs 481-486, shall not exceed a daily maximum of 0.2 mg/l during the chlorination of the

circulating water system. If chlorination is reinitiated, the Permittee shall maintain a log, noting the time and duration of sodium hypochlorite addition to the circulating water system.

Permittee, however, shall be permitted to discharge TRC in excess of two hours per day to address a demonstrated macroinvertebrate fouling problem in the SWS. Permittee shall monitor for TRC from the continuous chlorination of the service water system three (3) times per week by grab sample at each permitted outfall, DSN 481-486. TRC discharged from each permitted outfall DSN, 481-486, shall not exceed a monthly average of 0.3 mg/l or a daily maximum of 0.5 mg/l when circulating water system non-contact cooling water is not being discharged through the associated permitted outfalls, DSNs 481-486. At all other times, the amount of TRC discharged from each permitted outfall (DSNs 481-486) shall not exceed a daily maximum of 0.2 mg/l and the monthly average shall be reported.

TOTAL ORGANIC CARBON (TOC), CHEMICAL OXYGEN DEMAND (COD), BIOCHEMICAL OXYGEN DEMAND (BOD5), and TOTAL SUSPENDED SOLIDS (TSS) were detected and reported in the 1990 Permit Application. The 1990 Permit Application indicates that the source of these pollutants is the intake water. Accordingly, no limitations or conditions for these parameters are imposed at this time.

Effluent limitations and conditions for pH are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Monitoring of pH shall be performed three times per week using a grab sample. The daily minimum pH of the effluent shall not be less than 6.0 Standard Units (SU) and the daily maximum pH shall not be greater than 9.0 SU. The daily minimum pH limitation shall be the intake pH when the intake pH is less than 6.0 SU. The daily maximum pH limitation shall be the intake pH when the intake pH is greater than 9.0 SU.

AMMONIA was detected and reported in the 1990 Permit Application. The 1990 Permit Application indicates the source of detectable quantities of this pollutant is the intake water. Accordingly, no limitations or conditions for this parameter shall be imposed at this time.

The existing permit contains a monitoring requirement and a limit of $LC50 \geq 50\%$ for **ACUTE TOXICITY** at DSN 48C. The effluent from DSN 48C, a low volume wastestream, commingles with the non-contact cooling water prior to discharge through outfalls DSNs 481, 482, 484 and/or 485. This commingling provides treatment for residual chlorine due to the natural chlorine demand of, and treatment for pH due to the natural buffering by, the non-contact cooling water. The Department has determined that monitoring for toxicity in the

discharge is more appropriate at the circulating water system water outfalls since this is the discharge to which aquatic species could be exposed.

The effluent limitations and conditions for acute toxicity testing are consistent with the existing permit in accordance with the anti-backsliding provisions at N.J.A.C. 7:14A-3.13(a)(12)i. The representative monitoring point has however been changed. The Permittee shall be required to perform acute toxicity testing on each circulating water system outfall(s) to which the effluent from DSN 48C is aligned during the sample event. The Permittee may align the DSN 48C effluent to a single circulating water system outfall during sample collection. In such event Permittee would perform only one acute toxicity test during the required sampling event.

Permittee shall perform acute toxicity testing quarterly in accordance with Part IV-B/C of the Draft Permit. A minimum limitation of $LC50 \geq 50\%$ is imposed. This limitation is equivalent to 2 TUa's (Acute Toxicity Units) maximum.

The "Acute Toxicity Biomonitoring Requirements" section of the Draft Permit has been updated to reflect present standard language and current Department mailing addresses. Since the effect of the

River water relative to acute toxicity is unknown, the Permittee may perform concurrent tests on the intake water. If these intake tests indicate an acute toxicity in the intake water, the discharge will be evaluated relative to the intake water.

N.J.A.C. 7:14A-3.13 states that each DSW permit shall include conditions to satisfy the requirements of the Clean Water Act. The Clean Water Act, as amended, mandates that the States include water quality-based effluent limitations in NJPDES permits, if the instream water quality standard is exceeded and there is a reasonable potential for the effluent to cause an exceedance of water quality standards and to protect the aquatic biota and human health. These conditions may include those necessary to control the discharge of toxic pollutants, including whole effluent chronic and acute toxicity.

Pursuant to Part IV-B/C of this Draft Permit, the Permittee shall be required to perform an Effluent Characterization Study, a Chronic Toxicity Characterization Study and, if required, a Dilution Study at the discharge of non-contact cooling water outfalls. The acute toxicity limitation and conditions will be reevaluated based on the results of the Effluent Characterization Study, Chronic Toxicity Characterization Study and Dilution Study (if required).

BORON was detected and reported in the 1990 Permit Application. The 1990 Permit Application indicates the presence of this pollutant in detectable quantities is due to the intake water. Accordingly, no limitations or conditions shall be imposed at this time.

TOTAL COPPER was detected and reported in the 1990 Permit Application. No limits or conditions shall be imposed at this time since the 1990 Permit Application indicates that copper is also present in the intake water. This parameter will be monitored in the Effluent Characterization Study and the requirement for effluent limitations and conditions shall be re-evaluated after the Study is completed.

B. DSN 48C

1. Background

The influent waste streams to the NRLWDS include the following:

- a. regenerant wastes from demineralizers utilized for producing ultrapure water at Salem and the Hope Creek Generating Station;

- b. chemical handling area drains, chemical feed tank drains and area floor drains, and the demineralizer area sump, as well as the acid and caustic chemical unloading area drains and the ammonia filling connection drains;
- c. secondary analytical laboratory drains and in-line instruments that measure the purity of the process water in the feedwater cycle;
- d. limited steam generator blowdown, and, during major outages, steam generator drainage;
- e. system recycle water and discharge from the NRLWDS vents, drains, analytical laboratory drains, and floor drains; and
- f. regenerant wastes from the condensate polishers.

Figure 6 depicts the flow and treatment capabilities of the NRLWDS.

The wastestreams to the NRLWDS may contain dilute acid and caustic regenerants; residual treatment chemicals, including ammonium

hydroxide and hydrazine; river water from sampling and leakage from the service water system; analytical reagents from laboratory drains; floor drain wastewater which may contain small amounts of cleaning solutions and lubricants; and trace minerals and metals.

Influents to the NRLWDS are collected in an equalization mixing basin where some self-neutralization of the dilute acid and caustic wastes occurs. The wastestream may be treated with sodium hypochlorite or hydrogen peroxide, if necessary, to reduce the concentrations of ammonia and hydrazine. The amount of sodium hypochlorite or hydrogen peroxide added is based on the concentration of ammonia to be treated and the stoichiometric relationship. The wastestream is normally routed through the #2 clarifier, the mix tank, the #1 clarifier, and discharged through DSN 48C where it mixes with the non-contact cooling water discharged through any or all of DSNs 481, 482, 484, and 485.

2. Effluent Limitations and Conditions

Conditions for FLOW are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i and are required pursuant to the NJPDES regulations and fee calculation requirements. Flow shall be monitored and recorded on a daily basis. Daily maximum and monthly average

reporting in units of Million Gallons per Day (MGD) shall be required.

Effluent limitations and conditions for **PETROLEUM HYDROCARBONS** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. As originally established, the limitations for petroleum hydrocarbons were based on N.J.A.C. 7:14A-14.1, et seq., entitled "Oil and Grease Effluent Limitations." The sample shall be collected as a grab sample. Monitoring frequency shall be twice per month. The monthly average limitation of 10 mg/l and the daily maximum limitation of 15 mg/l have been retained.

Effluent limitations and conditions are imposed on **TOTAL ORGANIC CARBON (TOC)**, in lieu of the existing limitation on **CHEMICAL OXYGEN DEMAND (COD)**, in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. This technical change in the organic oxygen-demanding parameter regulated is being made because TOC is a more appropriate parameter for the NRLWDS wastestream. The samples shall be collected as composite samples. Monitoring shall be conducted twice per month. A daily maximum limitation of 50 mg/l is imposed. Reporting of a monthly average shall also be required.

BIOCHEMICAL OXYGEN DEMAND (BOD5) was detected and reported in the 1990 Permit Application. Since TOC effluent limitations and conditions are imposed, no limitations or conditions for BOD5 shall be imposed at this time.

Effluent limitations and conditions for **TOTAL SUSPENDED SOLIDS (TSS)** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. DSN 48C is a low volume waste source pursuant to 40 CFR Part 423 and the limitations are consistent with that section. Samples shall be collected as composite samples and monitoring shall be conducted twice per month. The limitations imposed are a monthly average of 30 mg/l, a daily maximum of 100 mg/l, and a seven-day average of 45 mg/l.

Effluent limitations and conditions for **pH** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. USEPA regulations and guidance, including the combined wastestream rule at 40 CFR Section 423.12(b)(12), allow mixing a low volume wastestream such as DSN 48C with cooling water effluents in order to utilize the natural buffering capacity of the cooling water, as long as the final discharge at the cooling water outfalls (DSNs 481, 482, 484, and 485) complies with the pH limitation. The

samples shall be collected as grab samples. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units as monitored and reported for the respective outfall of DSN 481, 482, 484, and/or 485.

Effluent limitations and conditions for **AMMONIA** are carried over from the existing permit in accordance with the anti-backsliding provision set forth in N.J.A.C. 7:14A-3.13(a)(12)i. A monthly average limitation of 35 mg/l and a daily maximum limitation of 70 mg/l has been imposed. Monitoring shall be performed twice per month. The form of ammonia regulated has been changed from ammonia as NH_4 to ammonia as N, consistent with DRBC's Water Quality Regulations applicable to Zone 5 of the Delaware River. In addition, the "sample type" specified in the permit has been changed from a "grab" to a "composite" to provide for a more representative sample.

All limitations and conditions on **ACUTE TOXICITY** are deleted from this outfall and imposed at the discharge of the circulating water system outfalls in accordance with N.J.A.C. 7:14A. The effluent from DSN 48C commingles with the non-contact cooling water prior to discharge through outfalls DSNs 481, 482, 484 and/or 485. This commingling provides treatment for residual chlorine due to the natural chlorine demand of the non-contact cooling water and

treatment for pH due to the natural buffering by the non-contact cooling water. The Department has determined that monitoring for toxicity at the point of discharge to the receiving waters is more appropriate since this is the effluent to which aquatic species are exposed.

HEXAVALENT CHROMIUM was reported on the Discharge Monitoring Reports (DMR) through March, 1989. The monitoring requirements and limitations were deleted by the 1989 permit modification. The DMR data indicates hexavalent chromium was detected at trace amounts in the effluent. Effluent limitations and conditions have not been imposed at this time. Total chromium shall be monitored in the Effluent Characterization Study and the requirement for a limit shall be re-evaluated at the completion of the study.

TOTAL COPPER and TOTAL IRON data were submitted on the DMR through March, 1989 and in the 1990 Permit Application. No effluent limitations or conditions have been imposed in this Draft Permit. The data indicates these metals were detected at low levels in this effluent. Total copper shall be monitored in the Effluent Characterization Study and the requirement for a limit shall be re-evaluated after the completion of that study.

TOTAL LEAD and TOTAL NICKEL analytical data were submitted in the 1990 Permit Application. The data indicate these metals were detected at trace levels in the effluent. Effluent limitations and conditions are not imposed at this time. Total lead and total nickel shall be monitored in the Effluent Characterization Study and this requirement for a limit shall be re-evaluated after completion of that study.

Effluent limitations and conditions for **NITRATE-NITRITE** have not been imposed at this time as the Permittee's 1990 Permit Application data indicates that this compound was detected at only trace levels.

Effluent limitations and conditions for **TOTAL PHENOLS** have not been imposed at this time as the Permittee's 1990 Permit Application data indicates that this compound was detected at only trace levels. Phenol shall be monitored in the Effluent Characterization Study and the requirement for a limit shall be re-evaluated after completion of that Study.

Effluent limitations and conditions for **PHOSPHORUS and SULFATE** are not imposed at this time as these compounds were detected at levels which are not considered to be significant for the discharge to

saline waters based on the Permittee's 1990 Permit Application data.

Effluent limitations and conditions for **SULFIDE** and **TOTAL ORGANIC NITROGEN** are not imposed at this time as these compounds were detected at trace levels based on the Permittee's 1990 Permit Application data.

ZINC data were submitted on the Discharge Monitoring Reports (DMR) through March 1989 and, also, in the 1990 Permit Application. The data indicates this metal was detected at low levels in this effluent. Effluent limitations and conditions are not imposed at this time. Upon receipt of the Effluent Characterization Study report, the Department may re-evaluate the imposition of limits.

C. DSN 487

1. Background

The wastewater flows to this outfall include river water influx, precipitation runoff, roof drains, floor drains, sump pumps, the No. 2 flood pump, and the effluent from the No. 3 skimmer tank, monitoring point DSN 487B. Monitoring at this outfall does not produce representative samples as this outfall is subject to tidal

influences. Pollutant contribution is measured on a "net" basis in the existing permit. A review of the data indicates no net addition of pollutants. Figure 7 depicts the wastewater flows to DSN 487.

DSN 487A, the former sanitary wastewater treatment plant discharge, has been deleted from the permit. The treatment plant was closed in accordance with a NJDEPE-approved closure plan and, in January 1989, Salem's sanitary wastewater was routed to the Hope Creek treatment plant. DSN 487B will be rerouted to the NRLWDS influent for treatment, and except for emergency overflows, will not discharge through DSN 487 after December 31, 1993.

2. Effluent Limitations and Conditions

The analytical data provided in the 1990 Permit Application for DSN 487 is essentially representative of the river. All limitations and conditions are deleted from this outfall because samples obtained at the specified monitoring point are largely subject to tidal influences where monitoring may be inappropriate. The majority of the potentially contaminated water is currently being monitored at internal point 487B and as such, the Permittee's pollutant contributions are adequately assessed. This discharge shall no longer be a monitored outfall.

D. DSN 487B

1. Background

The influents to the No. 3 Oil Water Skimmer, which discharges through DSN 487B to DSN 487, include precipitation runoff, roof drains, minor intermittent flows from floor and equipment drains, and auxiliary boiler blowdown. Auxiliary boiler blowdown may contain ammonia and hydrazine as these compounds are used for corrosion control. Figure 9 depicts the influents to the #3 Oil Water Skimmer.

As noted above, Permittee shall be required to re-route the wastewater from the No. 3 Oil Water Skimmer to the NRLWDS which will provide additional treatment. The re-route shall be performed in accordance with the compliance schedule provided in Part IV-B/C of this permit. The outfall will remain a monitored outfall with effluent limitations and conditions that will apply until the reroute is complete and, subsequent thereto, if an emergency discharge from DSN 487B occurs.

2. Effluent Limitations and Conditions

Conditions for **FLOW** are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i and are required pursuant to the NJPDES regulations and fee calculation requirements. Permittee shall be required to calculate flow for this outfall on a monthly basis. The daily maximum and monthly average values shall be reported in units of Million Gallons per Day (MGD). Flow is calculated based on the non-precipitation related estimated discharge plus the calculated precipitation related discharge.

Effluent limitations and conditions for **EFFLUENT TEMPERATURE** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Samples shall be collected as grab samples. The average daily temperature shall be reported. A maximum effluent temperature limitation of 43.3°C has been imposed. This limitation is consistent with the DRBC's Interpretative Guideline No. 1, Resolution No. 72-1. (DRBC Water Quality Guidelines).

Effluent limitations and conditions for **PETROLEUM HYDROCARBONS** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i.

Samples will be collected as grab samples. Permittee shall monitor once per month. The monthly average limitation is 10 mg/l and the daily maximum limitation is 15 mg/l.

Effluent limitations and conditions are imposed on **TOTAL ORGANIC CARBON (TOC)**, in lieu of the limitation on **CHEMICAL OXYGEN DEMAND (COD)** in the existing permit, in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. The Department is making this technical correction in the organic oxygen-demanding parameter regulated in that TOC is a more appropriate parameter for this wastestream. Samples shall be collected as grab samples. Monitoring is required monthly. A daily maximum limitation of 50 mg/l shall be imposed. Reporting of the monthly average shall also be required.

BIOCHEMICAL OXYGEN DEMAND (BOD5) was detected and reported in the 1990 Permit Application. Since TOC effluent limitations and conditions are imposed, no limitations or conditions for BOD5 shall be imposed at this time.

Effluent limitations and conditions for **TOTAL SUSPENDED SOLIDS** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Samples will be collected as grab samples. Monitoring is required

monthly and the limitations imposed shall be a monthly average of 30 mg/l, a daily maximum of 100 mg/l, and a seven-day average of 45 mg/l.

Effluent limitations and conditions for pH are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units. Samples will be collected as grab samples on a monthly basis.

AMMONIA was detected and reported in the 1990 Permit Application. Effluent limitations and conditions have not been imposed on this parameter since the level detected in the effluent was approximately two orders of magnitude below DRBC Water Quality Regulations for this parameter.

TOTAL CADMIUM was detected and reported in the 1990 Permit Application. Effluent limitations and conditions have not been imposed on this parameter since the level detected in the effluent was approximately an order of magnitude below DRBC Water Quality Guidelines for this parameter.

TOTAL COPPER was detected and reported in the 1990 Permit Application. Effluent limitations and conditions have not been imposed on this parameter since the level detected in the effluent was approximately two orders of magnitude below DRBC Water Quality Guidelines for this parameters.

TOTAL PHENOLS was detected and reported in one sample in the 1990 Permit Application. A January 10, 1991 application supplement provided data collected at three additional sampling events which demonstrated no detectable total phenols. Based on the additional data, effluent limitations and conditions have not been imposed.

E. DSN 489

1. Background

The wastewater flows to this outfall consist of river water influx, precipitation runoff, roof drains, floor drains, sump pumps, and the effluent from the No. 1 skimmer tank, (DSN 489A) and No. 2 skimmer tank (DSN 489B). Monitoring at this outfall does not produce representative samples as this outfall is subject to tidal influence. The Permittee committed to install an oil water separator system at DSN 489 in its 1993 Application Supplement. The 1993 Application Supplement indicates that the discharge from

the oil water separator system will be pumped, thereby eliminating the tidal influence and allowing the collection of samples representative of the Permittee's discharge at this DSN. Figure 9 depicts the influents which discharge through DSN 489.

2. Effluent Limitations and Conditions

- a. No limitations or conditions are imposed for this outfall until April 30, 1994 or the date on which the oil water separator system becomes operational, whichever occurs first. Limitations and conditions have not been imposed at this time in that the sampling point is largely subject to tidal influences and monitoring does not produce representative samples and is, therefore, inappropriate. The data provided in the 1990 Permit Application indicate that the effluent at DSN 489 is essentially representative of the River. In addition, the majority of the potentially contaminated water is monitored at internal monitoring points DSN 489A and DSN 489B, thereby providing an adequate assessment of Permittee's pollutant contributions.
- b. Permittee shall be required to install an oil water separator at DSN 489 to provide additional treatment

for stormwater and the effluents from DSNs 489A and 489B. Beginning May 1, 1994 or the date on which the oil water separator system becomes operational, whichever occurs first, DSNs 489A and 489B will no longer be monitoring locations or outfalls and the effluent limitations and conditions applicable to DSN 489 shall be as follows:

Conditions for **FLOW** will be consistent with the existing permit requirements for DSNs 489A and 489B. These conditions are consistent with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i and are required pursuant to the NJPDES regulations and fee calculation requirements. Permittee shall be required to calculate flow on a monthly basis using a flow totalizer or using the operating times of the discharge pumps for this outfall. The daily maximum and monthly average values shall be reported in units of Million Gallons per Day (MGD).

Effluent limitations and conditions for **PETROLEUM HYDROCARBONS** are carried over from the existing permit at DSNs 489A and 489B and in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Samples will be collected as grab samples. Permittee shall monitor once per month. The monthly

average limitation is 10 mg/l and the daily maximum limitation is 15 mg/l.

Effluent limitations and conditions are imposed on **TOTAL ORGANIC CARBON (TOC)**, in lieu of the limitation on **CHEMICAL OXYGEN DEMAND (COD)** on DSNs, 489A and 489B in the existing permit, in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. The Department is applying TOC as the organic oxygen-demanding parameter regulated in that TOC is a more appropriate parameter for this wastestream. Samples shall be collected as grab samples. Monitoring is required monthly. A daily maximum limitation of 50 mg/l shall be imposed. Reporting of the monthly average shall also be required.

Effluent limitations and conditions for **TOTAL SUSPENDED SOLIDS (TSS)** are carried over from DSNs 489A and 489B in the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Samples will be collected as grab samples. Monitoring is required monthly and the limitations imposed shall be a monthly average of 30 mg/l, a daily maximum of 100 mg/l, and a seven-day average of 45 mg/l.

Effluent limitations and conditions for **pH** are carried over from DSNs 489A and 489B in the existing permit in accordance with the

anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units. Samples will be collected as grab samples on a monthly basis.

F. DSN 489A

1. Background

DSN 489A discharges wastewater from the #1 skim tank. The influents to the skim tank include precipitation runoff, roof drains, floor drains, equipment drains, turbine building sumps, and transformer sump drains. System leakage from components and equipment collected by the turbine building sumps may contain lubricants and very dilute quantities of acid, caustic, ammonia, and hydrazine. Figure 10 depicts the influents to the #1 skim tank.

2. Effluent Limitations and Conditions

As noted above, Permittee shall be required to install an oil water separator at DSN 489 to provide additional treatment for the effluent from DSN 489A. This oil water separator shall be installed in accordance with the compliance schedule provided in Part IV-B/C of the Draft Permit.

Until April 30, 1994 or the date on which the oil water separator system becomes operational, whichever occurs first, the effluent limitations and conditions applicable to DSN 489A shall be as follows:

Conditions for **FLOW** are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14-A-3.13(a)(12)i and are required pursuant to the NJPDES regulations and fee calculation requirements. Permittee shall be required to calculate flow for this outfall on a monthly basis. Daily maximum and monthly average values shall be reported in MGD. Flow is calculated based on the non-precipitation related estimated discharge plus the calculated precipitation related discharge.

Effluent limitations and conditions for **PETROLEUM HYDROCARBONS** are carried over from the existing permit in accordance with the antibacksliding provisions set forth in N.J.A.C. 7:14-3.13(a)(12)i. Samples will be collected as grab samples. Permittee shall monitor once per month. The monthly average limitation is 10 mg/l and the daily maximum limitation is 15 mg/l.

Effluent limitations and conditions are imposed on **TOTAL ORGANIC CARBON (TOC)**, in lieu of the limitation on **CHEMICAL OXYGEN DEMAND (COD)** in the existing permit, in accordance with the provisions set

forth in N.J.A.C. 7:14A-3.13(a)(12)i. The Department is making this technical correction in the organic oxygen-demanding parameter regulated in that TOC is a more appropriate parameter for this wastestream. Samples shall be collected as grab samples. Monitoring is required monthly. A daily maximum limitation of 50 mg/l shall be imposed. Reporting of the monthly average shall also be required.

BIOCHEMICAL OXYGEN DEMAND (BOD5) was detected and reported in the 1990 Permit Application. Since TOC effluent limitations and conditions are imposed, no limitations or conditions for BOD5 shall be imposed at this time.

Effluent limitations and conditions for **TOTAL SUSPENDED SOLIDS (TSS)** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Samples will be collected as grab samples. Monitoring is required monthly and the limitations imposed shall be a monthly average of 30 mg/l, a daily maximum of 100 mg/l, and a seven-day average of 45 mg/l.

Effluent limitations and conditions for **pH** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. The pH shall

not be less than 6.0 standard units nor greater than 9.0 standard units. Samples will be collected as grab samples on a monthly basis.

AMMONIA was detected and reported in the 1990 Permit Application. Effluent limitations and conditions have not been imposed on this parameter since the level detected in the effluent was approximately two orders of magnitude below DRBC Water Quality Regulations for this parameter.

Beginning May 1, 1994 or the date on which the oil water separator system becomes operational, which ever occurs first, the effluent limitations and conditions at DSN 489A shall be deleted and DSN 489A will no longer be an outfall.

G. DSN 489B

1. Background

DSN 489B discharges wastewater from the #2 skim tank. The influents to the skim tank include precipitation runoff, roof drains, floor drains, equipment drains, turbine building sumps, and transformer sump drains. System leakage from components and equipment collected by the turbine building sumps may contain lubricants and

very dilute quantities of acid, caustic, ammonia, and hydrazine. Figure 10 depicts the influents to the #2 skim tank.

2. Effluent Limitations and Conditions

Permittee shall be required to install an oil water separator at DSN 489 to provide additional treatment for the effluent from DSN 489B. This oil water separator shall be installed in accordance with the compliance schedule provided in Part IV-B/C of this Draft Permit.

Until April 30, 1994 or the date on which the oil water separator system becomes operational, whichever occurs first, the effluent limitations and conditions applicable to DSN 489B shall be as follows:

Conditions for **FLOW** are consistent with the existing permit in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i and are required pursuant to the NJPDES regulations and fee calculation requirements. Permittee shall be required to calculate flow for this outfall on a monthly basis and the daily maximum and monthly average values shall be reported in MGD. Flow is calculated based on the non-precipitation related estimated discharge plus the calculated precipitation related discharge.

Effluent limitations and conditions for **PETROLEUM HYDROCARBONS** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Samples will be collected as grab samples. Permittee shall monitor once per month. The monthly average limitation is 10 mg/l and the daily maximum limitation is 15 mg/l.

Effluent limitations and conditions are imposed on **TOTAL ORGANIC CARBON (TOC)**, in lieu of the limitation on **CHEMICAL OXYGEN DEMAND (COD)** in the existing permit, in accordance with the provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. The Department is making this technical correction in the organic oxygen-demanding parameter regulated in that TOC is a more appropriate parameter for this wastestream. Samples shall be collected as grab samples. Monitoring is required monthly. A daily maximum limitation of 50 mg/l shall be imposed. Reporting of the monthly average shall also be required.

BIOCHEMICAL OXYGEN DEMAND (BOD5) was detected and reported in the 1990 Permit Application. Since TOC effluent limitations and conditions are imposed, no limitations or conditions for BOD5 shall be imposed at this time.

Effluent limitations and conditions for **TOTAL SUSPENDED SOLIDS (TSS)** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. Samples will be collected as grab samples. Monitoring is required monthly and the limitations imposed shall be a monthly average of 30 mg/l, a daily maximum of 100 mg/l, and a seven-day average of 45 mg/l.

Effluent limitations and conditions for **pH** are carried over from the existing permit in accordance with the anti-backsliding provisions set forth in N.J.A.C. 7:14A-3.13(a)(12)i. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units. Samples will be collected as grab samples on a monthly basis.

AMMONIA was detected and reported in the 1990 Permit Application. Effluent limitations and conditions have not been imposed on this parameter since the level detected in the effluent was approximately an order of magnitude below DRBC Water Quality Regulations for this parameter.

Beginning May 1, 1994 or the date on which the oil water separator system becomes operational, whichever occurs first, the effluent

limitations and conditions at DSN 489B shall be deleted and DSN 489B will no longer be an outfall.

H. DSN 488

1. Background

The influents to this outfall consist of precipitation runoff, roof drains, floor drains, sump pumps, the #1 turbine building flood pump, service water sump pumps, service water strainer backwash, CWS vents, and tidal influx. Sodium hypochlorite can be added at the suction side of the service water pumps, and, as such, residual chlorine may be present in this discharge in small quantities. The primary contributor to the effluent flow is the River water. As this outfall is subject to tidal influence, monitoring at the outfall does not produce representative samples. Figure 11 depicts the influents to DSN 488.

2. Effluent Limitations and Conditions

The analytical data provided in the 1990 Permit Application for DSN 488 is essentially representative of River water. Effluent limitations and monitoring requirements are not imposed for this outfall in that this wastestream is primarily river water. For the

same reason, the existing permit as well as the previous permit for this facility did not contain limitations or monitoring requirements at this outfall.

I. DSNs 490 and 491

1. Background

Discharges through these outfalls consist solely of precipitation runoff from areas of the property not associated with any industrial process. DSN 490 discharges precipitation runoff from the helicopter landing pad area. DSN 491 discharges precipitation runoff from an employee parking lot and an adjacent access road. Figure 12 depicts the influents to DSN 491.

2. Effluent Limitations and Conditions

Limitations and monitoring requirements have not been imposed for these outfalls. Discharges from these outfalls consist solely of stormwater run off from non-industrial process areas and, as such, should not contain substantial quantities of pollutants. For the same reason, the existing permit as well as the previous permit did not contain limitations or monitoring requirements at these outfalls.

OTHER PERMIT REQUIREMENTS

A. Effluent Characterization Study

1. Introduction

The Permittee shall perform an Effluent Characterization Study of specific discharges to determine whether the discharges have a reasonable potential to exceed established water quality criteria protective of aquatic biota and human health. Permittee shall submit a report of the Study to the NJDEPE. After a review of this report, and consistent with State and Federal regulations (See generally, 40 C.F.R Section 122.44 and N.J.A.C. Section 7:14A-1), the Department will determine whether Water Quality Based Effluent Limitations are required or additional modified permit conditions are necessary.

2. Sampling Locations

a. Non-Contact Cooling Water (DSNs 481-486)

The outfalls from the once-through non-contact cooling water are identified as DSNs 481 through 486. DSNs 481, 482 and 483 are related to Unit #1 and DSNs 484, 485 and 486

are related to Unit #2. The character of the discharge from these outfalls is similar. All six of the outfalls contain primarily non-contact cooling water withdrawn from the River. DSNs 481, 482, 484, and 485 may contain pollutants from low volume waste streams (i.e. NRLWDS and RLW) which are commingled with the non-contact cooling water prior to discharge (see discussion above). DSNs 483 and 486 contain only non-contact cooling water. Permittee shall be required to monitor one outfall which can receive low volume waste streams and one outfall which receives only non-contact cooling water.

The two outfalls to be monitored on the Circulating Water System discharge will be on the same Unit to ensure that representative samples are collected. The Permittee shall be required to sample DSN 481 and DSN 483 (Unit #1 discharge). If Unit #1 is unavailable for monitoring (such as Unit outage or pump unavailability), Permittee shall sample the Unit #2 discharge at DSN 484 and DSN 486. During sample collections for the Effluent Characterization Study, the effluent from DSN 48C shall be aligned to discharge through DSN 481 if the effluent from Unit #1 is being sampled, or through DSN 484 if the effluent from Unit #2 is being sampled. If the DSN 48C effluent is aligned to

discharge through more than one circulating system outfall during sampling for the Effluent Characterization Study, all circulating water outfalls for the Unit(s) to which DSN 48C effluent is aligned shall be sampled. The RLW effluent for the respective Unit shall be aligned to discharge through the outfall being monitored during Effluent Characterization Study sampling, consistent with USNRC discharge requirements.

Monitoring of the non-contact cooling water discharge shall be performed at the normal location for routine monitoring for these outfalls.

Permittee shall perform monitoring of the intake water in that the discharge consists primarily of non-contact cooling water withdrawn from the River. The intake water will be monitored for the same parameters as the discharge. Samples will be collected at a point in the circulating water system after the intake water is mixed but before the intake water makes contact with the condenser tube sheets or tubes, such as the inlet water box of the condenser. Intake monitoring shall be conducted at the inlets associated with each outfall being monitored. Since there are two intakes associated with each outfall, Permittee

shall sample both intakes for each outfall monitored to obtain intake samples representative of the outfall. The intake samples shall be reported as a single value either by physically compositing the two samples prior to analysis or by mathematically averaging the analytical results of individual analyses on concurrent samples.

b. Non-Radioactive Liquid Waste Disposal System Discharge
(DSN 48C)

The Non-Radioactive Liquid Waste Disposal System (NRLWDS) discharge is a low volume waste stream and is monitored at DSN 48C, an internal monitoring location. DSN 48C can discharge through DSNs 481, 482, 484 and/or 485.

Permittee shall be required to monitor the effluent waste stream from DSN 48C at a point after the final clarifier, but prior to the wastestream being commingled with non-contact cooling water.

c. Oil Water Separator Discharge (DSN 489)

By April 30, 1994, the Permittee shall be required to have installed an oil water separator at DSN 489 to treat the

effluent from #1 and #2 skim tanks which are currently monitored as DSNs 489A and 489B. Once the oil water separator becomes operational, DSNs 489A and 489B will cease to be outfalls. Accordingly, DSN 489A and DSN 489B are not included in the Effluent Characterization Study. Once the oil water separator becomes operational, Permittee shall be required to monitor the discharge from DSN 489.

At the time Effluent Characterization Study sampling is conducted at DSN 489, Permittee shall be required to collect samples at DSN 489 from either the discharge of the oil water separator pumps or the effluent holding chamber of the oil water separator.

d. Other Outfalls (DSNs 487, 487B, 488, 490 and 491)

Permittee shall not be required to monitor DSNs 487, 488, 490 and 491 as part of the Effluent Characterization Study in that monitoring requirements and effluent limitations have not been imposed in Part III-B/C of the Draft Permit for these outfalls.

Permittee shall be required to reroute DSN 487B, the discharge of #3 skim tank, to the NRLWDS by December 31,

1993. Once the re-route is completed, the wastewater from #3 skim tank will only discharge from DSN 487B under emergency conditions. As such, monitoring of the effluent from DSN 487B shall not be required as part of the Effluent Characterization Study.

3. Parameters and Analyses

a. Permittee shall be required to analyze samples collected for the following categories of pollutants:

Conventional Pollutants

Priority Pollutant Metals and Cyanide

Priority Pollutant Volatiles

Priority Pollutant Base/Neutrals

Priority Pollutant Acid Extractables

Permittee shall not be required to analyze for Priority Pollutant Pesticides as these pesticides are not used at the Station. Permittee shall also not be required to analyze for Dioxin (2,3,7,8-Tetrachlorodibenzo-P-Dioxin) and Polychlorinated Biphenyl compounds as there is no reason to believe that these pollutants will be present in the discharge.

The parameters comprising the categories of pollutants to be analyzed as described above are listed in Table 1 at Page 95 and briefly discussed below.

SALEM GENERATING STATION
EFFLUENT CHARACTERIZATION
TABLE 1

CONVENTIONAL POLLUTANTS	RQL (ug/l)
TOTAL ORGANIC CARBON	
TOTAL SUSPENDED SOLIDS	
PETROLEUM HYDROCARBONS	
pH	

METALS AND CYANIDE	CAS NUMBER	RQL (ug/l)
ANTIMONY, TOTAL	7440-36-0	20
ARSENIC, TOTAL	7440-38-2	8
BERYLLIUM, TOTAL	7440-41-7	20
CADMIUM, TOTAL	7440-43-9	4
CHROMIUM, TOTAL	7440-47-3	10
COPPER, TOTAL	7550-50-8	10
LEAD, TOTAL	7439-92-1	10
MERCURY, TOTAL	7439-97-6	1
NICKEL, TOTAL	7440-02-2	10
SELENIUM, TOTAL	7782-49-2	10
SILVER, TOTAL	7440-22-4	2
THALLIUM, TOTAL	7440-28-0	10
ZINC, TOTAL	7440-66-6	30
CYANIDE, TOTAL	57-12-5	40

PRIORITY POLLUTANT VOLATILES	CAS NUMBER	RQL (ug/l)
ACROLEIN	107-02-08	50
ACRYLONITRILE	107-13-1	50
BENZENE	71-43-2	7
BROMOFORM	72-25-2	8
CARBON TETRACHLORIDE	56-23-5	6
CHLOROBENZENE	108-90-7	6
CHLORODIBROMOMETHANE	124-48-1	6
CHLOROETHANE	75-00-3	N/A
2-CHLOROETHYL VINYL ETHER	110-75-8	N/A
CHLOROFORM	67-66-3	5
DICHLOROBROMOMETHANE	75-27-4	5
1,1-DICHLOROETHANE	75-34-3	23.5
1,2-DICHLOROETHANE	107-06-2	3
1,1-DICHLOROETHYLENE	75-35-4	6
1,2-DICHLOROPROPANE	78-87-5	30
CIS - 1,3-DICHLOROPROPENE	10061-01-5	5
TRANS - 1,3-DICHLOROPROPENE	10061-02-6	7
ETHYLBENZENE	100-41-4	6
METHYL BROMIDE	74-83-9	9
METHYL CHLORIDE	74-87-3	10
METHYLENE CHLORIDE	75-09-2	6
1,1,2,2-TETRACHLOROETHANE	79-34-5	10
TETRACHLOROETHYLENE	127-18-4	9
TRICHLOROETHANE	108-68-3	6
TRANS-DICHLOROETHYLENE	156-60-5	4
1,1,1-TRICHLOROETHANE	71-55-6	6
1,1,2-TRICHLOROETHANE	79-00-5	6
TRICHLOROETHYLENE	79-01-6	5
VINYL CHLORIDE	75-01-4	10

PRIORITY POLLUTANT ACID EXTRACTABLE	CAS NUMBER	RQL (ug/l)
2-CHLOROPHENOL	95-57-8	20
2,4-DICHLOROPHENOL	120-83-2	10
2,4-DIMETHYLPHENOL	105-67-9	13.5
4,6-DINITRO-O-CRESOL	534-52-1	60
2,4-DINITROPHENOL	51-28-5	40
2-NITROPHENOL	88-75-5	18
4-NITROPHENOL	100-02-7	12
P-CHLORO-M-CRESOL	59-50-7	15
PENTACHLOROPHENOL	87-86-5	30
PHENOL	108-95-2	10
2,4,6-TRICHLOROPHENOL	88-06-2	20

PRIORITY POLLUTANT BASE/NEUTRAL COMPOUNDS	CAS NUMBER	RQL (ug/l)
ACENAPHTHENE	83-32-9	9.5
ACENAPHTHYLENE	208-96-8	10
ANTHRACENE	102-12-7	10
BENZIDINE	92-87-5	50
BENZO (A) ANTHRACENE	56-55-3	10
BENZO (A) PYRENE	50-32-8	20
BENZO (B) FLUORANTHENE	205-99-2	10
BENZO (GH) PERYLENE	191-24-2	20
BENZO (K) FLUORANTHENE	207-08-9	20
BIS (2-CHLOROETHOXY) METHANE	111-91-1	26.5
BIS (2-CHLOROETHYL) ETHER	111-44-4	10
BIS (2-CHLOROISOPROPYL) ETHER	108-60-1	10
BIS (2-ETHYLHEXYL) PHTHALATE	117-81-7	30
4-BROMOPHENYL PHENYL ETHER	101-55-3	9.5
BUTYL BENZYL PHTHALATE	85-68-7	20
2-CHLORONAPHTHALENE	91-58-7	9.5
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	21
CHRYSENE	218-01-9	20
DIBENZO (A,H) ANTHRACENE	53-70-3	20
1,2-DICHLOROBENZENE	95-50-1	9
1,3-DICHLOROBENZENE	541-73-1	9
1,4-DICHLOROBENZENE	106-46-7	20
3,3-DICHLOROBENZIDINE	91-94-1	60
DIETHYL PHTHALATE	84-66-2	10
DIMETHYL PHTHALATE	131-11-3	10
DI-N-BUTYL PHTHALATE	84-74-2	20
2,4-DINITROTOLUENE	121-14-2	10
2,6-DINITROTOLUENE	606-20-2	9.5
DI-N-OCTYL PHTHALATE	117-84-0	12.5
1,2-DIPHENYLHYDRAZINE		
(AS AZOBENZENE)	122-66-7	N/A
FLUORANTHENE	206-44-0	10
FLUORENE	86-73-7	10
HEXACHLOROBENZENE	118-74-1	10
HEXACHLOROBUTADIENE	87-68-3	10
HEXACHLOROCYCLOPENTADIENE	77-47-4	10
HEXACHLOROETHANE	67-72-1	10
INDENO (1,2,3-CD) PYRENE	193-39-5	20
ISOPHORONE	78-59-1	10
NAPHTHALENE	91-20-3	8(C)
NITROBENZENE	98-95-3	10
N-NITRO-SODIMETHYLAMINE	62-75-9	20
N-NITROSODI-N-PROPYLAMINE	621-64-7	N/A
N-NITROSODIPHENYLAMINE	86-30-6	20
PHENANTHRENE	85-01-8	10
PYRENE	129-00-0	20
1,2,4-TRICHLOROBENZENE	120-82-1	10

b. Conventional Pollutants

Permittee shall be required to sample for the following conventional pollutants: Total Suspended Solids (TSS), Total Organic Carbon (TOC), Petroleum Hydrocarbons (PHC), and pH.

Permittee shall collect samples as grab samples for pH and PHC and as composite samples for TSS and TOC. All composite samples shall be time-proportional 24 hour composites collected manually at least once per hour, automatically by compositor, or by multiple grab samples of batch discharges.

Analysis for TSS, TOC, and pH shall be conducted pursuant to the methods in 40 CFR 136, and analysis for PHC shall be the method specified in N.J.A.C. 7:14A-14.

Permittee is required to routinely monitor and report for DSNs 481-486 and DSN 48C for following parameters:

DSNs 481-486 pH

DSN 48C pH, Petroleum Hydrocarbons,

Total Suspended Solids, and Total Organic Carbon

In addition, once the oil water separator becomes operational, Permittee shall be required to routinely monitor and report at DSN 489 for pH, PHC, TSS and TOC. As such, Permittee will not be required to monitor for these parameters at DSN 489 as part of this Study.

d. Priority Pollutant Metals and Cyanide

Permittee shall be required to report the total metals concentration in the samples and may also report the dissolved metal fractions in order to determine bioavailability.

Analyses for metals and cyanide shall be conducted in accordance with the methods approved in 40 CFR 136 to achieve the Recommended Quantitation Level (RQL) listed in Table 1. Approved chelation, concentration and extraction procedures, such as those specified in USEPA's "Methods for Chemical Analysis of Water and Wastes", and USEPA's "Test Methods For Evaluating Solid Waste: Physical/Chemical Methods" (SW-846), may be utilized in the analysis of total and dissolved metals.

Permittee shall collect samples for metals analyses as composite samples. All composite samples shall be time

proportional 24-hour composites collected either manually at least once per hour, automatically by compositor, or by multiple grab samples of batch discharges. Permittee shall collect samples for cyanide analysis as grab samples. Preservation and holding times shall be conducted in accordance with 40 CFR 136. All analytical results shall be reported in micrograms per liter (ug/l).

e. Priority Pollutant Volatiles

Permittee shall conduct analyses for volatiles in accordance with the methods approved in 40 CFR 136 to achieve the RQL listed in Table 1. Samples shall be collected as grab samples. Preservation and holding times shall be in accordance with 40 CFR 136. All results shall be reported in micrograms per liter (ug/l).

f. Priority Pollutant Base/Neutrals

Permittee shall conduct analyses for Base/Neutrals in accordance with the procedures approved in 40 CFR 136 to achieve the RQL required. Samples for Base/Neutrals analyses will be collected as composite samples. All composites shall be time-proportional 24-hour composites

collected either manually at least once per hour, automatically by compositor, or by multiple grab samples of batch discharges. Preservation and holding times shall be in accordance with 40 CFR 136. All results shall be reported in micrograms per liter (ug/l).

g. Priority Pollutant Acid Extractables

Permittee shall conduct analyses for Acid Extractables in accordance with the procedures approved in 40 CFR 136 to achieve the RQL required. Samples for Acid Extractables analyses will be collected as composite samples. All composites shall be time-proportional 24-hour composites collected either manually at least once per hour, automatically by compositor, or by multiple grab samples of batch discharges. Preservation and holding times shall be in accordance with 40 CFR 136. All analytical results shall be reported in micrograms per liter (ug/l).

4. Schedule

The Permittee shall develop and implement a quality assurance plan including the use of field blanks, trip blanks, and laboratory

certification verification prior to initiation of the Effluent Characterization Study.

Permittee shall be required to conduct the Effluent Characterization Study monitoring at each designated outfall on twelve separate sampling events. If analyses of a parameter at a specific outfall from four consecutive sampling events are below the RQL for that parameter or there is no net discharge of the parameter, the Permittee may terminate monitoring for that parameter at that specific outfall. If a parameter is detected in one out of the first five sample events in the same order of magnitude as the RQL, and the Permittee has reason to believe that the detection of the parameter is not representative of the discharge, the Permittee may request the Department to delete that parameter from the Study. This parameter should continue to be included in the Study, however, until a response is received from the Department.

Since the circulating water effluent is essentially River water, the basis for determining the presence of a pollutant in the discharge attributable to the Permittee is the net concentration of the pollutant. The net concentration of the pollutant is determined by subtracting the influent analytical result from the effluent analytical result for that pollutant. If the effluent and

influent analytical results are below the RQL for the parameter or it is determined that there is no net addition of the parameter on four consecutive sampling events, the discharge is not a source for that pollutant and, as such, analysis for the parameter may be terminated as specified above.

For priority pollutant scans, if a single (or several) parameter(s) is detected in any of the first four sample events and the Permittee has reason to believe that the detection of that parameter is not representative of the discharge, the scan should be continued as part of the Study, and data for all parameters in the scan should continue to be collected, even though other parameters were eligible for deletion from the Study. The Permittee may request the Department to delete that scan from the Study, however, this scan should continue to be included in the Study until response is received from the Department.

Permittee shall be required to conduct each sampling event for each outfall at least 7 days apart and no greater than 60 days apart. Monitoring for DSN 489 will be initiated after the oil water separator becomes operational. If the Permittee is unable to conduct a required sampling event within 60 days of the prior sampling event, the Permittee shall notify the Department and include the reason(s) in the final report.

The Permittee shall be required to complete the twelve sampling events within EDP plus 18 months. Permittee shall be required to submit a final report summarizing the results of the Effluent Characterization Study to the Department within EDP plus 24 months.

5. Evaluation of Data

In order to ensure useful data to characterize the effluents monitored, Table 1 contains the RQL for each priority pollutant (including metals, acid extractables, base/neutrals and volatiles) to be analyzed. Priority pollutants which are detected by the instrumentation but below the RQL shall be reported as less than the RQL. Priority pollutants reported as less than the RQL are not considered to be present in the wastestream. If a pollutant is reported as below the RQL in both the influent and the effluent of the non-contact cooling water, there is no net addition of the pollutant to the wastestream.

The Permittee shall submit a final report summarizing the analytical data from the Effluent Characterization Study. The final report shall include the analytical results in tabular format by outfall and an evaluation of the analytical data. Anomalous results shall be explained.

The Permittee shall retain copies of all analytical data including laboratory data sheets, for at least five years following submittal of the final report. Copies of this data shall be provided to the Department upon request.

B. Dilution Study

The Federal Clean Water Act, as amended, mandates that the States include water quality-based effluent limitations in NPDES permits, if there is a reasonable potential for the effluent to cause an exceedance of the instream water quality standards. To enable the Department to determine the need for water quality-based effluent limitations, the Permittee may be required to perform a Dilution Study. The Permittee has provided data which demonstrates that the circulating water system outfalls discharge at a velocity of approximately 10.5 feet per second and, also, provided data to demonstrate that the receiving water is generally not vertically stratified for salinity.

Permittee shall conduct a Dilution Study for the non-contact cooling water outfalls (DSNs 481 - 486) and for DSN 489, if the Effluent Characterization Study indicates that toxic pollutants are being discharged. For DSNs 481 - 486, that determination would be based on the net pollutant concentration. If the toxic pollutants

identified meet the criteria for deletion from the Effluent Characterization Study or the Permittee has submitted a request for deletion under the provisions above in the Effluent Characterization Study, Permittee shall not be required to conduct a Dilution Study for that outfall.

If Permittee is required to conduct a Dilution Study, Permittee shall submit Dilution Study Work Plan(s) for the respective outfall(s) to the Department within 90 days of receipt of the analytical results for the fourth set of Effluent Characterization Study samples for that respective outfall(s) or receipt of the Department's denial of a request, if required, to terminate the Effluent Characteristic Study.

The "critical period(s)" - a period of minimal dilution and/or maximum environmental impact on aquatic life and the designated uses of the receiving water body - shall be identified by the Permittee in the Dilution Study Work Plan(s). The Permittee shall commence field work for any Dilution Study during the first designated "critical period" which occurs at least 90 days after approval by the Department of any Dilution Study Work Plan(s).

The model to be utilized in the Dilution Study and the basis for selection of this model shall be identified in the Dilution Study

work plan. The Permittee has historical data and model analyses regarding the mixing of the thermal plume from the discharge of the non-contact cooling water. Permittee may use this data and model analyses in the Dilution Study, however, Permittee shall include the bases for utilizing this data and model analyses in the Dilution Study Work Plan. Although no dye testing is required, the Permittee may utilize Rhodamine WT as a tracer dye without further approval. Since DSN 489 will be an intermittent discharge, the use of a tracer dye is not recommended.

The Permittee shall submit to the Department a report of the results obtained from the Dilution Studies within 6 months of the date the Permittee completes field work for the Dilution Studies.

C. Chronic Toxicity Characterization Study

The requirements for the Chronic Toxicity Characterization Study are included in accordance with N.J.A.C. 7:14A-2.5(a)10 to provide data on potential chronic effects of the effluent on the survival, growth, and/or reproduction of the two test species. The results of the Study will also determine which of the two test species is consistently most sensitive to the effluent. Multi-species testing is imposed in accordance with N.J.A.C. 7:9-4.5(f)1.i and recommendations in the Technical Support Document for Water

Quality-based Toxics Control (USEPA 1991; EPA-505/2-90-001, March, 1991).

The Permittee shall perform a Chronic Toxicity Characterization Study for the non-contact cooling water outfall(s) (DSNs 481 - 486) which are aligned to receive the effluent from DSN 48C during the sample event. The Permittee may choose to align the DSN 48C effluent to a single circulating water system outfall during sample collection, and thus be required to perform the chronic toxicity test on only one outfall during each required sampling event. Permittee shall conduct all testing in conformance with the guidelines contained in the "Interim Chronic Toxicity Testing Methodologies for use in the NJPDES Permit Program, Version 1.0, February 1989"). The laboratory performing the toxicity testing shall be within the existing acute toxicity testing laboratory certification program established under N.J.A.C. 7:18-6.

The Chronic Toxicity Characterization Study sampling shall be conducted on four sampling events during the Effluent Characterization Study period. The first Chronic Toxicity Characterization sampling event shall be initiated not later than 30 days after commencement of the Effluent Characterization Study sampling. Subsequent sampling events shall be conducted at

intervals to ensure the completion of four tests during the period scheduled for the Effluent Characterization Study.

Test results shall be expressed as the NOEC (No Observable Effect Concentration), the LOEC (Lowest Observable Effect Concentration), and IC25 (the 25% Inhibition Concentration) for each test endpoint. The discharge shall be considered to demonstrate chronic toxicity if the IC25 is <100% of the Instream Waste Concentration (IWC) for the most sensitive species.

The Test Species shall be sheepshead minnow (Cyprinodon variegatus) and inland silverside (Menidia beryllina). The tests shall be performed using split samples. The Permittee may concurrently test with a third species from among those listed in the methods specified; however, the species must be approved by the Department prior to initiating testing with this species.

The Chronic Toxicity Characterization Study shall not be complete until four tests using split samples on the two species, have been completed. This study must be completed and a report of the results must be submitted to the Department by the time the Effluent Characterization Study is completed.

Since the effect of the River water is unknown relative to chronic toxicity, the Permittee may perform concurrent tests on the intake water. If these intake tests indicate chronic toxicity in the intake water, the discharge will be evaluated relative to the intake water.

The Permittee shall conduct chronic toxicity testing under the methodologies in "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms", (USEPA, EPA/600/4-87/026, May, 1988) except as modified by the Department.

D. Toxicity Reduction Evaluation

The requirements for a Toxicity Reduction Evaluation (TRE) (in accordance with N.J.A.C. 7:14A-2.5(a)6) are imposed in the Draft Permit to ensure that immediate remedial action is initiated in the event that continuing acute toxicity permit violations occur.

The Permittee shall conduct a TRE for a non-contact cooling water outfall(s) if any two valid and acceptable acute toxicity tests for that outfall, conducted within any eighteen month period, violate the acute toxicity limitation in the permit. In such event, the initial step should be to identify the variability of the toxicity

of the effluent(s) and to verify that an ongoing toxicity problem related to the Station's operation exists for the outfall. If an ongoing toxicity problem exists, Permittee shall submit a TRE work plan to the Department for approval.

Permittee may perform a Toxicity Identification Evaluation ("TIE") in accordance with "Methods for Aquatic Toxicity Identification Evaluation, Phase I Toxicity Characterization Procedures EPA-600/3-88/034" and companion procedures in conjunction with an acute toxicity sampling event. If the TIE demonstrates that effluent toxicity is not persistent, then the acute toxicity test does not constitute a failure triggering the TRE. If the Permittee performs concurrent intake acute toxicity testing and the data indicates that the acute toxicity in the discharge is related to the toxicity of the intake, the acute toxicity test on the discharge does not constitute an event triggering a TRE. Also, if the Permittee is able to adequately demonstrate that the cause of the acute toxicity violation is known and corrective actions have been implemented immediately, that activity shall satisfy the TRE requirement of the permit. A report of the investigation and corrective action shall be submitted to the Department. If the Permittee conducts additional acute toxicity testing during the reporting period in connection with the investigation or corrective action, that test will not be considered as one of the two tests that trigger a TRE.

III. SECTION 316(A) VARIANCE AND SECTION 316(B) DETERMINATION

A. Background

As noted in the Fact Sheet, pursuant to the requirements of N.J.A.C. 7:14-A-2.1, PSE&G applied in June 1990 for a renewal of the Station's NJPDES permit. PSE&G's 1990 Permit Application renewed the Company's request, pursuant to Section 316(a) of the CWA, for a variance from the surface water quality standards for the Station's once through cooling water discharges. At that time, the NJDEPE had under review a best technology available determination pursuant to Section 316(b) relative to the Station's cooling water intake system.

On March 4, 1993, PSE&G filed the 1993 Application Supplement proposing Special Conditions for a Draft Permit supplementing the Company's Section 316(b) Demonstration concerning the Station's cooling water intake system. In this filing, the Company renewed a request for a variance from thermal surface water quality standards pursuant to Section 316(a) and further, made a request for a determination under Section 316(b) that, in conjunction with the implementation of proposed Special Conditions, the Station's cooling water intake system is the best technology available for minimizing adverse impacts.

B. Procedural History

1. Introduction

PSE&G was required to obtain licenses to construct and operate the Station from the Atomic Energy Commission, the forerunner of the USNRC. As part of the licensing process, PSE&G prepared several environmental reports, including one to satisfy the requirements of the National Environmental Policy Act of 1969 ("NEPA"), 42 U.S.C. 4321 et seq. This report provided a predictive assessment of thermal discharge and intake effects relative to the Station's once-through cooling water systems. Licenses were subsequently issued to PSE&G for the Station to operate with once-through cooling.

In 1972, Congress enacted the Clean Water Act, which established the NPDES permitting program requiring, among other things, the regulation of thermal discharges and intake structures used for cooling water withdrawal. The USEPA, which held original responsibility for administering the NPDES program, delegated its program authority to the Department in 1982, including responsibility for determinations under Section 316 of the Clean Water Act.

Section 316(a) of the CWA provides that alternative limits may be applied to thermal discharges which exceed technology-based or water quality-based limits, upon a showing that the alternative limits assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving waterbody. Section 316(b) of the CWA provides the mechanism for a regulatory agency determination as to whether the location, design, construction, and capacity of the cooling water intake structure reflect the best technology available for minimizing adverse environmental impact. Best technology available determinations involve a consideration of several factors including commercial availability and economic practicality i.e., whether a commercially available technology may be applied at a cost which is not wholly disproportionate to the environmental benefit to be realized.

In 1973, PSE&G applied to the USEPA for an NPDES permit for Salem pursuant to the Clean Water Act. In 1974, USEPA issued PSE&G an NPDES permit for the Station. In response to the issuance of this permit, PSE&G submitted an application to the USEPA in 1974 for a thermal variance from technology-based limits under Section 316(a). Supplemental data was submitted to the USEPA in support of the variance request in 1975, 1978 and 1979. Pursuant to USEPA requirements, in a 1978 consent decree (later incorporated in the

Station's 1981 NPDES permit), PSE&G submitted a Section 316(b) Demonstration in 1984 to the NJDEPE (which had assumed NPDES program authority in 1982) concerning the Station's intake structure in accordance with a plan of study developed in concert with various federal, regional and state agencies.

The USEPA deferred action on the Company's Section 316(a) variance request until completion of a review of the Company's Section 316(b) Demonstration.

2. Section 316(a) Variance Application

PSE&G submitted a Section 316(a) variance application, entitled "Protection of Representative Important Species," to USEPA on November 11, 1974. The predictive Section 316(a) Demonstration described Salem's anticipated plume; presented data on the seasonal abundance and distribution of fish, benthos, and plankton in the River in the vicinity of the Station; presented thermal tolerance, avoidance and preference data on selected species measured in the laboratory; and, presented an evaluation of the effects of the projected plume using all available biological data.

The modeled plume, as defined by water 1.5°F or more above the ambient water temperature, was predicted to extend downstream and

upstream about eight and seven miles, respectively. To the west, it was predicted to extend on occasion as far as the shipping channel, approximately one (1) mile offshore. The PSE&G Demonstration concluded that the plume, outside of a relatively small core area (nearest the discharge pipe), would essentially be a surface phenomenon.

The Demonstration presented available data concerning the distribution, abundance, and critical life functions of species that occur in the River near the Station and, also, presented results from PSE&G's laboratory studies and reports from scientific literature concerning estuarine fish and macroinvertebrate behavior with respect to warm water avoidance, warm water preference, warm water tolerance, and cold shock reaction. In supplemental agency submissions between 1975 and 1979, PSE&G provided supplemental information concerning the potential effects of this thermal discharge on critical life functions and on the attraction of nuisance species and results from on-going laboratory studies relating to the thermal response of fish.

PSE&G's Section 316(a) Demonstration concluded that: the thermal plume would not affect any critical life functions of aquatic organisms; any potential adverse effects from the thermal plume on habitat in the River would be very small and ecologically

insignificant; and there was reasonable assurance that the indigenous populations of aquatic organisms in the River would not be adversely affected by the thermal plume.

3. Section 316(b)-Best Technology Available Demonstration

To satisfy the requirements of its 1981 NPDES permit (incorporating a 1978 agreement with USEPA), PSE&G prepared a Section 316(b) Demonstration to evaluate the effects of the existing and alternative intake technologies and cooling water systems on aquatic populations in the Delaware River.

Salem's cooling water intake system can have two types of effects on aquatic species. The first effect, called impingement, occurs when organisms, the vast majority of which are fish from two to four inches in length, are caught on the intake screens. The second, called entrainment, occurs when smaller organisms (e.g., fish eggs and larvae) pass through these screens and the cooling system itself.

In the late 1970's, PSE&G, in concert with a Technical Advisory Group ("TAG") composed of aquatic scientists and resources managers from the USEPA, NJDEPE, the Delaware Department of Natural Resources and Environmental Control ("DNREC"), the National Marine

Fisheries Service ("NMFS"), the United States Fish and Wildlife Service ("USFWS"), the USNRC, and the Delaware River Basin Commission ("DRBC"), designed a plan of study to assess the effects of the Station's existing cooling water intake system on aquatic species in the River. As the first step in the development of the plan of study, populations and communities with a low potential for impact were identified and determined not to require detailed evaluation. The next step was to select species for detailed evaluation from the communities deemed to have the potential for impact ("Target Species"). The designation of a species as a Target Species was based on the species: being a recreationally or commercially important species; being an abundant species; having ecological or food chain importance; or, being a threatened or endangered species.

The plan of study, as approved by the USEPA, identified the Target Species and included the following study programs for these species: (1) impingement and entrainment abundance and survival monitoring; (2) collection of distribution and abundance data in the study areas with emphasis on the designated primary Target Species (weakfish, white perch, and bay anchovy); (3) application of quantitative mathematical models to predict conditional mortality rates (estimate of the percent reduction in a population in a study area due to plant operations in the absence of all other

sources of mortality) for primary Target Species; and, (4) performance of impact analyses for secondary Target Species (i.e. spot, Atlantic croaker, alewife, blueback herring, American shad, striped bass, opossum shrimp, and scud) in as detailed a manner as practicable, short of quantitative modeling.

The Demonstration presented data on species in the Delaware Estuary identified by TAG as having low potential for impact from the Station on the basis of their preferred habitat or high capacity to withstand localized stresses.

The Demonstration concluded that most communities that occur in the Delaware Estuary have negligible potential for adverse impact because their preferred habitats are located outside the zone of Salem's influence. Those biological communities so identified include: the vascular plant community and associated animal communities resident in the extensive marsh/littoral habitat zones along both shorelines of the Estuary; the communities residing in or on the bottom of the Estuary; and the organisms residing downstream of Salem or in the freshwater tributaries to the Estuary, or in upriver areas that cannot survive the low salinity condition which generally prevails in the vicinity of Salem.

The Demonstration also concluded, in support of the TAG determination, that most planktonic communities, due to their high capacity to withstand localized stress, have a low potential for adverse impact. This conclusion was based on studies of power plants at other estuarine sites. These studies have repeatedly demonstrated that planktonic communities have high entrainment survival rates and/or a high capacity to withstand localized stresses. These communities, which are composed of the most abundant organisms in the water entrained by Salem, include the microbial decomposers, phytoplankton, and nano- and micro-zooplankton communities. These communities' high capacity to withstand localized stresses results from their short generation times and high reproductive rates, their relatively high entrainment survival rate, and the transport and rapid dispersion of these planktonic organisms throughout the Estuary by water movements. High entrainment survival rates of these species are probably attributable to the organisms' higher tolerance of thermal and mechanical stresses and rapid transit time through the cooling water system.

Estimates of the number of the Target Species lost due to entrainment and impingement were computed. These computations were based on densities of organisms in the intake flow, their entrainment or impingement survival rates, and the cooling water

flow rates. Entrainment and impingement losses were then placed into a population or community perspective through the use of mathematical models. Losses to the source populations were predicted by using established indices, such as conditional mortality, equivalent adult loss, production foregone, and lost reproductive potential. These indices were used, together with other available information, to assess the potential impact of Salem's cooling water intake system on the Target Species.

PSE&G filed its Section 316(b) Demonstration with the NJDEPE in 1984. The Demonstration presented and integrated information regarding: the plant and its operations; the Delaware Estuary system; life histories of the Target Species; results of monitoring programs; model results; alternative technologies and their costs; and conclusions relative to the Station's cooling water system intake effects.

PSE&G's 1984 Demonstration concluded that the Station was not causing and would not cause an adverse environmental impact based on a consideration of the following factors: assessment of mathematical model results; the conservatism of the models; the known resilience or capacity of populations to recover or compensate for losses; the magnitude of other known sources of exploitation; and, species composition and abundance in a limited

area within the vicinity of the Station prior to and after Salem began operations. Sufficient long-term trend data regarding relative abundance of the species of concern throughout the Estuary was not available at the time the 1984 Demonstration was prepared.

4. Versar Review

In April 1986, the NJDEPE retained Martin Marietta Environmental Systems (later to become Versar, Inc. and hereinafter referred to as "Versar") to conduct a technical review of PSE&G's Variance Request and its Section 316(b) Demonstration. In September 1986 Versar prepared a report for NJDEPE entitled Technical Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstration of Impact for the Salem Nuclear Generating Station - Final Report ("1986 Report"). Versar did not dispute many of the conclusions PSE&G reached in its Section 316(a) Variance Request and the Section 316(b) Demonstration.

With respect to PSE&G's Variance Request, Versar concluded that "[d]ischarge effects were small and localized and not a major source of impact ... [and did] not need to be reduced to protect balanced indigenous population." 1986 Report, Page VI-1.

With respect to the Section 316(b) Demonstration, Versar agreed that the Target Species chosen for study by PSE&G provided an adequate and representative group against which to measure any impact of Salem's intake structure. 1986 Report, Page III-10. Versar concurred that the modeling techniques used for estimating the effects of impingement and entrainment were state-of-the-art and, in fact, the "best methods reasonably available" for quantifying plant-related losses and placing them into a population-level context. Id., Page V-31. Versar concurred that certain of the assumptions inherent in the models were conservative and failure to meet these assumptions would result in an overestimate of plant impacts. Id., Page V-7.

PSE&G had determined that there was no significant adverse environmental impact under Section 316(b) for any Target Species due to Station operations. Versar disagreed, finding the potential for long-term declines for six of the eleven Target Species (i.e., weakfish, white perch, Atlantic croaker, spot, bay anchovy, and opossum shrimp). Id., Page VI-3. Versar did find that Station operations were not having either an actual or potential adverse environmental impact on five Target Species (i.e., American shad, striped bass, blueback herring, alewife, and scud). Id., Page VI-3. To minimize this potential long-term adverse environmental impact for the six Target Species, Versar recommended that the

Station be retrofitted with recirculating cooling towers. Id.,
Page VIII-3.

In 1987, the NJDEPE convened a technical workshop in an effort to identify, understand, and resolve differences among the experts relative to the findings and conclusions in Versar's 1986 Report concerning the existence of the alleged potential adverse environmental impact to the six Target Species. Representatives from the following organizations attended the technical workshop: PSE&G and its technical consultants; the NJDEPE's Fish, Game and Wildlife and Water Resources Divisions; Versar; DNREC; DRBC; NMFS; and USFWS. Subsequent to the technical workshop, there were several follow-up exchanges of information between PSE&G's consultants and Versar concerning the inputs to the mathematical models utilized in PSE&G's 1984 Demonstration.

In addition, in 1988, in a response to an NJDEPE request, PSE&G submitted written comments to the NJDEPE relative to Versar's 1986 Report. In this submission, PSE&G also presented a statement of the information the Company had presented to Versar during the technical workshops. PSE&G's 1988 submission included comments concerning Versar's application of the mathematical models, Versar's selection of model input parameters (e.g., natural survival rates, sampling gear efficiency and species geographic

range), Versar's interpretation of model results and Versar's utilization of numerical decision criteria concerning acceptable levels of impact.

Versar issued a revised report in January 1989, entitled Technical Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstration of Impact for the Salem Nuclear Generating Station - Revised Final Report ("1989 Report").

With respect to the Station's thermal discharge, Versar's 1989 Report reiterated its finding that "[d]ischarge effects were small and localized and not a major source of impact ... [and did] not need to be reduced to protect balanced indigenous populations." (1989 Report, Page VI-1).

With respect to intake effects, Versar presented reduced estimates from those presented in its 1986 Report for certain target species based on the technical workshop discussions, subsequent exchanges of information with PSE&G consultants, and PSE&G's written comments to the 1986 Report. Versar's reduced estimates of losses resulted in Versar's eliminating one of the Target Species (i.e. Atlantic croaker) from the potentially impacted category list. In addition, Versar reduced the estimate of losses for three of the five Target Species identified as potentially impacted (i.e. weakfish, white

perch and spot) to levels approaching the Versar "threshold value below which no significant adverse impact is expected to occur." 1989 Report, Page V-34. Despite the fact that Versar lowered the estimates of losses from those presented in the 1986 Report, Versar did not change its conclusion that the continued operation of Salem had the potential for long-term adverse environmental impact for five (5) Target Species (weakfish, white perch, spot, bay anchovy, and opossum shrimp). 1989 Report, Page VI-3.

C. October 3, 1990 Draft NJPDES Permit

On October 3, 1990, NJDEPE issued the 1990 Draft Permit for the Station, accompanied by a 54-page Fact Sheet and Statement of Basis ("1990 Fact Sheet") providing the Department's basis for the proposed permit. Based upon the administrative record developed as of that time, the Department concluded that "PSE&G [had] failed to meet the burden of proof necessary to entitle it to a variance [from thermal effluent limitations] pursuant to Section 316(a) of the Federal Clean Water Act." 1990 Fact Sheet p. 50. The Department also found that "... recirculating cooling towers [were] the Best Available Technology (BAT) for controlling the thermal component of the discharges at the facility and [were] the Best Technology Available (BTA) for minimizing adverse

environmental impacts resulting from the cooling water intake structure at the facility." 1990 Fact Sheet p.2.

The 1990 Fact Sheet noted that empirical plume survey data indicated that water quality standards for June through August (ΔT no more than 1.5°F, maximum temperature of 86°F, except in heat dissipation areas) were exceeded more than one mile from Salem's cooling water discharge. 1990 Fact Sheet p. 46. DRBC and NJDEPE regulations provide that the temperature limitations may be exceeded by special permission in case-by-case heat dissipation areas but that these areas must not exceed 3,500 feet in length. 1990 Fact Sheet p. 46.

Although the Department noted that the thermal plume exceeds the surface water quality standard, the Department's conclusion that closed cycle cooling should be required was not primarily based on an assessment of the impacts of the Station's thermal discharge on the aquatic community. In fact, the 1990 Fact Sheet noted that Versar had concluded that adverse effects from the thermal loading would likely be restricted to a few species at temperature extremes and that even these limited effects "are likely to be localized." 1990 Fact Sheet p. 46. Rather, the Department's decision to deny the PSE&G Variance Request was primarily based on a concern regarding losses due to entrainment and impingement. The Fact

Sheet specifically notes that PSE&G failed to meet its burden of proof necessary to entitle it to a Section 316(a) variance "based on Versar's conclusion that the applicant did not demonstrate compliance with the criteria established in Section 316(a) based on PSE&G modeling results [concerning intake effects]." 1990 Fact Sheet p. 50.

The Department noted that Versar concluded that Salem did not meet decision criteria for bay anchovy, weakfish, opossum shrimp, and spot because of "[l]arge population and production losses" and for weakfish and white perch because "[p]opulation and production losses to [Representative Important Species]... are a relatively large fraction of commercial and recreational fisheries." 1990 Fact Sheet p. 51.

The Department noted that Versar's conclusion was based, in part, on other asserted deficiencies in data or studies concerning the PSE&G Variance Request such as "limited data on indirect and non-thermal effects, integration of thermal preference and tolerance data with environmental temperature distribution, lack of empirical verification of assumptions, and lack of data on habitat formers and nuisance species." 1990 Fact Sheet p. 50.

The Department determined, based on Versar's conclusions, that a major reduction in entrainment and impingement was needed, that the cooling tower technology provides the highest degree of protection of any currently available technology and, finally, that " ... closed cycle cooling ... is a demonstrated technology available for application at the Salem Nuclear Generating Station." 1990 Fact Sheet p.54. The Department stated in the 1990 Fact Sheet that it had considered costs in making this determination. Fact Sheet p.54. In that regard, however, the Department noted that PSE&G's cooling tower cost estimates were "not well documented but ... [were] on the same order of magnitude as Versar's estimates (i.e. \$112 million for natural draft towers)." Fact Sheet p.52.

D. Comments - 1990 Draft Permit

1. Background

In response to the 1990 Draft Permit and accompanying Fact Sheet, the Department received a number of comments from the public and from state and federal agencies. Written comments were filed by eighteen (18) individuals and agencies, including PSE&G, USEPA, and other government entities.

Other than those comments provided by the USEPA and PSE&G, the comments did not present information that had not been considered by the Department prior to issuing the Draft Permit. In sum, these comments reflect the strong desire of the public to protect the aquatic resources in the Delaware Estuary and, further, generally supported the Department's decision to require installation of the closed cycle cooling to protect those resources.

The most extensive comments were filed by the USEPA and PSE&G. Among other things, the USEPA comments stated, in pertinent part, that Section 316(b) determinations consider the technology to be applied to cooling water intake structures and that unlike Section 316(a) variance determinations the decision is subject to economic considerations. The EPA comments further stated that the economic test is based on the Seabrook Decision In the Matter of Public Service Co. of New Hampshire (Seabrook Stations, Unit 1 and 2), Case No. 76-7, slip. op. at 11. (June 10, 1977) wherein the USEPA Administrator stated that "... it is [not] reasonable to interpret Section 316(b) as requiring [the] use of technology whose cost is wholly disproportionate to the environmental benefit to be gained." The USEPA comments indicated that, while there were no published USEPA guidelines relating to what constitutes wholly disproportionate, "[if] the costs of closed cycle cooling ... [were] found to be wholly disproportionate, other forms of

available intake technology could be required." In addition, the USEPA Comments referred the Department to USEPA decisions with respect to power plant assessments including In the Matter of Crystal River Power Plant Units 1, 2 and 3 (Florida Power Corporation), NPDES Permit No. FL0000159 (revised Findings and Tentative Determinations Pursuant to 33 U.S.C. §1326, September 1, 1988) ("Crystal River Determination") wherein the USEPA determined that the costs of the retrofitting the Crystal River Power Plant with closed cycle cooling were wholly disproportionate to the environmental benefits to be gained and, further, that mitigation measures may constitute minimization of environmental impacts in connection with making a BTA determination under Section 316(b).

2. PSE&G Comments

PSE&G's 1991 Comments presented substantial scientific (See Appendices C, E, F, H, I and P), engineering (See Appendices J and K), and economic data (See Appendices K, L and M) not part of the administrative record upon which the Department determined that closed cycle cooling was required. These data were reviewed by the Department in connection with its reconsideration and, in part, form the basis for the Department's decision to issue this Draft Permit. Accordingly, the Department believes it appropriate to summarize separately herein the relevant aspects of the new

scientific, engineering, and economic data presented in PSE&G's 1991 Comments.

a. Application for Section 316(a) Variance

PSE&G's 1991 Comments presented empirical and modeling data on the thermal plume, analyses integrating the plume data with thermal tolerance data for the Representative Important Species, and data and information responding to the deficiencies identified by Versar in its 1989 Report relative to PSE&G's thermal variance application (See Appendices E, F and P). (1990 Fact Sheet, Page 50).

i. Thermal Plume Characteristics

Because the Station had not commenced commercial operation in 1974, PSE&G's 1974 Section 316(a) variance application was based on anticipated or predictive thermal plume characteristics. Subsequent to filing the Variance Request, and after commercial operations began, PSE&G performed a thermal monitoring program to collect empirical data on plume characteristics under operating conditions. Based on data from this thermal monitoring program, the thermal plume characteristics are described in Appendix E to PSE&G's 1991 Comments, and may be summarized as follows:

The discharge exits from six pipes at the bottom of the River at a depth of 33 feet about 500 feet offshore at a discharge velocity of about 10.5 feet per second. The momentum of the water as it exits from the underwater discharge pipes causes rapid mixing with the cooler river water. The thermal plume rises to the river surface in less than one minute within 300 feet of the point of discharge. At the time the thermal plume reaches the surface, the maximum temperature has been reduced by approximately 50 to 55 percent. This temperature at this point typically ranges from 7° to 11° F above the ambient temperature of the river (ΔT). From this point, the plume becomes a surface phenomenon. The surface nature of the plume creates conditions that facilitate a decrease in plume temperature including mixing associated with wind and wave action, energy loss to the atmosphere and mixing due to ambient currents. Within 3,500 feet of the discharge, temperatures in the warmest center line portion of the plume have decreased to a ΔT that ranges from 2 to 4° F above the ambient temperature. The plume continues to diminish in both temperature and depth beyond 3,500 feet.

The shape and location of the plume vary depending on such factors as the flow rate and temperature of the discharge, the stage and direction of the tide, and the direction and velocity of the wind. Due to the strength of the current in the channel, the thermal plume is confined to the eastern side of the River. On the flood

tide the plume contacts the nearshore of Artificial Island. No other shoreline contact occurs either up or downstream of the Station during any tidal cycle. As compared to the NJDEPE summer thermal water quality standard ($\Delta T < 1.5^{\circ}\text{F}$ at 3,500 feet from the discharge), the maximum centerline length of the plume at the 1.5°F isotherm typically occurs during ebb tide and is approximately 3 miles long, as compared with the tidal Delaware system, which is 131 miles long. This buoyant far-field plume beyond 3,500 feet (ΔT ranging from 0.5° to 2°F) is normally contained in the upper 3 to 9 feet of water. The maximum width of the plume is approximately 0.7 miles, or approximately 25 percent of the width of the River at the Station, with the average width of the plume being about 15 percent of the width of the River at Salem. These data and analyses demonstrate that the predicted plume which formed the basis for the 1974 Section 316(a) Demonstration overestimated the length and width of the actual plume.

Analyses of the 1.5°F surface temperature isotherm for the months of June through August indicate that the area bounded by this isotherm is minimal compared to the area of the River and is constrained within the upper water column in the deeper open-water portion of the River. In addition, the maximum percentages of the river cross-sectional area and surface width within the 1.5°F isotherm are typically less than 10 and 15 percent of the River,

respectively. Consequently, most of the River's cross-section and surface width remains unaffected by the thermal plume.

**ii. Integration of Thermal Preference Data With
Thermal Plume Characteristics**

PSE&G's Comments presented a biothermal assessment, which integrated species temperature preference data with plume characteristic data to evaluate the potential for impact on populations of organisms encountering the plume. (1991 Comments, Appendix F). The biothermal assessment for habitat formers, nuisance species, phytoplankton, microzooplankton and macroinvertebrates, including opossum shrimp, indicates that the combination of an offshore location and high velocity submerged discharge achieves plume temperature conditions with a low potential for adverse impact on these biotic categories.

The biothermal assessment for fish indicates that:

- heat shock of juveniles and adults is not likely to cause mortality;
- cold shock mortality is not likely to occur;
- habitat exclusion due to thermal avoidance is insignificant;

- thermal barriers to migratory routes will not occur;
- areas of the plume which may exceed optimum growth temperature are insignificant or inaccessible; and,
- Eggs and larvae of most representative important species do not typically occur in abundance in the vicinity of Salem. Eggs and larvae of bay anchovy and weakfish do occur in relative abundance in the vicinity of Salem. The bay anchovy and weakfish eggs and larvae which may become involved with the warmest part of the plume may potentially be adversely affected; however, this plume area is very small, less than 0.00013 percent of the habitat available in the Delaware Estuary.

iii. Indirect and Non-Thermal Effects

PSE&G's Comments also presented data relating to indirect and non-thermal influences on these aquatic organisms (1991 Comments, Appendix F). As part of the biothermal assessment, the 1991 Comments presented an assessment of the interaction of the thermal plume and its potential to affect other parameters (i.e. dissolved oxygen, chlorine, toxics, and bacteria) which may adversely impact aquatic organisms. (1991 Comments, Appendix F)

The assessment concluded that dissolved oxygen in the River in the vicinity of the Station continues to achieve the water quality standards desired for attaining fishable water quality; chlorine, with or without the thermal plume, has no adverse impact on the ecosystem; and, the levels of toxics and bacteria are not preventing attainment of fishable and swimmable water quality.

b. Section 316(b) Demonstration

The assessment of potential impact presented in PSE&G's 1984 Section 316(b) Demonstration was based primarily on a predictive methodology, due to limited Station operating experience. The updated impact assessment provided by PSE&G in the 1991 Comments utilized both predictive and empirical methodologies, evaluating the model results in conjunction with available abundance and catch data.

PSE&G's 1991 Comments (Appendices I and P) supplemented the administrative record relating to the Section 316(b) determination and included updated estimates of potential impact based on: (1) new information on the life history of weakfish, (i.e., natural survival rates between life stages); (2) use of a more appropriate assessment model incorporating factors to account for source population distribution to estimate spot entrainment conditional

mortality; (3) new information concerning the distribution of bay anchovy in the Delaware Estuary; (4) inclusion of correction factors for entrainment sampling gear efficiency; and, (5) updated information on plant operating conditions based on longer historical records (e.g., no CWS chlorination, CWS intake flow rates, and entrainment thermal exposure times).

A compilation of long-term juvenile abundance data and available recreational and commercial fisheries catch data for the four fish Target Species in dispute were also presented (1991 Comments, Appendix H). These empirical data were obtained from various regulatory and resource management agencies' studies conducted to monitor the status and trends of long-term abundance and recruitment.

Lastly, PSE&G's 1991 Comments presented detailed engineering information for capital, O&M, and replacement power cost estimates associated with retrofitting the Station with a closed cycle cooling system. Information relating to the engineering, costs estimates and biological efficacy of other alternate intake technologies was also presented. (1991 Comments, Appendices J, K and L).

The PSE&G updated model results indicate reduced estimates of losses due to the Station's operations for the five species in dispute. The reduced estimates of losses are at or below Versar threshold value[s] below which no significant adverse impact is expected to occur. (1991 Comments, Appendix I). In addition, the long-term abundance data presented by PSE&G indicate no long-term decline in abundance for bay anchovy and juvenile weakfish, spot, and white perch. (1991 Comments, Appendix H). With respect to threatened and endangered species, PSE&G presented recent "no jeopardy" determinations by NMFS, under Section 7 of the Endangered Species Act of 1973, 16 U.S.C. 1531 et seq. for shortnose sturgeon and sea turtles (1991 Comments, Appendix P).

Detailed engineering analyses relative to retrofitting the Station with cooling towers were presented and include: engineering and construction details for, and cost estimates associated with, the proposed retrofit; a description of other modifications (e.g., condensers, piping) required to retrofit Salem with cooling towers, and their associated costs; cost estimates for replacement energy associated with Station shutdown during construction and the loss of Station efficiency due to closed cycle cooling. (1991 Comments, Appendices K and L.)

PSE&G's engineering details indicate that retrofitting the Station with a closed-cycle cooling system would involve a complicated and wide-scale construction effort with significant schedule and budget risks and would be the first of a kind from an engineering perspective. The project would involve: the excavation of over 1/4 million cubic yards of soil, 75,000 cubic yards of which would require off-site disposal; the demolition of large quantities of the existing circulating water system piping and supports; installation of over 4 miles of 7 foot diameter pipe; and wholesale removal of existing single-pass condensers and replacement with two-pass modular units. In addition to the construction of the cooling towers themselves (i.e. two natural draft cooling towers approximately 540 feet high or six mechanical draft cooling towers 250 ft. in diameter and 70 ft. high), the retrofit would also require the construction of a new pump house, chemical control system structures, a new major electrical power distribution system to operate recirculating water pumps, a make-up water system, and a blowdown system and associated chemical control facilities. Due to soil and subsurface conditions, all heavy structure would require deep pile foundations. (1991 Comments, Appendix K).

Capital expenditures for the retrofit ranged from \$475 for natural draft cooling towers to \$625 million for mechanical draft towers. Annual operating and maintenance costs would increase by at least

\$4 million. Station electrical output would be reduced during the summer period by approximately 128 MWe, based on the use of natural draft cooling towers. The capital costs associated with installing a new 100 MWe combustion turbine unit to replace the lost capacity alone is estimated at \$41 million. (1991 Comments, Appendix K).

Retrofitting the Station with closed cycle cooling using natural draft cooling towers would require that the Station be shutdown for at least four years. The replacement power costs associated with an immediate shutdown, as required by the Draft Permit, were estimated to exceed \$2 billion. Even assuming the Draft Permit had allowed a compliance schedule, replacement power costs were estimated at \$544 million. (1991 Comments, Appendix L).

PSE&G's 1991 Comments indicate that neither natural draft cooling towers nor mechanical draft cooling towers are technically capable of meeting the 1990 Draft Permit operating requirement of a 10° F approach temperature (1991 Comments, Appendix K). These Comments further indicated that approach temperatures are only used by engineers as a design criteria and are not reasonable as an operating requirement. While natural draft and mechanical draft cooling towers could in theory be designed to a 10° F approach, PSE&G 1991 Comments conclude that they cannot achieve a 10° F approach as an operating requirement.

PSE&G's 1991 Comments also presented an evaluation of five alternative technologies considered to have the potential for minimizing entrainment and impingement: wedgewire screens; variable speed pumps, fine-mesh screens, behavioral barriers, and modified fish lifting buckets for the existing Ristroph screens (See 1991 Comments, Appendix J). For the reasons summarized below, PSE&G's Comments concluded that none of these five technologies could be considered "best technology available" for application at Salem. PSE&G's Comments may be summarized as follows.

Wedgewire Screens

Wedgewire screens have been shown to be effective in reducing fish impingement and entrainment at several power plants. The wedgewire screen technology is not an available technology for application at Salem in that:

- Salem's cooling water flow rate is more than five times the flow rate of any facility at which this technology has been applied;
- Suspended solids and detrital loadings are substantially higher at Salem than at any facility where this technology has been applied, increasing the potential for screen clogging;

- The river current conditions in the vicinity of Salem do not provide the continuous high velocity, cross-flow current necessary to achieve biologically effectiveness associated with application of the technology; and,
- the brackish waters in the vicinity of Salem would create a significant biofouling problem. Given the submerged off-shore design of the screen elements, substantial maintenance and biofouling control difficulties would be created.

Installation cost estimates for a wedgewire system at Salem range from \$44 to \$120 million, depending upon required design. The replacement power costs associated with construction outages were estimated at \$445 million.

Variable Speed Pumps

Flow reduction through the installation of variable speed pumps has been proposed at other power plants to address entrainment mortality. The reduction in flow rate achievable with variable speed pumps would result in higher condenser temperatures, increased entrainment transit time, less efficient condenser operation, and a higher discharge temperature without a concurrent reduction in reactor power (and resulting loss in station output)

to maintain ΔT within normal operating ranges. While flow reduction alone (without a concurrent reduction in power) might produce some reductions in the number of organisms entrained, the greater thermal stress may increase entrainment mortality dependent on ambient river temperatures. (1991 Comments, Appendix J). Replacement power costs associated with a 10% reduction in Station electric output (associated with a 32% summer flow reduction), for instance, were estimated to be \$35 million for 1995 escalating to \$144 million by the end of the useful life of the Station. (1991 Comments, Appendix J; Stone & Webster, May 1988).

Fine Mesh Screens

Several different configurations of fine mesh screens have been installed and are in operation at other power plants. Fine mesh screens reduce fish entrainment but do so by impinging fish (that otherwise would be entrained) on the screen mesh. The overall mortality, however, of certain species may increase because early life stages (i.e., eggs and larvae) that may survive entrainment are lost due to the different stresses associated with impingement on the screen surface. Decreased open surface area of the screens may present substantial operation and maintenance difficulties. Simple replacement of the existing screen panels with fine mesh panels would not be an available technology due to the presence of

severe biofouling and detrital loading conditions at Salem, and the necessity to reduce intake velocity to improve the survival of early stage of fish which would be impinged instead of entrained.

Construction of a new screening structure would achieve the lower velocities which may improve potential fish survival. Full-scale prototype testing would be required however to determine whether the screens would operate in the river environment near the Station and to determine whether impingement and entrainment and related mortality rates would be reduced below existing levels. Costs for such a structure were estimated at approximately \$80 million.

Behavioral Barriers

Strobe lights to repel or divert fish from water intakes have been tested at power plants and hydro-electric facilities with varying success. There has, however, been no demonstrated application of this technology at any power plant water intake. Turbid river conditions at Salem would preclude successful application of this technology. (1991 Comments, Appendix J).

The use of sound to repel or divert fish from water intakes has also been tested at power plants and at hydro-electric facilities with varying success. American Electric Power Service Corporation

has recently developed a low-frequency sound technology that has been proven to be somewhat successful in repelling trout and salmon in pilot tests at hydro-electric facilities. There has, however, been no demonstrated application of this technology. The capital cost to install a low-frequency sound technology was estimated to be approximately \$1 million.

Modified Ristroph Screens

Improved fish buckets designed to minimize stress to, and prevent escape of, impinged fish have been tested in the laboratory and at a power plant on the Hudson River. These tests (laboratory flume and pilot field tests) indicate that the design may significantly reduce mortality of impinged fish. There was, however, no demonstrated application of this technology as of that time. Costs of the modified fish buckets were estimated to be in excess of \$1.5 million.

E. PSE&G 1993 Application Supplement

On March 4, 1993, PSE&G filed the 1993 Application Supplement which proposed Special Conditions for a proposed Draft Permit in support of the Company's request for a BTA determination under Section 316(b) and a thermal variance request under Section 316(a).

As part of the Company's 1993 Application Supplement, the Company submitted a Technical Appendix which provides the scientific and technical basis for the proposed Special Conditions to the Draft Permit for resolution of PSE&G's Variance Request and the Department's Section 316(b) BTA determination. PSE&G's proposed Special Conditions and the technical justification therefor may be summarized as follows:

PSE&G Proposed Special Condition No. 1:

- limitation of the circulating water system ("CWS") intake flow to a monthly average rate not to exceed 3,024 MGD.

PSE&G Technical Justification:

The impingement/entrainment loss estimates presented in the Salem Section 316(b) Demonstration relied upon a calculated cooling water intake volume based upon the assumption that the circulating water pumps in service operated at 100 percent of design capacity. The CWS design flow is calculated to be 3,197 MGD.

Based on data accumulated over the years, including circulating water dye studies and plant operating history, it has been determined that the CWS pumps do not consistently operate at 100

percent of the design capacity. Using these data, PSE&G proposes to limit the maximum CWS intake flow so that the flow will not exceed a 30-day average of 3,024 MGD.

Consistent adherence to this lower flow rate will ensure that the estimated losses do not exceed the updated model estimates of losses presented in the 1993 Application Supplement. To assure that the lower flow volume is maintained, PSE&G will commit to a 30-day average flow permit limit on CWS flow of 3,024 MGD, which in effect limits the average for each circulating pump to 175,000 GPM.

PSE&G Proposed Special Condition No. 2:

- modify the design of the fish buckets on the intake screens in accordance with a design plan to be prepared by PSE&G.

PSE&G Technical Justification:

Flume tests indicate that flow through the standard Ristroph screen may create a vortex in the fish buckets which can result in fish being repeatedly buffeted against the screen surfaces and damaged by abrasion. A new fish bucket design has been demonstrated in flume studies that will reduce the vortex current and create a

somewhat sheltered region where the fish are able to maintain a stable, upright position.

In addition, with the standard Ristroph design, fish tend to escape from the fish buckets as the screen rotation lifts them out of the water, resulting in reimpingement and increased injury or death. As part of the modification, a short auxiliary screen was added to the leading edge of each fish bucket to prevent escape of the fish. This modification also creates a hydrodynamic condition favorable to fish capture in the fish buckets. Flume tests indicate that many of the fish that move into the vicinity of the screen face tend to dive behind the auxiliary screen and into the fish bucket. By contrast, fish swimming in the flow above the unmodified fish buckets tend to avoid the buckets and are repeatedly reimpinged.

Pursuant to a New York State Department of Environmental Conservation requirement, these screen intake modifications were installed at Indian Point Power Plant on the Hudson River by July 1991. Data from a pilot study at Indian Point, which involved several of the species at issue here, i.e. white perch, bay anchovy and weakfish, indicate that the proposed modification will increase survival of impinged organisms. Qualitative studies indicate improved impingement survival rates.

PSE&G Proposed Special Condition No. 3:

- restoration, enhancement and/or preservation of wetlands in the Delaware River Basin including:
 - a. the restoration or enhancement of an aggregate of at least 8,000 acres of land in the Delaware River Basin such that (i) tidal flow to diked wetlands (i.e., salt hay farms, muskrat impoundments and agricultural impoundments) are restored, or (ii) degraded wetlands, i.e., common reed (Phragmites australis), are converted to primarily Spartina species and other naturally occurring indigenous marsh grasses (e.g. Distichlis spicata, Juncus spp.), all as more particularly described in a management plan to be approved by the Department. The lands restored or enhanced will have appropriate title ownership or restrictions to assure continued protection from development;
 - b. the restoration or enhancement of an additional 2,000 acres of wetlands of the kind described in (a) above or the preservation from future development through the acquisition or imposition of conservation easements of up to 6,000 acres of uplands adjacent to tidal wetlands within the Delaware River Basin; and,

- c. imposition of a deed restriction to preclude future development of approximately 4,500 acres of land, commonly known as the Company's Bayside Tract in Greenwich Township, approximately 2,600 acres of which are wetlands and approximately 1,900 acres of which are uplands.

PSE&G Technical Justification:

Estuarine wetlands are valuable natural resources. The entire wetland complex in temperate zone estuaries, such as the Delaware Estuary, generates an enormously high annual production of biomass. On an equivalent area basis, estuarine wetlands are among the most productive ecosystems on earth. Much of the production of fish and shellfish in coastal ecosystems is associated with wetlands. Wetlands provide excellent spawning and nursery habitat and produce plant material which becomes food resources; e.g. detritus, algae and small organisms.

The species at issue at Salem (white perch, spot, weakfish, bay anchovy, and opossum shrimp) are all consumer organisms which feed in the Delaware Estuary food web. Wetland systems in the Delaware Estuary provide foraging and refuge habitat, serve as nursery areas for early life stages and juveniles, and provide direct food resources. For these reasons, increased wetlands in the Delaware

Estuary will contribute incrementally to the production of these species.

In that wetlands in the Delaware Estuary support incremental production of the species at issue, wetlands restoration and enhancement can be applied to minimize the effects of Salem-related losses by incrementally increasing productivity of these species. Wetlands restoration and enhancement are accepted approaches for achieving incremental production of fish and shellfish in programs regulating impacts to ecosystems nationwide. Wetlands restoration and enhancement effectively minimize the effects of Station-related losses to fish and shellfish species at issue by incrementally increasing their populations. Wetlands restoration and enhancement also benefit all other species dependent on the productivity derived from the wetlands.

Wetland production (estimated by the aggregated food chain model) was related directly to biomass lost (estimated by standard power plant impact assessment models) to estimate the wetlands restoration acreage required to minimize adequately the effects of Salem-related losses by incrementally increasing the population of these species. The food chain model estimates the production of fish biomass per acre based on the biological conversion of wetland plant productivity through the food chain to the fish species at

issue. Primary productivity per acre of wetland per year and food chain transfer conversion factors were derived from published, peer-reviewed scientific literature and were employed in this calculation using information specific to the Delaware Estuary, where available.

Based on the estimates of fish biomass lost and estimates of productivity per acre of wetland presented in the Company's Technical Appendix, PSE&G determined that 2,425 acres of wetlands was appropriate to increase the overall populations so as to minimize the effects of station-related losses, thereby assuring the protection and propagation of a balance indigenous population. PSE&G has increased the number of acres of wetlands to be restored or enhanced to a minimum of 8,000 acres as a safety factor to allow for uncertainties identified by the Department with respect to estimating the fish biomass produced per acre of wetland.

PSE&G Proposed Special Condition No. 4

- Implement a program for the elimination of impediments to fish migration through the installation of fish ladders at up to five candidate sites in consultation with the Department.

PSE&G Technical Justification

River herring serve as forage for a variety of important commercial and recreational species, e.g., bluefish, white perch, weakfish, and striped bass. Many of the tributary streams and rivers utilized by river herring for spawning along the Atlantic Coast of the United States have been dammed or otherwise blocked for industrial, irrigation, recreational, or flood control purposes. Concerns over the effects of the loss of such spawning habitat on the stocks of river herring (and other anadromous fishes) have led to strong efforts in other river systems to provide fish passageways around these impediments to create spawning runs for river herring in tributary streams.

Recognizing the potential benefits of providing access to spawning habitat now blocked by dams, the Department has conducted a number of surveys of tributaries to the Delaware as part of the Department's anadromous herring run restoration program to ascertain the presence or absence of river herring runs and to identify specific sites which may benefit from the installation of fishways. These surveys identified numerous barriers to potential herring passage within the Delaware system and recommended the installation of fishways around obstructions to anadromous herring

runs where such a fishway would provide access to upstream spawning and nursery areas.

Restoration of anadromous river herring runs will increase river herring production, available forage for important commercial and recreational species (including certain of the Target Species at issue), and increase commercial and recreational fishing opportunities in the tributary streams to the Delaware. Scientific studies show that river herring also may provide increased growth rates for freshwater gamefish in impounded waters to which they are introduced which could lead to greater freshwater fishing opportunities.

PSE&G Proposed Special Condition No. 5

- Conduct a study to evaluate the feasibility of using sound to divert fish away from the CWS intake.

PSE&G Technical Justification

PSE&G proposes to conduct a study to evaluate the feasibility of utilizing sound to divert fish away from the CWS intake. Successful diversion of fish from the area of the CWS intake would

reduce the number of fish impinged onto the intake screen thereby reducing Salem-related losses.

Recent laboratory and field tests have indicated some success in diverting certain fish species from specific areas, including cooling water intake structures through the use of sound generating devices, such as underwater speakers or sound projectors. Unlike poppers and hammers, these devices are capable of varying the frequency and producing sounds heard by fish.

Specifically, American Electric Power Service Corporation ("AEP") has conducted laboratory and field tests using low frequency sound at three hydroelectric facilities. AEP reports that the laboratory tests indicate that a variety of warmwater and coldwater species were capable of being diverted by sound. The field test results indicate that sound was effective in diverting fish from the forebay of the intake. The New York Power Authority has conducted field tests with sound technology at the cooling water intake structure at its John H. Fitzpatrick Generating Station on Lake Ontario. Preliminary test results indicate success in diverting fish (i.e. alewife) from the CWS intake.

PSE&G Proposed Special Condition No. 6

- Conduct a Department-approved biological monitoring program for the Estuary consisting of bay-wide abundance monitoring and impingement and entrainment monitoring.

PSE&G Technical Justification:

The biological monitoring program will be designed to collect supplemental information on the relative abundance of fish and macroinvertebrates throughout the Estuary. Long-term abundance data will provide information on the status of the individual resources in light of past levels, information on the factors affecting these long-term resources trends and provide a basis for more informed resource management decisions. The program will be conducted pursuant to a work plan approved by the Department. Monitoring results will be reported to the Department in accordance with a schedule to be developed in concert with the Department.

Components of the program will include: farfield, bay-wide abundance monitoring for finfish and macroinvertebrates; nearfield monitoring for finfish; beach seine sampling for finfish which use the Estuary shallow water areas; onsite impingement and entrainment

monitoring; and, special studies to investigate specific issues of interest to the Department.

IV. SECTION 316 DETERMINATIONS

1. Introduction

In the 1990 Draft Permit, a determination was made that closed cycle cooling was an "available technology... [for reducing] the adverse effects of the cooling water intake and thermal discharge which threatened the balanced, indigenous community of the receiving waters. ..." (1990 Draft Permit, p. 54). Emphasis Added. Considering both thermal discharge and intake effects on the "protection and propagation of a balance indigenous population", this determination was made under Section 316(a). Having made that determination, the Department concluded that closed cycle cooling was also BTA for minimizing adverse environmental impact.

USEPA's comments on the 1990 Draft Permit referred the Department to USEPA determinations in other power plant impact assessment cases. These USEPA determinations have provided procedural and substantive guidance to the Department in connection with making a Section 316(a) and (b) determination in this case. One of the

USEPA references, Office of General Counsel (OGC) Opinion No. 63, relating to EPA's decision in Central Hudson Gas and Electric Corporation, 2ELPS Fed. Ref. Service 371, 382 slip op. at 16 (July 29, 1977), is particularly instructive here. While acknowledging that the application of Section 316(a) and Section 316(b) should be coordinated to the extent possible, Opinion No. 63 provides, in pertinent part, that "... conditions may be imposed under Section 316(b) independent of any proceeding to modify an effluent limitation under Section 316(a)..." (OGC Opinion at 16) and, further, that "... [T]here is no legal basis for predicated determinations under Section 316(b) on determinations under Section 316(a)" (OGC Opinion at 19).

This guidance is particularly pertinent here for three reasons. First, focusing solely on PSE&G's request for a variance from thermal surface water quality standards pursuant to Section 316(a), there is no dispute that the Station's "discharge effects are small and localized..." and, "... do not need to be reduced" (1986 Report, page VI-1; and 1989 Report, page VI-1). In sum, the administrative record demonstrates that the Station's thermal discharge has assured and will continue to assure the protection and propagation of a balanced, indigenous population, the statutory standard for issuance of a variance under Section 316(a). Concerns as to the "protection and propagation of the balanced indigenous

population" relate primarily to the cooling water intake structure effects and Section 316(b) is generally the statutory mechanism for resolving that question, not Section 316(a). Second, as USEPA's Comments indicate, while economic considerations may not be considered under Section 316(a), economic considerations are a factor under Section 316(b), and, further, while some dispute may yet exist, the current administrative record clearly indicates that retrofitting the Station with closed cycle cooling would involve a complicated and wide-scale construction project, entailing substantial capital and replacement power costs. Finally, while the USEPA Comments indicate that mitigation measures may not be considered under Section 316(a), the USEPA decisions in other power plant assessment cases required mitigative measures as BTA under Section 316(b).

Against this background, and in the context of the information in the current administrative record and PSE&G's March 4, 1993 Application Supplement, the Department has undertaken a reconsideration of the 1990 Draft Permit determination that requires the Station to be retrofitted with closed cycle cooling. Since the administrative record demonstrates that the Station's thermal discharge has not had and is not having an adverse environmental effect on the protection and propagation of a balanced indigenous population in the River, the Department has

focused on the entrainment and impingement losses associated with the operation of the cooling water intake system under Section 316(b).

As a result of this reconsideration, the Department has determined to allow the Station to continue to operate with a once through cooling water system finding that, with the modifications to the intake structure, the intake flow limitation, the wetland restoration and enhancement program, the fish migration barrier removal program, the feasibility study for sound deterrent technology, and the biological monitoring program, all as required in the Special Conditions of the Draft Permit, the Station's intake structure will be BTA for minimizing adverse environmental impacts. In addition, as a result of this reconsideration, the Department is proposing that with the implementation of the above measures under Section 316(b), the impingement and entrainment effects will be minimized to a level that assures a balanced, indigenous population thereby entitling PSE&G to a thermal variance under Section 316(a).

2. Section 316(b) Best Technology Available Determination

Under Section 316(b), the Department must determine whether the Station's intake structure reflects the best technology available for minimizing adverse environmental impact. At the time the 1990

Draft Permit was issued, the Department's and PSE&G's experts disagreed on whether Salem's intake structure had the potential, in the future, to cause adverse environmental impact to aquatic life in the River. Versar, the Department's consultant, concluded that the intake structure had the potential to cause adverse environmental impact to five of the eleven Target Species studied in PSE&G's Section 316(b) Demonstration. But as noted above, PSE&G's Demonstration concluded that the existing intake structure was BTA for minimizing adverse environmental impacts on all Target Species. The disagreement between Versar and PSE&G's consultants was primarily based on the application of mathematical models as well as the interpretation of the model results.

As indicated above, PSE&G's 1991 Comments presented updated model estimates of losses for the Target Species at issue, abundance trend data for the four fish species at issue, and detailed engineering information and updated cost estimates relating to retrofitting the Station with closed cycle cooling.

PSE&G's updated model estimates for certain of the species at issue result from the utilization of updated data for model inputs related to: actual station operations (i.e., cooling water flows, ΔT , entrainment transit times and a recirculation factor); natural

survival rates for weakfish; and sampling equipment efficiency correction factors.

The 1991 updated model results present reduced estimates of losses due to Station operation which are at or below Versar's threshold values below which no significant adverse impact is expected to occur (i.e. a ten percent conditional mortality rate or 1,000,000 equivalent adults for recreationally or commercially important species) (NJDEPE Technical Workshops, 1978; PSE&G, Compilation of Previous Comments with Supplemental Comments on the Report Entitled "Technical Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstration of Impact for the Salem Nuclear Generating Station"; February 22, 1988, Part III and 1989 Report, Page D-34).

The abundance trend data presented in PSE&G's 1991 Comments and subsequent submissions includes data for the four fish species at issue collected in the Delaware River by DNREC and by the Department's Division of Fish, Game and Wildlife over the period from 1980 (prior to the initiation of two unit operation) through 1991 (ten years after initiation of two unit operation). PSE&G's 1991 Comments state that the data do not indicate the presence of any long-term decline in abundance of bay anchovy and juvenile weakfish, spot and white perch, the fish Target Species at issue.

The revised model estimates and abundance data have been submitted to provide further support for the Company's position that the Station's intake structure has not had and is not having an adverse impact on aquatic life in the Delaware River. Although the revised model estimates of losses may narrow the areas of disagreement between the experts and the field data may provide empirical evidence that weigh against the potential that adverse impact has occurred or will occur, these data do not rule out the potential for long term adverse impact. Rather, these data only demonstrate an uncertainty as to the potential for adverse impact and highlight the complexity faced by the Department in making the Section 316(b) determination here.

The detailed engineering information relating to retrofitting the Station with closed-cycle cooling indicates that the retrofit project would involve a complicated and wide-scale construction effort never before attempted at a generating station of this size or at any operating nuclear power plant. Capital costs are estimated by PSE&G to range from at least \$475 million for natural draft cooling towers to \$625 million for mechanical draft cooling towers. PSE&G estimates that the costs for replacement power associated with the construction-related shutdown and the resultant reduction in electrical output would range from \$544 million (with

continued operation during the construction phase) to more than \$2 billion (if immediate shutdown were required, as contemplated in the 1990 Draft Permit). While disagreement may exist concerning the exact costs of retrofitting the Station with a closed cycle cooling system, the Department acknowledges that the detailed engineering information and capital and replacement power cost data presented in PSE&G's 1991 Comments demonstrate that the retrofit project would be quite substantial from both an engineering and cost perspective and could present significant risks from both a cost and scheduling perspective.

Decisions under Section 316(b) concerning best technology available for cooling water intake structures require a case-by-case determination and these determinations include an evaluation of economic considerations. "Best technology available" is intended to mean the best technology available commercially at an economically practicable cost [USEPA Guidance Document at P. 177; see also Brunswick case; 118 Cong. Rec. 33,762 (1972) (daily ed. October 4, 1972) (Statement of Rep. Clausen)] and, further, that the costs of a technology must not be wholly disproportionate to the environmental benefit to be gained. Decision of the Administrator, In the Matter of Public Service Co. of New Hampshire (Seabrook Station), Case No. 76-7 (June 10, 1977) ("Seabrook Administrator's Decision") at 13; Letter from Cynthia C. Dougherty,

Director, Permits Division, USEPA to John Fields, NJDEPE; "Specific Comments on CWA §316 Issues: PSE&G-Salem Nuclear Generating Station Permit No. NJ0005622", at 1-2. (January 14, 1991).

While closed cycle cooling would substantially reduce losses due to Station operations, the Department finds that, based on the detailed engineering and cost data presented in PSE&G's 1991 Comments, the costs of the technology would be wholly disproportionate to the environmental benefits to be realized. In this regard, the Department is mindful of the engineering judgement presented in PSE&G's 1991 Comments that, even at these costs, there is no cooling tower technology available which is capable of meeting the 1990 Draft Permit effluent limitations (1991 Comments, Appendix K).

Given these circumstances, the Department has evaluated information on various other alternative technologies in connection with its reconsideration, including their technical feasibility, biological effectiveness and associated costs presented in PSE&G's 1984 Section 316(b) Demonstration, Versar's 1989 Report, PSE&G's 1991 Comments (Appendices J, K, and L) and PSE&G's 1993 Application Supplement. These alternative technologies include more than 40 different technologies and cooling water systems. The alternative technologies having the greatest potential for application at Salem

are wedgewire screens, variable speed pumps, fine mesh screens, screen modifications to incorporate an improved fish bucket design and behavioral barriers, i.e., sound deterrents.

The Department concurs with both PSE&G and Versar that: (i) wedgewire screens are not an available technology for application at Salem given the size and location of the Station (1991 Comments, Appendix J; 1986 Report VII-17, 1989 Report, VII-17); (ii) variable speed pumps are not an available technology since meaningful reductions in intake flow could increase the ΔT and thereby entrainment mortality or would require a significant reduction in electrical output and attendant substantial replacement power costs (1991 Comments, Appendix J; 1986 Report VII-9; 1989 Report, VII-8); and, (iii) fine mesh screens are not an available technology since: they may cause an overall increase in mortality since the impingement mortality rates for early life stages of many species may be greater than the current entrainment mortality rates for these species; Station modifications necessary for potential application of this alternative would involve major changes to the intake structure at substantial costs; and, even with these intake changes, a reduction in overall mortality rates has not been demonstrated under conditions similar to those at Salem. (1991 Comments, Appendix J; 1986 Report, VII-12; 1989 Report, VII-14).

The Department notes that recent developments have occurred, however, with respect to CWS intake travelling screen modifications to incorporate an improved fish bucket design and fish behavioral barrier technologies, specifically the utilization of sound deterrents.

Recent developments (since PSE&G's 1991 Comments were filed) with respect to the CWS intake travelling screen improvements installed at the Indian Point Power Plant are described in PSE&G's 1993 Application Supplement. This information provides a basis for a determination by the Department that application of this technology is feasible from an engineering and cost perspective and presents the potential for improved impingement survival rates and thereby a reduction in Station-related losses to certain of the Target Species at issue.

Information on recent developments with respect to the utilization of sound (i.e., underwater speakers or sound projectors) to guide or deter fish from water intakes presented in PSE&G's 1993 Application Supplement suggests that this technology may present a potential for reducing the number of impinged fish. While this technology has not been installed for operation at a power plant intake structure and its effectiveness is species-specific, recent laboratory and field tests provide nonetheless a basis for a

determination that a site-specific feasibility study of this technology should be conducted at Salem.

In connection with its reconsideration of the 1990 Draft Permit, the Department reviewed and evaluated the Special Conditions proposed in PSE&G's 1993 Application Supplement as part of an evaluation of available intake alternatives.

The Special Conditions propose alternatives for a Draft Permit that are intended to reduce and minimize intake structure effects to aquatic life in the Estuary. The Special Conditions propose: a restriction on intake flow to a monthly average of 3,024 MGD; modifications to the CWS intake travelling screens (i.e., improved fish bucket design); restoration of at least 8,000 acres of wetlands and the restoration of an additional 2,000 acres of wetlands or the preservation of 6,000 acres of upland buffer in the Delaware River Basin; a fish migration barrier removal program on certain Delaware River tributaries; a study to assess the feasibility of sound deterrent technology; and, the conduct of a baywide biological monitoring program. The technical and/or scientific bases for the proposed Special Conditions are detailed in a Technical Appendix accompanying PSE&G's 1993 Application Supplement and, also, is summarized in Part III of this Fact Sheet/Basis.

Certain components in the Special Conditions (i.e., wetland restoration and fish migration barrier removal) are measures that are designed and intended to minimize the effects of losses due to Station operations by incrementally increasing the fish population. Such measures are appropriate as BTA under Section 316(b). See, Crystal River Determinations, supra at 7-8; Tennessee Valley Authority, John Sevier Steam Plant, NPDES Permit No. TN0005436 (January 23, 1986); In the Matter of Central Hudson Gas & Electric Corporation, Roseton Generating Station, et al., Decision and Order, Docket No. C/II-WP-77-01; Appendix A (April 22, 1981); Pacific Gas & Electric Company, Pittsburgh Power Plant NPDES No. CA0004880, (April 18, 1990); Potomac Electric Power Company, Chalk Point Generating Station State Discharge Permit Number 81-DP-0627B, NPDES Permit Number MD0002658B (April 26, 1991).

The Department will first address PSE&G's proposed wetland restoration program. Wetlands are important contributors to the productivity of estuaries. Tidal wetlands perform several important ecological functions for the populations of fish and shellfish of the Estuary. First, they provide a habitat where early life stages of fish and macroinvertebrates can find the abundant food, shelter and protection necessary for growth and survival to later life stages. Second, through the tidal flooding, nutrients produced by the wetlands plants are washed into the

estuarine waters where they serve as food for numerous aquatic species. The plant material from the wetlands is consumed by various small organisms which, in turn, are food for larger organisms. This process is carried out through several steps in the food chain. For these reasons, increased wetlands in the Estuary would contribute incrementally to the production of fish species, including the Target Species at issue.

Tidal wetlands also offer many additional significant values to the Estuary. Other species, such as terrestrial mammals, fur bearing mammals in particular, waterfowl and other birds and threatened and endangered species (whose populations depend upon wetland habitat for their survival) would benefit. Tidal wetlands also provide other important functions to the ecosystem, including: flood and storm protection; maintenance of and improvement in water quality; regulating global processes, including the Nitrogen, Sulphur, Methane and Carbon Dioxide Cycles; and aesthetic benefits.

Tidal wetlands along the Delaware Estuary have been impacted by human activities, including draining and filling. The Department notes that it is reported that New Jersey has lost an estimated tens of thousands of acres of wetlands along the Delaware Estuary.

Given the loss in acreage of wetlands along the Estuary and the fact that the Target Species at issue (i.e., opossum shrimp, bay anchovy, weakfish, spot and white perch) are dependent, at least in part, on the wetlands of the Estuary for food as well as habitat, the restoration and enhancement of wetlands would incrementally increase the productivity of these species and thereby minimize the effect of the losses due to Station operation by incrementally increasing the productivity of the populations.

The Department, therefore, finds that the restoration or enhancement of tidal wetlands in the Delaware River Basin is an appropriate form of mitigation for minimizing losses of the five Target Species at issue. While the ecological significance of these losses remains in dispute, minimizing the effects of the losses through the proposed wetland restoration program which will incrementally increase the productivity of these populations, should address, in part, concerns about the potential for long-term decline in the population of the species at issue.

The number of acres to be restored or enhanced must be determined. PSE&G utilized essentially a two step process to quantify the acreage necessary for restoration or enhancement. First, PSE&G quantified the relationship between primary productivity per acre of wetland and fish production (i.e., biomass) per acre of the

species at issue. Once this relationship was established, PSE&G then estimated the wetland acreage required to incrementally increase fish populations by dividing the estimated fish biomass lost for each Target Species at issue due to Station operation by the fish biomass of that species produced per acre of wetland. The Department finds that PSE&G's approach is appropriate.

The Department notes that utilizing this approach PSE&G quantified the number of acres required for mitigation at 2,425 acres. PSE&G's proposal, however, increases the number of acres of wetlands targeted for restoration to a minimum of 8,000 acres. The number of acres was increased as a result of preliminary discussions with the Department's Division of Fish, Game and Wildlife wherein the Department expressed concerns as to certain of the values PSE&G utilized in calculating the wetland acreage required to minimize the effects of Station-related operations. While no definitive studies have established that any primary productivity from wetlands is lost prior to being consumed by aquatic organisms of the Estuary, the Department has conservatively assumed that some portion of this primary productivity is lost. The Department has, therefore, conservatively applied a factor of 45 percent to account for the assumed loss. The Department also believes that crabs and other macroinvertebrates consume a considerable portion of the productivity available to the aquatic

community. The Department has partitioned 32 percent of the primary productivity to these organisms instead of 10 percent as PSE&G did.

The Department finds that PSE&G's proposal to restore or enhance a minimum of 8,000 acres of wetlands in the Delaware River Basin adequately resolves the uncertainties associated with the biomass lost and productivity per acre values utilized by PSE&G in calculating the number of acres required to minimize the effects of Station-related operations.

The second mitigation measure proposed in PSE&G's Special Conditions involves the removal of impediments to anadromous fish (i.e. river herring) migration on certain Estuary tributaries. River herring are recreationally and commercially important species and the juveniles serve as forage for other recreational and commercial species, including certain of the Target Species at issue (i.e. weakfish and white perch). Many of the Estuary's tributaries utilized by anadromous fish have been dammed and that this damming has reduced the spawning habitat available for river herring. The Department, therefore, finds that the implementation of this measure would provide long-term benefits to the Estuary fisheries through increased recreational and commercial fish

opportunities for certain species, including certain of the Target Species at issue.

The Special Conditions include proposals for intake structure modifications to reduce effects on aquatic life due to Station operations including a permit limitation on the circulating water system intake flow, the installation of modifications to the CWS intake travelling screens and the conduct of a study to assess the feasibility of using sound to divert fish from the CWS intake.

The Station's current permit does not contain a CWS flow limitation. PSE&G's 1991 Comments and 1993 Application Supplement utilize a monthly average flow limit of 3,024 MGD in connection with the revised model estimates of Station-related losses. The Draft Permit imposes a monthly average flow limit of 3,024 MGD to assure that the estimated losses presented in PSE&G's 1991 Comments and 1993 Application Supplement are not exceeded.

The proposed modifications to the CWS intake travelling screens would involve the incorporation of the improved fish bucket design similar to that employed at the Indian Point Power Plant. As indicated above, the Department finds that the CWS intake travelling screen improvements should increase impingement survival rates and thereby minimize the effects of Station-related losses to

certain of the Target Species at issue. Impingement mortality reductions will result in a proportionally greater reduction in overall Station-related effects because impinged organisms have a higher probability of surviving to reproductive age than do fish eggs and larvae.

PSE&G's Special Conditions also proposed to conduct a study to assess the feasibility of using sound to divert fish away from the CWS intake. Successful diversion of fish from the area of the intake would also reduce the number of impinged fish and thereby reduce Station-related losses. The Department finds that recent laboratory and field tests reported by PSE&G in its Technical Appendix related to this technology indicate certain successes in diverting certain fishes from water intake structures. The recent developments in this relatively inexpensive technology together with its potential for a reduction in impinged organisms at Salem and other water intakes warrants the conduct of the proposed feasibility study.

PSE&G's Special Conditions also proposed the conduct of a biological monitoring program to provide information concerning the long-term abundance of fish and macroinvertebrates in the Estuary and continued monitoring of impingement and entrainment losses. The Department finds that this monitoring program will provide data

relating to the abundance and diversity of aquatic resources in the Estuary, in general, and data necessary for a continued biological assessment to reduce the uncertainties associated with potential long-term adverse environmental impacts due to Station operations, in particular. PSE&G has not considered the expected reduction in losses associated with implementation of these intake screen modification in calculating the acreage for minimizing effects due to Station operations.

Section 316(b) requires that an intake structure reflect BTA for minimizing adverse environmental impact and, further, notes that minimization of adverse environmental impact does not necessarily require that all losses of organisms due to Station operations be eliminated (USEPA Guidance Document at 224; Pilgrim case at 18).

The Department finds that PSE&G's Special Conditions present measures that have the potential to reduce and minimize losses due to Station operations which losses form the basis for the concerns as to the potential for long-term adverse environmental impact. The Department further finds that these measures can be implemented without a loss of power associated with a Station shutdown or Station efficiency loss and at a capital cost which is not wholly disproportionate to the environment benefits which will be realized from implementation of these measures.

Accordingly, the Department proposes to allow the Station to continue to operate with the present cooling water intake structures finding that the intake structure in conjunction with the modifications to the intake structure, the intake flow limitation, the wetland restoration and enhancement program, the fish migration barrier removal program, the sound deterrent technology feasibility study, and the biological monitoring program, all as required in the Special Conditions of the Draft Permit, constitute BTA for minimizing adverse environmental impact.

3. Section 316(a) Variance Determination

In the 1990 Draft Permit, the Department reviewed PSE&G's thermal variance request taking into account the aggregate of all relevant stresses to aquatic life in the river, including losses due to entrainment and impingement, in connection with a Department determination as to whether the effects of the Station's thermal discharge assured the protection and propagation of a balanced indigenous population. See, Seabrook Administrator's Decision, supra at 13. Utilizing this approach, the Department determined that PSE&G had failed to meet the requisite burden of proof to support a variance from thermal effluent limitations pursuant to Section 316(a) based primarily on the effects of the cooling water

intake on the protection and propagation of the balanced indigenous population.

As indicated above, the Department has determined that the Station's cooling water system, in conjunction with the implementation of the Draft Permit Special Conditions described above in more detail, will be BTA for minimizing adverse environmental impact. In light of this determination, the Department has reconsidered the 1990 Draft Permit determination denying PSE&G a variance from thermal surface water quality standards under Section 316(a).

NJDEPE's thermal surface water quality standards (N.J.A.C. 7:9-4.14) for Zone 5 of the Delaware River (the Zone applicable to the Station) require that the water temperature in the receiving waters not be raised by more than 4°F (2.2°C) during the period from September through May and no more than 1.5°F (0.8°C) during the period from June through August, nor shall the maximum temperature exceed 86°F (30°C), except in designated heat dissipation areas not longer than 3,500 feet measured from the point of discharge.

PSE&G requested a variance from these thermal surface water quality standards pursuant to Section 316(a). PSE&G requires a variance in that the physical dimensions of the thermal plume during the

summer, as measured by a 1.5°F above ambient isotherm, extend beyond the mixing zone specified in these standards and the maximum temperature at 3,500 feet may exceed 86°F (30°C).

Section 303(g) provides that state surface water quality standards for heat are subject to and must be enforced consistent with the standards specified in Section 316(a). Section 316(a) provides, in pertinent part, that the NJDEPE can impose an effluent limitation less stringent than necessary to ensure compliance with thermal surface water quality standards if the Permittee can show that such limitations are more stringent than necessary to assure the protection and propagation of a balanced indigenous population.

PSE&G submitted a Section 316(a) variance application in 1974. The predictive Section 316(a) Demonstration described Salem's anticipated plume; presented data on the seasonal abundance and distribution of fish, benthos, and plankton in the River in the vicinity of the Station; presented thermal tolerance, avoidance and preference data on selected species measured in the laboratory; and presented an evaluation of the effects of the projected plume using all available biological data.

In subsequent submissions, PSE&G provided supplemental information concerning the potential effects of this thermal discharge on

critical life functions and on the attraction of nuisance species, and results from on-going laboratory studies relating to the thermal response of fish. PSE&G's Section 316(a) Demonstration concluded that the thermal plume would not affect any critical life functions of aquatic organisms; that any potential adverse effects from the plume on habitat in the River would be very small and ecologically insignificant; and, accordingly, that there was reasonable assurance that the indigenous populations of aquatic organisms in the River would not be adversely affected.

Versar reviewed PSE&G's Section 316(a) Demonstration. In their review of this Demonstration, Versar evaluated the effects of the Station's thermal discharge alone on the protection and propagation of a balanced indigenous population. Versar concluded that the thermal discharge effects "were small and localized... [and did] not need to be reduced to protect balanced, indigenous population." (1989 Report, p. VI-I). Versar did nonetheless identify certain deficiencies relative to PSE&G's Section 316(a) demonstration. (1990 Fact Sheet p. 50). PSE&G's 1991 Comments presented empirical and modelling data relative to the thermal plume characteristics and a biothermal assessment integrating the thermal plume characteristics with the thermal tolerances of aquatic organisms as well as information concerning the interaction of the thermal plume with other parameters (i.e., dissolved oxygen, chlorine, toxics,

and bacteria) to address the deficiencies identified by Versar. (1991 Comments, Volume 2, Appendices E and F).

The Department finds that the administrative record demonstrates that the effects of the Station's thermal discharge do not threaten the protection and propagation of a balanced indigenous population.

Accordingly, the Department determines that the issuance of a variance from its thermal surface water quality standards will assure the protection and propagation of the balanced, indigenous population, taking into account the aggregate of all relevant stresses (including the entrainment and impingement losses). The Department is, therefore, granting PSE&G's request for a variance pursuant to Section 316(a) and is proposing thermal limits which will allow the continued operation of the existing once through cooling water system.

4. BAT Determination

Since USEPA has not promulgated an industry-wide technology-based standard for thermal discharges, the Department must set technology-based limits on a case-by-case basis using its best professional judgment ("BPJ") consistent with the requirements of Section 304(b) of the CWA. Section 304(b) and the implementing

regulations (40 CFR Section 125.3(c)(2)) require agencies including the Department to consider certain factors in making a BPJ BAT determination, including: the age of the equipment and facilities; the engineering aspects of the application of various types of control techniques; process changes; the cost of achieving such effluent reductions; and non-water quality environmental impacts, including energy requirements.

Based on information presented in PSE&G's 1991 Comments relating to the biothermal assessment as well as the engineering considerations, energy losses, capital and replacement power costs and other environmental conditions associated with retrofitting an operating nuclear power station to operate with a closed cycle cooling system with cooling towers, (PSE&G's 1991 Comments, Pages 10-12, and Appendices K, L, and N), the Department concludes that the existing once through cooling water system is BAT for controlling the thermal component of Salem's discharge.

DRAFT NJPDES PERMIT NO. NJ0005622
SALEM GENERATING STATION

**NEW JERSEY POLLUTANT
DISCHARGE ELIMINATION SYSTEM**

The New Jersey Department of Environmental Protection and Energy hereby restricts and controls the discharge of pollutants to waters of the State from the subject facility/activity in accordance with applicable laws and regulations. The permittee is responsible for complying with all terms and condition of this authorization and agrees to said terms and conditions as a requirement for the construction, installation, modification or operation of any facility for the collection, treatment or discharge of any pollutant to waters of the State.

PERMIT NUMBER NJ0005622

DRAFT

Permittee

SALEM GENERATING STATION
P.O. BOX 236 / N21
HANCOCKS BRIDGE, NJ 08038
ATTN: MANAGER - LICENSING AND REGULATION

Co-Permittee

Property Owner

PUBLIC SERVICE ELEC. & GAS CO.
80 PARK PLACE
P.O. BOX 570
NEWARK, NJ 07101

Location of Activity

PSE&G SALEM GENERATING STATION
LOWER ALLOWAYS CREEK TOWNSHIP
SALEM COUNTY, NEW JERSEY

<u>Type of Permit Covered</u>	<u>Issuance</u>	<u>Effective</u>	<u>Expiration</u>
<u>By This Approval</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>

B :Ind/Comm.SW Discharge
C :Thermal SW Discharge
05:Group I - Stormwater
Runoff

DISCHARGED TO: Delaware River

CLASSIFICATION: Zone 5

By Authority of:
Commissioner's Office

NJDEPE AUTHORIZATION

DRAFT - FOR DISCUSSION PURPOSES ONLY

CHECKLIST OF PARTS AND MODULES COMPRISING THIS NJPDES PERMIT

1. Cover Page
2. Checklist
3. Part I (General Conditions for All NJPDES Discharge Permits)
4. Part II - Additional General Conditions for the types of NJPDES Permits checked as follows:
 - ☐ Part II - A (Municipal/Sanitary)
 - ☒ Part II - B/C (Industrial/Commercial/Thermal)
 - ☐ Part II - L (SIU)
 - ☐ Part II - IWMF (Industrial Waste Management Facility)
 - ☐ Part II - DGW Specify type(s): _____

5. Part III - Effluent Limitations and Monitoring Requirements
 - ☐ Part III - A
 - ☒ Part III - B/C
 - ☐ Part III - L
 - ☐ Part III - DGW Specify type(s): _____

6. Part IV - Special Conditions
 - ☐ Part IV - A
 - ☒ Part IV - B/C
 - ☐ Part IV - L
 - ☐ Part IV - IWMF
 - ☐ Part IV - DGW Specify type(s): _____

7. ☒ Part V - Chronic Toxicity Methods

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
WASTEWATER FACILITIES REGULATION PROGRAM
10-30-92

GENERAL CONDITIONS FOR ALL NJPDES/DSW PERMITS

The permittee shall comply with all conditions set forth in this permit and the New Jersey Pollutant Discharge Elimination System (NJPDES) regulations, N.J.A.C. 7:14A-1 et seq., which are authorized by the New Jersey Water Pollution Control Act (the State Act), N.J.S.A. 58:10A-1 et seq. The permittee may be subject to penalties for any violations hereof. Specific conditions and requirements of this permit are incorporated herein by reference and are set forth as follows:

Subchapter 1: General Information

- 7:14A-1.1 Purpose
- 7:14A-1.2 Scope
- 7:14A-1.3 General prohibitions
- 7:14A-1.4 Consolidation of permit processing
- 7:14A-1.5 Severability
- 7:14A-1.6 Conflict of interest
- 7:14A-1.7 Application
- 7:14A-1.8 Fee schedule for NJPDES permittees and applicants
- 7:14A-1.9 Definitions

Subchapter 2: General Requirements for the NJPDES Permit

- 7:14A-2.1 Application for a NJPDES permit
- 7:14A-2.2 Emergency permits
- 7:14A-2.3 Continuation of expired permits
- 7:14A-2.4 Signatories
- 7:14A-2.5 Conditions applicable to all permits
- 7:14A-2.6 Establishing permit conditions
- 7:14A-2.7 Duration of permits
- 7:14A-2.8 Schedules of compliance
- 7:14A-2.9 Requirements for recording and reporting of monitoring results
- 7:14A-2.10 Effect of a permit.
- 7:14A-2.11 Transfer of permits
- 7:14A-2.12 Modification, suspension, or revocation of permits
- 7:14A-2.13 Termination of permits
- 7:14A-2.14 Minor modification of permits
- 7:14A-2.15 (Reserved)

Subchapter 3: Additional Requirements Applicable to Discharges to Surface Water (DSW)

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- 7:14A-3.2 Application for a permit
- 7:14A-3.3 Discharge allocation certificate (DAC)
- 7:14A-3.4 Concentrated animal feeding operations
- 7:14A-3.5 Concentrated aquatic animal production facilities
- 7:14A-3.6 Aquaculture projects
- 7:14A-3.7 Silvicultural activities
- 7:14A-3.8 Separate storm sewers
- 7:14A-3.9 General permits
- 7:14A-3.10 Additional conditions applicable to all DSW permits
- 7:14A-3.11 Additional conditions applicable to specified categories of DSW permits

- 7:14A-3.12 Emergency plans
- 7:14A-3.13 Establishing DSW permit conditions
- 7:14A-3.14 Calculating NJPDES permit conditions
- 7:14A-3.15 Duration of certain DSW permits
- 7:14A-3.16 Disposal of pollutants into wells, DTW's or by land application
- 7:14A-3.17 Criteria and Standards for the New Jersey Pollutant Discharge Elimination System

Subchapter 4: Additional Requirements for an Industrial Waste Management Facility

- 7:14A-4.1 Purpose
- 7:14A-4.2 Scope
- 7:14A-4.3 Definitions
- 7:14A-4.4 Application for an individual IWMF permit
- 7:14A-4.5 IWMF permits-by-rule
- 7:14A-4.6 Standards for wastewater treatment units subject to a permit-by-rule
- 7:14A-4.7 Standards for hazardous waste land treatment units

Subchapter 5: Additional Requirements for Underground Injection Control Program (UIC)
(Not applicable to DSW permits)

Subchapter 6: Additional Requirements for Discharges to Ground Water (DGW)
(Not applicable to DSW permits)

Subchapter 7: Procedures for Decision-Making

- 7:14A-7.1 Purpose and scope
- 7:14A-7.2 Procedures for decision-making
- 7:14A-7.3 Application review by the Department
- 7:14A-7.4 Consolidation of permit processing
- 7:14A-7.5 Modification, revocation and reissuance, or termination of permits
- 7:14A-7.6 Draft permits and draft DACs
- 7:14A-7.7 Statement of basis
- 7:14A-7.8 Fact Sheet
- 7:14A-7.9 Administrative record for the draft DAC and draft permits

Subchapter 8: Public Comment and Notice Procedures

- 7:14A-8.1 Public notice of permit actions and public comment period
- 7:14A-8.2 Public comments and requests for public hearings
- 7:14A-8.3 Public hearings
- 7:14A-8.4 Obligation to raise issues and provide information during the public comment period
- 7:14A-8.5 Action subsequent to public comment
- 7:14A-8.6 Issuance and effective date of permit
- 7:14A-8.7 Response to comments
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- 7:14A-8.9 Adjudicatory hearing
- 7:14A-8.10 Stays of contested permit conditions
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- 7:14A-8.13 Public participation in the State enforcement process

Subchapter 9: Specific Procedures Applicable to Discharges to Surface Water (DSW)

- 7:14A-9.1 Permits required on a case-by-case basis
- 7:14A-9.2 Fact Sheet
- 7:14A-9.3 Public notice of Section 316(a) request
- 7:14A-9.4 Conditions requested by the Corps of Engineers and other governmental agencies concerning DSW permits

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- 7:14A-11.4 Fees
- 7:14A-11.5 Procedure for confidentiality determinations
- 7:14A-11.6 Substantive criteria for confidentiality determinations
- 7:14A-11.7 Class determinations
- 7:14A-11.8 Access to and safeguarding confidential information
- 7:14A-11.9 Disclosure of confidential information to State, Interstate, and Federal agencies, with the exception of EPA and the U.S. Department of Justice.
- 7:14A-11.10 Disclosure of confidential information to authorized agents
- 7:14A-11.11 Designation by person of an addressee for notices and inquiries
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- 7:14A-12.9 Request for endorsement
- 7:14A-12.10 Treatment works approval: general
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- 7:14A-12.13 Application for treatment works approvals (Stage 2)
- 7:14A-12.14 Criteria for approval of building, installing, or modifying treatment works (Stage 2)
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Subchapter 13: Additional Requirements for Users of Domestic Treatment Works (DTWs)
(Not applicable to DSW permits)

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- 7:14A-14.1 Purpose and scope
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- 7:14A-14.3 Implementation
- 7:14A-14.4 Oil and grease effluent limitations
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- 7:14A-14.6 Sampling protocol
- 7:14A-14.7 Analytical methods
- 7:14A-14.8 Exemptions

Copies of the NJPDES Regulations may be obtained, for a nominal charge, by contacting:

NJDEPE
Office of Administrative Law
Budget and Finance
CN 049
Trenton, NJ 08625-0049
(609) 588-6606

In addition to the requirements cited, the following are applicable to all NJPDES/DSW permits:

1. Penalties for Violations

- A. Section 10 of the State Act provides that any person who violates a permit condition is subject to a civil penalty each day of violation. Any person who willfully or negligently violates permit conditions is subject to a fine each day of violation, or to imprisonment, or to both.
- B. Section 10 of the State 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 per violation, or by imprisonment, or by both.
- C. Section 10 of the State Act provides that any person who knowingly makes a false statement, representation, or certification in any application, record, or other document filed or required to be maintained under the State Act shall, upon conviction, be subject to a fine, or imprisonment, or both.
- D. Violation of any condition of this permit or the NJPDES regulations may subject the permittee to an Assessment of Civil Administrative Penalties of up to \$50,000 per violation per day in accordance with N.J.A.C. 7:14-8.1 et seq.

2. Permit Expiration. This permit and the authorization to discharge shall expire at midnight on the expiration date of the permit. The permittee may only continue an activity regulated by a NJPDES permit after the expiration of the permit if the permittee has complied with the provisions of N.J.A.C. 7:14A-2.3.
3. Duty to Reapply. If the permittee wishes to continue an activity regulated by a NJPDES permit after the expiration date of the permit, the permittee shall apply for and obtain a new permit. (If the activity is continued, the permittee shall complete, sign and submit such information, forms, and fees as are required by the Department at N.J.A.C. 7:14A-2.1 no later than 180 days before the expiration date.)
4. Facilities Operation and Operator Certification. The operation of any treatment works shall be under the supervision of an operator on the first day of operation of the treatment works and continually thereafter in accordance with N.J.A.C. 7:14A-2.5(a)7. The operator shall meet the requirements of the Department of Environmental Protection and Energy (Department) pursuant to the provisions of N.J.S.A. 58:11-64 et seq. and any amendments thereto. The name of the proposed operator shall be submitted to the Department in order that his/her qualifications may be determined prior to initiating operation of the treatment works. Further information regarding this section may be obtained from:

NJDEPE
Bureau of Revenue
Examinations and Licensing Unit
CN 417
Trenton, NJ 08625-0417
(609) 777-1012

5. Operation Restrictions. The operation of a waste treatment or disposal facility shall at no time create: (a) a direct discharge to surface waters of the State, except as authorized by the Department; (b) a persistent standing or ponded condition for water or waste on the permittee's property except as specifically authorized by this or another permit, or (c) any standing or ponded condition for water or waste on adjacent properties unless these activities are specifically included within this or another permit.
6. Liability and Other Laws
 - A. Nothing in this permit shall be deemed to preclude the institution of any legal action or relieve the permittee from any responsibilities or penalties to which the permittee is or may be subject under any federal, state or local law, ordinance, rule, or regulation.
 - B. Nothing in this permit shall be construed to exempt the permittee from complying with the rules, regulations, policies, and/or laws lodged in any agency or subdivision in this State having legal jurisdiction.
7. Inspection and Entry
 - A. The permittee shall, upon the presentation of credentials, allow the USEPA, the Department, or any authorized representative(s) right of entry to the permittee's premises for purposes of inspection, sampling, copying, or photographing as provided by N.J.A.C. 7:14A-2.5(a)11.
 - B. Any refusal by the permittee, facility land owner(s), facility lessee(s), their agents, or any other person(s) with legal authority, to allow entry to the authorized representatives of the Department and/or USEPA shall constitute grounds for suspension, revocation and/or termination of this permit.
 - C. By acceptance of this permit, the permittee hereby agrees, consents and authorizes the representatives of the Department and/or USEPA to present a copy of this permit to any municipal or state police officer having jurisdiction over the premises occupied by the permittee in order to have said officer effectuate compliance

with the right of entry, should the permittee at any time refuse to allow entry to said authorized representatives.

- D. By acceptance of this permit, the permittee waives all rights to prevent inspections by authorized representatives of the Department and/or USEPA to determine the extent of compliance with any and all conditions of this permit and agrees not to, in any manner, seek to charge said representatives with the civil or criminal act of trespass when they enter the premises occupied by the permittee in accordance with the provisions of this authorization as set forth herein above.

8. Monitoring and Reporting

- A. Monitoring results shall be summarized and reported on the appropriate Discharge Monitoring Reports (DMRs) following the completed reporting period. Unless otherwise specified or directed, signed copies of these shall be submitted postmarked no later than the 25th day of the month following the completed reporting period to the following address:

NJDEPE
Bureau of Permits Management
CN-029
Trenton, New Jersey 08625
ATTN: Monitoring Reports

- B. If a contract laboratory is utilized for analyses, the permittee shall submit the name and address of the laboratory and the parameters analyzed at the time it submits its monitoring reports as required by N.J.A.C. 7:14A-2.5(a)12(iv). Any change in the contract laboratory being used or the parameters analyzed shall be reported prior to or together with the monitoring report covering the period during which the change was made.
- C. All permit applications and associated information, and all effluent data shall be available for public inspection at the Department offices. All other submittals shall likewise be available unless a claim of confidentiality has been asserted and approved under N.J.A.C. 7:14A-11.1 et seq.
9. 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.
10. Transfers. This permit is not transferable except after notice to the Department in accordance with N.J.A.C. 7:14A-2.11.
11. Definitions. Unless otherwise stated, all terms shall be as defined in the NJPDES Regulations, N.J.A.C. 7:14A-1 et seq.

"Aliquot" means a sample of specified volume used to make up a total composite sample.

"Composite sample" means a combination of individual (or continuously taken) samples (aliquots) of at least 100 milliliters, collected at periodic intervals over a specified time period. Composites can be either time proportional or flow proportional. The type of composite to be used shall be specified in the permit. If not specifically stated in the permit, the sample type shall be considered to be a time proportional composite. Aliquots may be collected manually or automatically. For a continuous discharge, a minimum of 24 aliquots (at hourly intervals) shall be collected and combined to constitute a 24-hour composite sample. For intermittent discharges of more than 4 hours duration, aliquots shall be taken at a minimum of 30-minute intervals. For intermittent discharges of less than 4 hours duration, aliquots shall be taken at a minimum of 15-minute intervals.

"Daily" means seven days per week including holidays.

"EDP" means Effective Date of Permit.

"Flow Proportional Composite" means either the time interval between each aliquot or the volume of each aliquot must be proportional to either the wastestream flow at the time of sampling or the total wastestream flow since the collection of the previous aliquot.

"Grab" means an individual sample of at least 100 milliliters collected over a period not exceeding 15 minutes.

"Monthly" means one day each calendar month (the same day each month) and a normal operating day (e.g., the 2nd Tuesday of each month), except for stormwater, which shall be sampled during the first precipitation event of the month which causes a discharge at the site during working hours, unless otherwise directed in the permit. A normal operating day shall be a period of time reasonably representative of normal operating conditions.

"Multiple Grab Composite" means a combination of individual samples (aliquots) collected at a specified frequency over a specified time period. Each aliquot must be collected in a glass vial with a septum cap and iced until delivered for analysis. An air space should remain in the vial. Each aliquot shall be analyzed individually. The recorded value will be the flow proportioned average of the individual analyses for the specific time period.

"Seven day average value" or "Weekly average value" means the greatest sum of all daily discharges measured during any seven consecutive days, divided by the number of discharges measured during those seven consecutive days.

"Six hour composite" means a combination of individual aliquots obtained at a minimum frequency of one aliquot at 30-minute intervals over a 6-hour period.

"Thirty day average value" or "Monthly average value" means the sum of all daily discharges measured during a calendar month, divided by the number of daily discharges measured during that month.

"Time Proportional Composite" means a single sample which receives equal aliquots at equal time intervals.

"ug/l" means micrograms per liter.

"Weekly" means every seventh day (the same day each week) and a normal operating day, unless otherwise directed in the permit. A normal operating day shall be a period of time reasonably representative of normal operating conditions.

Miscellaneous Notes:

In N.J.A.C. 7:14A-2.5(a)(14)(vi)(2), (3), and (4), 7:14A-2.5(a)(14)(vii), 7:14A-3.10(a), (a)(1), (2), and (3), all references to 12 vi are incorrect and should be replaced with 14 vi.

**ADDITIONAL GENERAL CONDITIONS FOR NJPDES/DSW PERMITS FROM
INDUSTRIAL/COMMERCIAL AND/OR THERMAL DISCHARGES**

1. The following additional conditions applicable to specified categories of DSW permits in accordance with N.J.A.C. 7:14A-3.11, in addition to those set forth in N.J.A.C. 7:14A-2.5, 3.10 and 3.12, hereby apply to all DSW permits within the categories specified below:

Existing manufacturing, commercial, mining, and silvicultural dischargers and research facilities. In addition to the reporting requirements under Section 2.5(a)12 and Section 3.10 of N.J.A.C. 7:14A-1 et seq., all existing manufacturing, commercial, mining, and silvicultural dischargers and research facilities must notify the Department as soon as they know or have reason to believe:

- A. That any activity has occurred or will occur which would result in the discharge of any toxic pollutant 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;
 - (3) Five (5) times the maximum concentration value reported for the pollutant in the permit application in accordance with N.J.A.C. 7:14A-10.3(a)9. or 10.3(a)12; or
 - (4) The level established by the Department in accordance with N.J.A.C. 7:14A-3.13(a)6.
 - B. That they (except for research facilities) have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application under N.J.A.C. 7:14A-3.2 and 10.3(a)11.
2. If the permittee is required by this permit to monitor for Oil and Grease and/or Petroleum Hydrocarbons, samples shall be collected and analyzed in accordance with the Oil and Grease Effluent Limitations, N.J.A.C. 7:14A-14.1 et seq.
 3. Submission of Monitoring Reports

Monitoring results for each reporting period shall be summarized and reported on the appropriate Monitoring Report Forms and shall be submitted postmarked no later than the 25th day of the month following the completed reporting period.

A **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

During the period beginning EDP and lasting through EDP + five (5) years, the permittee is authorized to discharge non-contact cooling water, NRLWDS effluent and RLW effluent from outfall serial numbers 481, 482, 483, 484, 485, and 486.

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

The abbreviation "N/A" in the table below denotes "Not Applicable" while the abbreviation "NL" denotes "Not Limited" with both monitoring and reporting required.

Samples taken in compliance with the specified monitoring requirements shall be taken at the outfalls of discharges 481, 482, 483, 484, 485, and 486 and reported monthly.

<u>PARAMETER</u>	<u>DISCHARGE LIMITATIONS</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>MIN</u>	<u>AVG</u>	<u>MAX</u>	<u>FREQUENCY</u>	<u>SAMPLE TYPE</u>
Effluent Flow (MGD)	N/A	NL	NL	Daily	Calculated
Temperature-Influent °F (°C)	N/A	NL	NL	Continuous	----
Temperature-Effluent °F (°C) ^{(1) (2)}	N/A	NL	115(46.1)	Continuous	----
Temperature-Diff. °F (°C) ⁽¹⁾	N/A	NL	27.5(15.3)	Daily	Calculated
Heat, Facility (MBTU/hr) ⁽¹⁾	N/A	NL	30,600	Daily	Calculated
Chlorine-Total Residual (mg/l) ⁽³⁾	N/A	0.3	0.5	3x/Week	Grab
Chlorine-Total Residual (mg/l) ⁽⁴⁾	N/A	NL	0.2	3x/Week	Grab
pH, Influent (S.U.)	NL	N/A	NL	Weekly	Grab
pH, Effluent (S.U.)	6.0	N/A	9.0	Weekly	Grab
Acute Toxicity, LC50 (% effluent)	≥50 ⁽⁵⁾	N/A	N/A	Quarterly	See Part IV-B/C, B

⁽¹⁾ See Part IV-B/C, Section A.9 for clarification of thermal limitations and DMR reporting methods.

⁽²⁾ This limitation shall apply from June 1st through September 30th. During the remainder of the year the effluent temperature limitation shall be 110°F (43.3°C).

⁽³⁾ These limitations shall apply when only service water system non-contact cooling water is discharged. The maximum limitation of 0.2 mg/l shall apply at other times. See Part IV-B/C, Section A.5 for clarification.

The maximum limitation of 0.2 mg/l shall apply when circulating water system non-contact cooling water is discharged. See Part IV-B/C, Section A.5 for clarification.

⁽⁵⁾ This limitation is equivalent to 2 TUa's (Acute Toxicity Units) maximum.

B **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

During the period beginning EDP and lasting through EDP + five (5) years, the permittee is authorized to discharge treated regenerant wastewater, chemical drains, analytical equipment wastewater, steam generator drains, and floor drains from the Non-Radioactive Liquid Waste Disposal System (NRLWDS) through outfall serial number 48C.

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

The abbreviation "N/A" in the table below denotes "Not Applicable" while the abbreviation "NL" denotes "Not Limited" with both monitoring and reporting required.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units as monitored and reported at the respective outfall of DSN 481, 482, 484 and/or 485.

Samples taken in compliance with the specified monitoring requirements shall be taken at the NRLWDS monitoring location and reported monthly.

<u>PARAMETER</u>	<u>DISCHARGE LIMITATIONS</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>MIN</u>	<u>AVG</u>	<u>MAX</u>	<u>FREQUENCY</u>	<u>SAMPLE TYPE</u>
Flow (MGD)	N/A	NL	NL	Daily	Calculated
Petroleum Hydrocarbons (mg/l)	N/A	10	15	2/Month	Grab
Total Organic Carbon (mg/l)	N/A	NL	50	2/Month	Composite
Total Suspended Solids (mg/l) ⁽¹⁾	N/A	30	100	2/Month	Composite
Ammonia as N (mg/l)	N/A	35	70	2/Month	Composite

⁽¹⁾ Total Suspended Solids shall not exceed 45 mg/l as a 7-day average.

C

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning EDP and lasting through EDP + five (5) years, the permittee is authorized to discharge the effluent from DSN 487B, stormwater, groundwater, and flood pump discharge through outfall serial number 487.

This discharge shall no longer be a monitored outfall.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning EDP and lasting through EDP + five (5) years, the permittee is authorized to discharge equipment drains, floor drains, auxiliary boiler blowdown, and stormwater through outfall serial number 487B.⁽¹⁾

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

The abbreviation "N/A" in the table below denotes "Not Applicable" while the abbreviation "NL" denotes "Not Limited" with both monitoring and reporting required.

Samples taken in compliance with the specified monitoring requirements shall be taken at the discharge monitoring point of the #3 Skim Tank and reported monthly.

<u>PARAMETER</u>	<u>DISCHARGE LIMITATIONS</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>MIN</u>	<u>AVG</u>	<u>MAX</u>	<u>FREQUENCY</u>	<u>SAMPLE TYPE</u>
Flow (MGD) ⁽²⁾	N/A	NL	NL	Monthly	Calculated
Temperature-Effluent °F (°C)	N/A	NL	110(43.3)	Monthly	Grab
Petroleum Hydrocarbons (mg/l)	N/A	10	15	Monthly	Grab
Total Organic Carbon (mg/l)	N/A	NL	50	Monthly	Grab
Total Suspended Solids (mg/l) ⁽³⁾	N/A	30	100	Monthly	Grab
pH, Effluent (S.U.)	6.0	N/A	9.0	Monthly	Grab

⁽¹⁾ See Part IV-B/C, Section G.1.

⁽²⁾ Flow is calculated based on non-precipitation related estimated discharge plus the calculated precipitation related discharge for the reporting period and reported in units of million gallons per day.

⁽³⁾ Total Suspended Solids shall not exceed 45 mg/l as a 7-day average.

E.1 EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning EDP and lasting through **April 30, 1994⁽¹⁾**, the permittee is authorized to discharge the effluent from DSN 489A, the effluent from DSN 489B, and stormwater through outfall serial number **489**.

This discharge shall not be a monitored outfall for the period beginning EDP through April 30, 1994⁽¹⁾.

⁽¹⁾ See Part IV-B/C, Section G.2.

E.2 EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning May 1, 1994⁽¹⁾ and lasting through EDP + 5 years, the permittee is authorized to discharge the effluent from DSN 489A, the effluent from DSN 489B and stormwater through outfall serial number 489.

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

The abbreviation "N/A" in the table below denotes "Not Applicable" while the abbreviation "NL" denotes "Not Limited" with both monitoring and reporting required.

Samples taken in compliance with the specified monitoring requirements shall be taken at the discharge monitoring point of the oil water separator and reported monthly.

<u>PARAMETER</u>	<u>DISCHARGE LIMITATIONS</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>MIN</u>	<u>AVG</u>	<u>MAX</u>	<u>FREQUENCY</u>	<u>SAMPLE TYPE</u>
Flow (MGD)	N/A	NL	NL	Monthly	Calculated
Petroleum Hydrocarbons (mg/l)	N/A	10	15	Monthly	Grab
Total Organic Carbon (mg/l)	N/A	NL	50	Monthly	Grab
Total Suspended Solids (mg/l) ⁽²⁾	N/A	30	100	Monthly	Grab
pH, Effluent (S.U.)	6.0	N/A	9.0	Monthly	Grab

⁽¹⁾ See Part IV-B/C, Section G.2.

⁽²⁾ Total Suspended Solids shall not exceed 45 mg/l as a 7-day average.

F.1 EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning EDP and lasting through April 30, 1994⁽¹⁾, the permittee is authorized to discharge treated stormwater, turbine sumps, and transformer containments drain through outfall serial number 489A.

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

The abbreviation "N/A" in the table below denotes "Not Applicable" while the abbreviation "NL" denotes "Not Limited" with both monitoring and reporting required.

Samples taken in compliance with the specified monitoring requirements shall be taken at the discharge monitoring point of the #1 Skim Tank and reported monthly.

<u>PARAMETER</u>	<u>DISCHARGE LIMITATIONS</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>MIN</u>	<u>AVG</u>	<u>MAX</u>	<u>FREQUENCY</u>	<u>SAMPLE TYPE</u>
Flow (MGD) ⁽²⁾	N/A	NL	NL	Monthly	Calculated
Petroleum Hydrocarbons (mg/l)	N/A	10	15	Monthly	Grab
Total Organic Carbon (mg/l)	N/A	NL	50	Monthly	Grab
Total Suspended Solids (mg/l) ⁽³⁾	N/A	30	100	Monthly	Grab
pH, Effluent (S.U.)	6.0	N/A	9.0	Monthly	Grab

⁽¹⁾ See Part IV-B/C, Section G.2.

⁽²⁾ Flow is calculated based on non-precipitation related estimated discharge plus the calculated precipitation related discharge for the reporting period and reported in units of million gallons per day.

⁽³⁾ Total Suspended Solids shall not exceed 45 mg/l as a 7-day average.

F.2 EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning **May 1, 1994⁽¹⁾** and lasting through EDP + 5 years, the permittee is authorized to direct the effluent from **DSN 489A** to the oil water separator system which discharges through DSN 489.

DSN 489A will not be an outfall after May 1, 1994⁽¹⁾.

⁽¹⁾ See Part IV-B/C, Section G.2.

G.1 EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning EDP and lasting through April 30, 1994⁽¹⁾, the permittee is authorized to discharge treated stormwater, turbine sumps, and transformer drains through outfall serial number 489B.

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

The abbreviation "N/A" in the table below denotes "Not Applicable" while the abbreviation "NL" denotes "Not Limited" with both monitoring and reporting required.

Samples taken in compliance with the specified monitoring requirements shall be taken at the discharge monitoring point of the #2 Skim Tank and reported monthly.

<u>PARAMETER</u>	<u>DISCHARGE LIMITATIONS</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>MIN</u>	<u>AVG</u>	<u>MAX</u>	<u>FREQUENCY</u>	<u>SAMPLE TYPE</u>
Flow (MGD) ⁽²⁾	N/A	NL	NL	Monthly	Calculated
Petroleum Hydrocarbons (mg/l)	N/A	10	15	Monthly	Grab
Total Organic Carbon (mg/l)	N/A	NL	50	Monthly	Grab
Total Suspended Solids (mg/l) ⁽³⁾	N/A	30	100	Monthly	Grab
pH, Effluent (S.U.)	6.0	N/A	9.0	Monthly	Grab

⁽¹⁾ See Part IV-B/C, Section G.2.

⁽²⁾ Flow is calculated based on non-precipitation related estimated discharge plus the calculated precipitation related discharge for the reporting period and reported in units of million gallons per day.

⁽³⁾ Total Suspended Solids shall not exceed 45 mg/l as a 7-day average.

G.2

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning May 1, 1994⁽¹⁾ and lasting through EDP + 5 years, the permittee is authorized to direct the effluent from DSN 489B to the oil water separator system which discharges through DSN 489.

DSN 489B will not be an outfall after May 1, 1994⁽¹⁾.

⁽¹⁾ See Part IV-B/C, G.2.

2. Toxic Pollutant Reopener Clause

Pursuant to N.J.A.C. 7:14A-3.13(a)3.iv., the Department may modify or revoke and reissue any permit to incorporate limitations or requirements to control the discharge of toxic pollutants, including whole effluent, chronic and acute toxicity requirements, chemical specific limitations or toxicity reduction requirements, as applicable.

A. ADDITIONAL REQUIREMENTS OF THIS PERMIT

1. Operation of Treatment Works

- (a) The operation of the treatment works shall be under the supervision of a licensed operator. The operator shall meet the requirements of the Department of Environmental Protection and Energy of the State of New Jersey for N2 or equivalent, pursuant to provisions of N.J.S.A. 58:11-64 et seq. and amendments thereto.
- (b) If subsequent to the issuance of this permit the permittee proposes to install additional treatment or modify the existing treatment works, the permittee shall submit to the Department, for approval of the treatment works and determination of the operator's appropriate license classification, a complete application for Treatment Works Approval pertaining to the proposed treatment works installation/modification pursuant to N.J.A.C. 7:14A-12.1 et seq. A Treatment Works Approval is required to be obtained from the Department prior to beginning construction. The permittee shall obtain the services of a licensed operator of the appropriate classification in accordance with the "Rules Governing the Examination and Licensing of Operators", N.J.A.C. 7:10-13.1 et seq., which became effective July 2, 1984, for any treatment works installed.

2. The permittee shall also submit a duplicate signed copy of discharge monitoring reports (DMRs) submitted to NJDEPE in accordance with Section 8.A in Part I-DSW of this permit, to the following addresses:

U.S. Environmental Protection Agency
Water Permits and Compliance Branch
26 Federal Plaza, Room 845
New York, New York 10278

Delaware River Basin Commission
P.O. Box 7360
West Trenton, New Jersey 08628

All DMRs shall be submitted on a monthly basis.

3. In accordance with the DRBC Administrative Manual - Part III Basin Regulations-Water Quality recodified and revised to include the amendments through May 22, 1991, the following shall be applied:

Stream Quality Objectives

Radioactivity:

- (a) alpha emitters- maximum 3 pc/l (picocuries per liter); and
- (b) beta emitters- maximum 1000 pc/l

4. State and Local Requirements - Radiation

- (a) The permittee shall comply with all regulations set forth in N.J.S.A. 26:2D-1 et seq. regarding Radiation Protection.
- (b) All radioactive wastes shall be collected, removed, and disposed of in accordance with N.J.A.C. 7:28-11.1 et seq.

5. Biofouling Control

- (a) Total residual chlorine (TRC) may not be discharged from any single generating unit for more than two hours per day. While addition of sodium hypochlorite to the circulating water system is not routinely required, if chlorination is required, the permittee shall notify the Department prior to reinitiating the addition of sodium hypochlorite to the circulating water system. As part of this notification, the permittee shall provide the Department with a methodology for sodium hypochlorite addition. In such event, TRC at the permitted outfalls, DSNs 481-486, will be monitored three times per week, each during a two (2) hour period of chlorination. The amount of TRC discharged from each permitted outfall, DSNs 481-486, shall not exceed a daily maximum of 0.2 mg/l during the chlorination of the main condensers. The permittee shall maintain a log, noting the time and duration of chlorination of the main condensers.
- (b) The permittee has demonstrated that the service water system has a macroinvertebrate fouling problem. TRC discharges in excess of two hours per

day are allowed to accommodate continuous chlorination of the service water system. Monitoring for TRC from continuous chlorination of the service water system shall be performed three (3) times per week at each permitted outfall, DSNs 481-486. The amount of TRC discharged from each permitted outfall DSN, 481-486, shall not exceed a monthly average of 0.3 mg/l or a daily maximum of 0.5 mg/l when circulating water system non-contact cooling water is not being discharged through the associated permitted outfalls, DSNs 481-486. The daily maximum limitation of 0.2 mg/l shall apply at all other times.

6. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.
7. The permittee is licensed by the U.S. Nuclear Regulatory Commission (USNRC) and responsible to that agency for compliance with radiological effluent limitations, monitoring requirements, and other licensing conditions.

8. Threatened/Endangered Species

Pursuant to its operating license issued by the USNRC, the permittee is required to take reasonable and prudent measures to minimize impacts on threatened and endangered species in accordance with decisions made by the National Marine Fisheries Service under the authority of the Endangered Species Act.

9. Thermal Reporting

- (a) The net amount of heat per unit time is determined by the product of the heat capacity, discharge flow and discharge-intake temperature difference. Heat is reported as the total heat released from the facility, DSNs 481-486 (FAC C).
- (b) The effluent temperature to be reported on the facility DMRs for the discharge from Unit 1, DSNs 481-483 (FAC A), shall be calculated as the flow-weighted average of the discharges, DSNs 481-483, and for the discharge from Unit 2, DSNs 484-486 (FAC B) shall be calculated as the flow-weighted average of the discharges, DSNs 484-486. Likewise, the calculations of the net temperature

difference shall be determined by subtracting the ambient river water temperature from the flow-weighted average effluent temperature of Unit 1 (DSNs 481-483) and of Unit 2 (DSNs 484-486).

10. Circulating Water System Intake Flow

- (a) Circulating water system intake flow is calculated as the sum of the twelve individual circulating water pump flows and reported as a Monthly Average in MGD. The flow of each individual circulating water pump is calculated as the product of the number of operating hours for that pump for the reporting period and the flow rate for that pump. The flow rate for each respective pump is calculated in accordance with (b) below.
- (b) The flow rate for each individual circulating water pump shall be determined at least annually using a Rhodamine WT dye tracer evaluation (the Tracer Evaluation). The permittee shall complete Tracer Evaluations for each circulating water pump within EDP + one hundred and eighty (180) days; provided, however, Tracer Evaluations for any pump performed within one hundred and eighty (180) days prior to the EDP may be submitted to the Department for the first year's test.
- (c) Upon completion of the Tracer Evaluation for each individual pump, the permittee shall report the following to the Department:
 - (i) date of Rhodamine WT dye tracer evaluation;
 - (ii) final concentration of dye in discharge;
 - (iii) total dye discharged; and
 - (iv) flow rate of circulating water pump(s) tested.
- (d) The report required to be submitted pursuant to 10.(c) above shall be submitted with the DMR submitted for the first month following the month in which a Tracer Evaluation is performed. Tracer Evaluations performed within one hundred and eighty (180) days prior to EDP shall be submitted with the DMR submitted for the first month following EDP.

The individual circulating water pump flow rates determined for each pump shall be used for the circulating water system intake flow calculation for the first month following completion of the Tracer Evaluation.

11. Section 316 Determinations

Based on the Section 316(a) and (b) Demonstrations filed by permittee pursuant on the federal Clean Water Act, permittee's comments to the 1990 draft permit, information submitted by permittee in a 1993 supplement to the application for renewal of the permit and other information in the administrative record, the Department hereby determines that:

- (a) with implementation of the Special Conditions H.1-H.6 set forth in Part IV-B/C, the Station's cooling water intake system reflects the best technology available for minimizing adverse environmental impact;
- (b) with implementation of the Special Conditions H.1-H.6 set forth in Part IV-B/C, the thermal effluent limitations for heat and temperature imposed in this permit will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving waterbody; and
- (c) the permittee is granted a variance for heat and temperature from surface water quality standards pursuant to Section 316(a) of the Clean Water Act and N.J.A.C. 7:14A-9, et seq.

B. ACUTE TOXICITY BIOMONITORING REQUIREMENTS

The permittee shall conduct definitive flow-through or definitive static renewal acute toxicity tests (bioassays) on its wastewater discharged at the circulating water system outfall(s) which are aligned to receive the effluent from DSN 48C during the sampling event. The circulating water system outfalls which can receive the effluent from DSN 48C are DSNs 481, 482, 484, and/or 485. Such testing will determine if appropriately selected effluent concentrations will affect the survival of the test species.

1. All toxicity tests shall be conducted in accordance with the following:
 - (a) Acute toxicity test procedures shall conform to the "Regulations Governing Laboratory Certification and Standards of Performance" (N.J.A.C. 7:18-1 et seq.). Subchapter 6 of the regulations contains the criteria and procedures for acute toxicity testing and analysis. The laboratory performing acute toxicity testing shall be within the laboratory certification program included within those regulations.
 - (b) Test results shall be expressed in terms of the mortalities in each effluent concentration and, if they can be calculated, the median lethal concentration (LC50) with confidence interval.
 - (c) All samples taken for the purpose of monitoring shall be representative of the monitored DSN.
2. Test Species and Test Duration
 - (a) The test duration shall be 96 hours.
 - (b) The test species is sheepshead minnow (Cyprinodon variegatus).
3. Monitoring Frequency
 - (a) The monitoring frequency shall be one test every three months.
 - (b) If a test, after a quality control review, is found to be invalid or otherwise unacceptable to the Department, the permittee shall begin an additional definitive acute toxicity test no later than thirty (30) days after notification by the Department that the test is unacceptable/invalid.
4. If there is a change in the acute toxicity testing contract laboratory, the following information shall be submitted within two (2) months of that change:
 - (a) A fully completed "Methodology Questionnaire for Acute Toxicity Tests" form, which includes an identification of the certified acute toxicity testing laboratory responsible for the testing.

Copies of this form are provided to certified laboratories.

- (b) A schematic diagram which depicts the location that the effluent samples will be taken; the diagram shall indicate the location of effluent sampling in relation to any wastewater treatment facilities (including chlorination/disinfection if present) and all DSNs.
 - (c) A photocopy of a county map or USGS quad with the location of the dilution water sampling site relative to the effluent discharge point marked (unless the use of a reconstituted water has been approved).
5. Acute toxicity test results shall be reported on the "NJPDES Biomonitoring Report Form - Acute Bioassays," copies of which are provided to certified laboratories.
- (a) TWO COPIES of each completed report form shall be submitted within 60 days of test completion to:

Bureau of Standard Permits
Wastewater Facilities Regulation Program
CN-029
Trenton, New Jersey 08625
Attention: Industrial Biomonitoring Program

- (b) The test results shall also be reported on the permittee's FAC C DMR for the monitoring period during which the test was conducted.

C. TOXICITY REDUCTION EVALUATION

1. The permittee shall conduct a Toxicity Reduction Evaluation (TRE) for the non-contact cooling water outfall(s) if any two valid/acceptable acute toxicity tests for that DSN(s), conducted within any eighteen month period, violate the acute toxicity limitation. The TRE is intended to determine how the permittee can consistently achieve compliance with the acute toxicity limitation.
2. The following additional conditions apply:

- (a) If the permittee performs a Toxicity Identification Evaluation (TIE) in conjunction with an acute toxicity test and the TIE demonstrates that effluent toxicity is not persistent, such acute toxicity test does not constitute a failure of an acute toxicity test for the purposes of triggering the requirement to conduct a TRE pursuant to C.1 above.
- (b) If the permittee performs intake testing for acute toxicity concurrent with an effluent acute toxicity test and the data indicate the acute toxicity of the discharge is related to the toxicity of the intake water, the acute toxicity test of the effluent does not constitute a failure for the purposes of triggering the requirement to conduct a TRE pursuant to C.1 above.
- (c) If the permittee demonstrates to the Department's satisfaction that the cause of the acute toxicity violation has been identified and corrective action(s) have been implemented, then the permittee shall have satisfied the requirement for a TRE pursuant to C.1 above.
- (d) If the permittee conducts additional acute toxicity testing during the reporting period in connection with an investigation or corrective action, the test(s) will not be considered as failure of an acute toxicity test for the purposes of triggering a TRE pursuant to C.1 above.

3. The TRE shall be conducted as follows:

- (a) The permittee shall submit a proposed plan for conducting the TRE to the Department, within ninety (90) days of the occurrence of an acute toxicity test triggering a TRE pursuant to C.1. above. The proposed TRE plan shall include: an identification of the investigator performing the TRE; appropriate measures to characterize effluent variability; appropriate measures to identify the causative toxicants and/or evaluate toxicity treatability; and a schedule for completing the study.

- (b) Upon notice that the Department has reviewed and approved the proposed plan and schedule, the permittee shall implement the TRE in accordance with the approved plan and schedule. Progress reports detailing all activities undertaken, including all data collected in connection with the TRE, shall be submitted to the Department beginning 90 days from the date of receipt of NJDEPE's approval of the TRE. Progress reports shall then be submitted on or before January 1, April 1, July 1 and October 1 of each year until TRE completion.
 - (c) Within 90 days of TRE completion, the permittee shall submit to the Department the final TRE results. These results shall include the corrective actions identified in the TRE as necessary to attain compliance with the acute toxicity limitation and a schedule for its implementation.
 - (d) Upon receipt of written approval from the Department on the corrective action schedule, the permittee shall implement those corrective actions consistent with that schedule. If, for any reason, the implemented measures do not result in consistent compliance with the acute toxicity limitation, the permittee shall submit to the Department a plan for resuming the TRE. The TRE shall not be complete until the permittee has attained consistent (> 18 months) compliance with the acute toxicity limitation in this permit.
4. Two copies of all written submissions required above shall be sent to:

Bureau of Standard Permits
Wastewater Facilities Regulation Program
CN-029
Trenton, New Jersey 08625
Attention: Industrial Biomonitoring Program

D. EFFLUENT CHARACTERIZATION STUDY

- 1. To determine whether the discharges have a reasonable potential to exceed established instream water quality criteria that are protective of aquatic biota and human

health, the permittee shall perform an Effluent Characterization Study.

2. Monitoring for the Effluent Characterization shall include 12 samples at each designated outfall during the Study period. If four consecutive analyses for a parameter at a specific outfall are below the Recommended Quantitation Level (RQL) specified on Table 1 at Part IV-B/C, Page 27 of 27 pages for that parameter, the permittee may terminate monitoring for that parameter. If a parameter is detected in one out of the first five sample events in the same order of magnitude as the RQL, and the permittee has reason to believe that the detection of the parameter is not representative of the discharge, the permittee may request the Department to delete that parameter from the Study. However, the permittee shall continue to include this parameter in the Study until receipt of written approval from the Department.

For priority pollutant scans (i.e., Volatiles, Acid Extractables and Base/Neutrals), if a parameter(s) is/are detected in any of the first four sample events and the permittee has reason to believe that the detection of that parameter is not representative of the discharge, the scan shall be continued as part of the Study; and data for all parameters in the scan shall continue to be collected. The permittee may request the Department's permission to delete that scan from the Study, however, this scan shall continue to be included in the Study until receipt of written approval from the Department.

3. The permittee shall complete all sampling required by the Effluent Characterization Study within EDP + eighteen (18) months. Samples shall be obtained at a frequency of at least seven (7) days apart and not greater than sixty (60) days apart for each discharge point required to be monitored for Effluent Characterization.
4. To represent the once-through, non-contact cooling water discharges, the permittee shall sample outfalls DSN 481 and DSN 483 (Unit #1 discharge). If the discharge from Unit #1 is unavailable for monitoring due to a Unit outage or pump unavailability, sampling may be performed on the Unit #2 discharge at outfalls DSN 484 and DSN 486. The effluent from DSN 48C shall be aligned to discharge through DSN 481, or through DSN 484 if the effluent from Unit #2 is sampled during sample collection for the

Effluent Characterization Study. If the DSN 48C effluent is aligned to discharge through more than one circulating system outfall during sampling for the Effluent Characterization Study, all circulating water outfalls for the Unit(s) to which DSN 48C effluent is aligned shall be sampled. The RLW effluent for the respective Unit shall normally be aligned to discharge through DSN 481 (DSN 484 if Unit No. 2 is sampled) consistent with USNRC discharge requirements. Sampling of the intake water is also required. The once through, non-contact cooling water shall be analyzed for the following parameters identified on Table 1:

Total Organic Carbon
Total Suspended Solids
Petroleum Hydrocarbons
Priority Pollutant Volatiles
Priority Pollutant Acid Extractables
Priority Pollutant Base/Neutrals
Priority Pollutant Metals and Cyanide

5. The permittee shall sample outfall DSN 48C, after the final clarifier, prior to commingling with the non-contact cooling water. The effluent from DSN 48C shall be analyzed for the following parameters identified on Table 1:

Priority Pollutant Volatiles
Priority Pollutant Acid Extractables
Priority Pollutant Base/Neutrals
Priority Pollutant Metals and Cyanide

6. The permittee shall sample outfall DSN 489 after installation and operation of the oil water separator. The effluent from DSN 489 shall be analyzed for the following parameters identified on Table 1:

Priority Pollutant Volatiles
Priority Pollutant Acid Extractables
Priority Pollutant Base/Neutrals
Priority Pollutant Metals and Cyanide

7. All samples shall be collected as 24 hour composites except for Volatiles, Cyanide and Petroleum Hydrocarbons. Samples for Volatiles, Cyanide and Petroleum Hydrocarbons shall be collected as grab samples. The analytical methodologies to be utilized shall achieve the RQLs in Table 1. The RQLs listed in Table 1 are to be used by

the permittee and its contract laboratory as a guideline of the quantitation levels the Department will accept without additional explanation or review. Less sensitive levels may be acceptable, but will require a detailed explanation on the part of the permittee and/or contract laboratory and a more detailed review on the part of the Department. Where no RQL is provided on Table 1 (N/A), the RQL shall be five times the MDL value achieved by the laboratory.

8. The final report, summarizing the results of the Effluent Characterization Study, shall be submitted to the Department within EDP + twenty-four (24) months. All correspondence relating to the Effluent Characterization Study shall be submitted to:

Bureau of Standard Permits
Wastewater Facilities Regulation Program
CN-029
Trenton, New Jersey 08625-0029

E. DILUTION STUDY

1. To enable the Department to determine the need for Water Quality-Based Effluent Limitations in conjunction with the Effluent Characterization Study, the permittee may be required to perform a Dilution Study. A Dilution Study shall be conducted for the non-contact cooling water outfalls (DSNs 481 - 486) and for DSN 489 if the Effluent Characterization Study demonstrates that toxic pollutants are being discharged. For DSNs 481 - 486, the Study shall be deemed to demonstrate that a toxic pollutant is being discharged only if the Effluent Characterization Study indicates a net addition of a toxic pollutant. For DSNs 481-486 and DSN 489, if the toxic pollutants meet the criteria for deletion for an outfall from the Effluent Characterization Study or the permittee has submitted a request for deletion of a parameter under Part IV-B/C, D.2. above, permittee shall not be required to conduct a Dilution Study for that outfall.
2. Within ninety (90) days of receipt of the analytical results for the fourth set of Effluent Characterization Study samples, the permittee shall submit any required Dilution Study Work Plan(s) to the Department. The Dilution Study Work Plan(s) shall be developed consistent with the Department's "Procedures and Requirements for

Conducting Dilution Studies", Appendix A to Part IV-B/C. Since the Effluent Characterization Study may not be conducted concurrently for the non-contact cooling water outfalls (DSNs 481 - 486) and DSN 489 due to construction of the oil water separator, separate Dilution Study Work Plan(s) may be developed and submitted for these outfalls.

3. The permittee shall commence field work during the first designated "critical period" which occurs at least ninety (90) days after approval by the Department of the Dilution Study Work Plan(s). The "critical periods" shall be defined in the Dilution Study Work Plan and is that period which produces the minimal dilution.
4. The permittee shall submit to the Department a report of the results obtained from the Dilution Study within six (6) months of completion of the field work associated with the Dilution Study.

F. CHRONIC TOXICITY CHARACTERIZATION STUDY

The permittee shall conduct a Chronic Toxicity Characterization Study as part of the Effluent Characterization Study required in Part IV-B/C, D above. This study shall consist of concurrent chronic toxicity testing with two species, conducted on the wastewater discharge at the circulating water system outfall(s) which are aligned to receive the effluent from DSN 48C during the sample collection. Such testing will provide data regarding the effects of appropriately selected effluent concentrations on the survival, growth and/or reproduction of the test species and determine which test species is consistently most sensitive to the effluent.

1. All testing shall be conducted in accordance with the following procedures:
 - (a) Testing shall be in conformance with the guidelines contained in the "Interim Chronic Toxicity Testing Methodologies for Use in the NJPDES Permit Program, Version 1.0, February 1989" (Part V of this Permit).

- (b) The laboratory performing the toxicity testing shall be within the existing acute toxicity testing laboratory certification program established under N.J.A.C. 7:18-6.
- (c) Test results shall be expressed as the NOEC (No Observable Effect Concentration), the LOEC (Lowest Observable Effect Concentration), and IC25 (25% Inhibition Concentration) for each test endpoint.
- (d) Since the chronic toxicity of the Delaware River water is unknown, the permittee may perform concurrent tests on the intake water.

2. Test Species and Test Duration

- (a) Chronic toxicity tests shall be conducted concurrently with split samples, using the following test species and test durations:
 - i. Sheepshead minnow (Cyprinodon variegatus), 7 day larval survival and reproduction test; and,
 - ii. Inland Silverside (Menidia beryllina), 7 day larval survival and reproduction test.
- (b) The permittee has the option of concurrently testing with a third species from among the methods specified in F.1.a. above. The selection of the third species must be approved by the Department prior to initiating testing with this species.

3. Monitoring Frequency

- (a) The first test shall be conducted no later than thirty (30) days after commencement of the Effluent Characterization Study required in Part IV-B/C, D. above. Subsequent tests shall be conducted at intervals to ensure the completion of four tests during the Effluent Characterization Study.
- (b) The chronic toxicity characterization study shall not be complete until four tests, using split samples on the two species, which are acceptable to the Department, have been completed. This study, including report submissions, shall be completed

by the time the Effluent Characterization Study is completed.

- (c) If a test has been reviewed for quality control and found to be unacceptable to the Department, the split sample tests shall be repeated within thirty (30) days.
4. The following information shall be submitted to the address in F.5.(a). below prior to conducting the first chronic toxicity test for this study:
- (a) an identification of the fish species selected for the study;
 - (b) an identification of the certified laboratory responsible for conducting the chronic toxicity tests;
 - (c) a completed chronic methodology summary questionnaire (copies of this form will be provided to the certified laboratories); and
 - (d) a schematic diagram of the facility with the sampling point and all other discharges clearly marked.
5. Test results shall be reported on forms provided to the certified laboratories by the Department.
- (a) Two copies of all test reports shall be submitted within thirty (30) days of each test completion to:

Bureau of Standard Permits
Wastewater Facilities Regulation Program
CN-029
Trenton, New Jersey 08625
Attention: Industrial Biomonitoring Program

G. TREATMENT SYSTEM MODIFICATIONS

1. DSN 487B Modification

- (a) The permittee shall redirect the discharge from outfall DSN 487B to the Non-Radioactive Liquid Waste Disposal System (NRLWDS) for treatment prior to discharge through DSN 48C. Outfall DSN 487B

shall remain a permitted outfall to accommodate any emergency overflow conditions. In the event of the occurrence of an emergency resulting in a discharge (e.g., an extraordinary storm event or a pump failure), the DSN 487B limitations and monitoring requirements shall apply.

- (b) This modification shall be completed by December 31, 1993.

2. DSN 489 Modification

- (a) The permittee shall install an Oil Water Separator System at outfall DSN 489. Once this modification is completed, wastewater discharged through DSNs 489A, 489B, and 489 will be treated in this system and discharged through DSN 489.
- (b) This modification shall be completed no later than April 30, 1994. Upon commencement of operation of the Oil Water Separator System, the permittee shall notify the Department of same, at which time DSNs 489A and 489B will cease to be outfalls.

H. SPECIAL CONDITIONS

1. Intake Flow Limitations

The permittee shall limit the circulating water system intake flow to a monthly average rate not to exceed 3,024 million gallons per day. Compliance with this limitation shall be determined in accordance with the calculations set forth in Part IV - B/C, A.10 above.

2. Intake Screen Modifications

- (a) The permittee shall modify the design of the circulating water system intake travelling screens to incorporate a new fish bucket design with an extended lip which bends inward toward the screen face at the top and an auxiliary screen extending up above the bucket to prevent fish escape. (Intake Screen Modifications)
- (b) The permittee shall:
 - (i) complete the engineering design for the

Intake Screen Modifications within EDP + six (6) months;

- (ii) complete installation of the Intake Screen Modifications to Unit #1 within EDP + fourteen (14) months;
- (iii) complete operability testing of the Unit #1 Intake Screen Modifications within EDP + twenty-two (22) months;
- (iv) incorporate any necessary changes into the design for the Unit #2 intake screens and complete installation of the Intake Screen Modifications as specified in 2.(a) and (b) (iii) above to Unit #2 screens within EDP + thirty (30) months; and
- (v) complete installation of any necessary changes in the engineering design identified as a result of the operability testing described in 2.(b)(iii) above to the Unit #1 intake screens within EDP + thirty-six (36) months or the conclusion of the next regularly scheduled Unit #1 refueling outage; whichever is later.

3. Wetlands Restoration and Enhancement

- (a) The permittee shall undertake a wetlands restoration and enhancement program within the region of the Delaware Estuary as follows:
 - (i) restore an aggregate of at least 8,000 acres of lands such that lands including salt hay farms, muskrat impoundments and/or agricultural impoundments are opened to tidal inundation and become functional salt marsh, and/or such that wetlands dominated by common reed (Phragmites australis) are converted to primarily Spartina species with other naturally occurring marsh grasses (e.g. Distichlis spicata, Juncus spp.). Permittee shall secure access to or control of such lands such that said lands will have title ownership or deed

restriction as may be necessary to assure the continued protection of said lands from development;

- (ii) preservation in a state that precludes development through appropriate title ownership or deed restriction of up to 6000 acres of uplands adjacent to Delaware Estuary tidal wetlands ("Upland Buffer"). For purposes of this paragraph 3.(a)(ii), an Upland Buffer shall mean an area of land adjacent to wetlands which minimizes adverse impacts on the wetlands and serves as an integral component of the wetland ecosystem; and
 - (iii) the acreage restored, enhanced and/or preserved pursuant to 3.(a)(i) and/or (ii) above will aggregate to 10,000 acres; provided, however, permittee will be credited one acre for every three acres of Upland Buffer acquired or restricted pursuant to 3.(a)(ii) above.
- (b) The permittee shall impose a deed restriction to approximately 4,500 acres of land in Greenwich Township, Cumberland County, commonly known as the Bayside Tract. The approximate 1,900 acres of Upland Buffer on the Bayside Tract shall be applied toward satisfying the acreage requirement in 3.(a)(ii) above. Not later than EDP + 180 days, the permittee shall provide the Department with evidence that this special condition has been satisfied.
 - (c) Any deed restriction imposed pursuant to paragraphs 3.(a) and/or 3.(b) above shall preclude future development, shall name the Department as a party to the restriction, shall be in a form substantially equivalent to the form in Attachment A to this Permit, and shall be recorded.
 - (d) For salt hay farm lands identified in paragraph 3.(a) above, the permittee shall:

- (i) not later than EDP + twelve (12) months, select and secure control of said lands through acquisition, deed restriction, termination of life estate or termination of leasehold interests;
 - (ii) not later than EDP + twelve (12) months, design and file with the Department for approval a Management Plan(s). The Management Plan(s) will include, but not be limited to, techniques for breaching of dikes, construction of upland dikes and an anticipated schedule for natural revegetation; and
 - (iii) not later than sixty (60) days after receipt of the Department's approval of the Management Plan(s), implement the Management Plan(s); provided, however, that within thirty (30) days of receipt thereof the permittee shall have the right to petition the Department to reconsider the Department's comments to the Management Plan(s). The Management Plan(s) is automatically incorporated as a condition of this permit upon final approval by the Department.
- (e) For muskrat or agricultural impoundment lands and/or wetlands dominated by common reed as specified in paragraph 3.(a) above, the permittee shall:
- (i) not later than EDP + eighteen (18) months, select and secure access and/or control of said lands;
 - (ii) not later than EDP + eighteen (18) months, design and file with the Department for approval a Management Plan(s). The Management Plan(s) shall include, but not be limited to: for wetlands dominated by common reed, techniques for application of herbicides and/or burning to remove dead common reed and an anticipated schedule for natural revegetation; and for muskrat or agricultural impoundments, techniques for

restoration of tidal flow, construction of upland dikes and an anticipated schedule for natural revegetation; and

- (iii) not later than sixty (60) days after receipt of the Department's approval of the Management Plan(s), implement the Management Plan(s); provided, however, that within thirty (30) days of receipt thereof, permittee shall have the right to petition the Department to reconsider the Department's comments to the Management Plan(s). The Management Plan(s) is automatically incorporated as a condition of this permit upon final approval by the Department.
- (f) For lands described in 3.(a) (ii) above, the permittee shall:
- (i) not later than EDP + eighteen (18) months select and secure access and/or control of said lands;
 - (ii) not later than EDP + twenty-four (24) months, design and file with the Department for approval a Management Plan(s) for such lands. The Management Plan shall include activities necessary to provide for the use of the property as a wetland buffer and for recreational and conservational purposes; provided, however, that the Management Plan(s) activities will not impair or interfere with the current use or enjoyment of the property; and
 - (iii) not later than sixty (60) days after receipt of the Department's approval of the Management Plan(s), implement the Management Plan(s); provided, however, that within thirty (30) days of receipt thereof, permittee shall have the right to petition the Department to reconsider the Department's comments to the Management Plan(s). The Management Plan(s) is automatically incorporated as a condition

of this permit upon final approval by the Department.

(g) For the lands described in 3.(b) above, the permittee shall:

(i) not later than EDP + twelve (12) months, design and file with the Department for approval a Management Plan for these lands. The Management Plan shall include activities necessary to provide for the use of the property for recreational and conservational purposes; provided, however, that the activities included in the Management Plan will not impair or interfere with the current use or enjoyment of the property; and

(ii) not later than sixty (60) days after receipt of the Department's approval of the Management Plan, implement the Management Plan; provided, however, that within thirty (30) days of receipt thereof, permittee shall have the right to petition the Department to reconsider the Department's comments to the Management Plan. The Management Plan(s) is automatically incorporated as a condition of this permit upon final approval by the Department.

(h) In no event shall completion of the Management Plans specified in paragraphs (d), (e), (f) and/or (g) above take longer than EDP + sixty (60) months.

(i) Permittee shall be deemed to have complied with the requirements of Special Condition H.3. upon completion of the Department-approved Management Plans.

4. Elimination of Impediments to Fish Migration

(a) Permittee shall fund an escrow account in an amount of \$500,000 within EDP + sixty (60) days. The monies in the escrow account will be used exclusively for a program to eliminate impediments for fish migration in accordance with the provisions of this Special Condition H.4. (Fish

Migration Project); provided, however, permittee's obligations under this Special Condition H.4.(b) and (c) is subject to the amount of monies deposited in the Escrow Account.

- (b) In connection with the Fish Migration Project, the permittee shall:
 - (i) within EDP + six (6) months, complete an engineering feasibility study at up to five candidate sites which will be selected based on a site selection study conducted in consultation with the Department;
 - (ii) within EDP + nine (9) months, solicit access rights and/or necessary authorizations with respect to the implementation of the Fish Migration Project at five candidate sites; and
 - (iii) within EDP + nine (9) months, complete site selection(s) in consultation with the Department.
- (c) For those sites selected for implementation in the Fish Migration Project, and in consultation with the Department the permittee shall:
 - (i) within EDP + twelve (12) months, complete an engineering design and submit a work plan and schedule for installation of fish ladders for Department approval;
 - (ii) within six (6) months after receipt of approval from the Department, commence implementation of the Department-approved work plan in accordance with the schedule specified in the work plan; provided, however, that within thirty (30) days of receipt thereof, permittee shall have the right to petition the Department to reconsider the Department's comments on the work plan; and

(iii) the work plan and schedule is automatically incorporated as a condition of this permit upon final approval by the Department.

(d) For those sites at which fish ladders are installed, permittee shall conduct operational and maintenance activities as may be necessary during the term of the permit.

5. Sound Deterrent Feasibility Study

The permittee shall:

- (a) submit a Plan of Study to the NJDEPE for approval to assess the feasibility of deterring fish from the area in front of the CWS intake structure through the use of underwater speakers or sound projectors within EDP + twelve (12) months;
- (b) implement the Plan of Study after receipt of the Department approval of the Plan of Study in accordance with the schedule approved by the Department subject to species availability; and
- (c) complete the Plan of Study and file a report of the results to the Department in accordance with the schedule approved by the Department but in no event not later than EDP + 60 months.

6. Biological Monitoring

- (a) The permittee shall develop and implement a biological monitoring program for the Delaware Estuary. The biological monitoring program shall consist of bay-wide abundance monitoring (farfield and nearfield), and impingement and entrainment monitoring.
- (b) Within EDP + ninety (90) days, the permittee shall submit a biological monitoring work plan which includes a reporting schedule to the Department for approval.
- (c) Within ninety (90) days after receipt of the Department's approval of the work plan, the permittee shall initiate biological monitoring;

provided, however, implementation shall not be required before January 1, 1994; provided further, however, that within thirty (30) days of receipt thereof, permittee shall have the right to petition the Department to reconsider the Department's comments to the biological monitoring work plan. The biological monitoring work plan is automatically incorporated as a condition of this permit upon final approval by the Department.

7. Financial Assurance Requirements

- (a) In the event permittee fails to satisfy a provision of any Special Conditions H.3, H.4, H.5 and H.6 ("Failure"), permittee shall obtain and provide to the Department financial assurance in the form of an irrevocable letter of credit and irrevocable standby trust fund, all in a form substantially equivalent to the forms contained in Attachments B and C to this permit (hereinafter collectively referred to as "Financial Assurance"); provided, however, if and as the Department determines that a Failure has occurred, the Department shall notify permittee in writing of the Failure and provide permittee with a reasonable time to cure the Failure, which cure period shall not exceed sixty (60) days.
- (b) In the event the Department determines that Financial Assurance is required pursuant to Paragraph 7.(a) above, permittee shall establish a Letter of Credit in an amount equivalent to the amount required to complete the Special Condition which is the subject of the Failure and, further, shall be required to maintain the Letter of Credit and Standby Trust for a term not to exceed EDP + sixty (60) months; provided, however, not earlier than six (6) months after permittee cures the failure, upon application by permittee, the Department shall agree to terminate the Financial Assurance.
- (c) The Department may make a draw(s) on the Letter of Credit to fund the standby trust and, further, may make a draw(s) from the standby trust all as same may be necessary to perform permittee's obligations under the special condition which is the subject of the Failure.

8. Force Majeure

(a) Special Conditions H.2., H.3., H.4. H.5. and H.6. require permittee to implement certain activities in accordance with a compliance schedule contained in each such Special Condition.

(b) (i) If any event occurs which PSE&G reasonably believes will or may cause delay in the compliance with any provision of the compliance schedules in Special Conditions H.2, H.3., H.4., H.5. or H.6., PSE&G shall notify the Department in writing within ten (10) business days of the delay or anticipated delay, as appropriate, referencing this paragraph and describing the anticipated length of the delay, the precise cause or causes of the delay, any measures taken or to be taken to minimize the delay, and the time required to take any such measures to prevent or minimize any such delay. PSE&G shall take all necessary actions to prevent or minimize any such delay.

(ii) If the Department finds that : (a) PSE&G has complied with the notice requirements of paragraph (i) above; and (b) that any delay or anticipated delay has been or will be caused by a circumstance(s) beyond the control of PSE&G; and (c) that PSE&G has taken all necessary actions to prevent or minimize the delay, the Department shall extend the time for performance for a period no longer than the delay resulting from such circumstances. If the Department determines that PSE&G has not complied with the notice requirements of the preceding paragraph, or the event causing the delay is not beyond the control of PSE&G, or PSE&G has not taken all necessary actions to prevent or minimize the delay, this paragraph shall not be applicable and such failure to comply with the provisions of the applicable compliance schedule shall constitute a violation of the terms and conditions of this permit. The burden of proving that any delay is caused by circumstances beyond the control of PSE&G, the length of any such delay attributed to those circumstances and that all necessary actions were taken to prevent or minimize the delay shall rest with PSE&G. Increase in the cost or expenses incurred by PSE&G in fulfilling the requirements of this permit shall

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not be a basis for an extension of time. Delay in an interim requirement shall not automatically justify or excuse delay in the attainment of subsequent requirements.

**SALEM GENERATING STATION
EFFLUENT CHARACTERIZATION
TABLE 1**

CONVENTIONAL POLLUTANTS		RQL (ug/l)
TOTAL ORGANIC CARBON		
TOTAL SUSPENDED SOLIDS		
PETROLEUM HYDROCARBONS		
pH		

METALS AND CYANIDE		RQL (ug/l)
CAS NUMBER		
ANTIMONY, TOTAL	7440-36-0	20
ARSENIC, TOTAL	7440-38-2	8
BERYLLIUM, TOTAL	7440-41-7	20
CADMIUM, TOTAL	7440-43-9	4
CHROMIUM, TOTAL	7440-47-3	10
COPPER, TOTAL	7550-50-8	10
LEAD, TOTAL	7439-92-1	10
MERCURY, TOTAL	7439-97-6	1
NICKEL, TOTAL	7440-02-2	10
SELENIUM, TOTAL	7782-49-2	10
SILVER, TOTAL	7440-22-4	2
THALLIUM, TOTAL	7440-28-0	10
ZINC, TOTAL	7440-66-6	30
CYANIDE, TOTAL	57-12-5	40

PRIORITY POLLUTANT VOLATILES		RQL (ug/l)
CAS NUMBER		
ACROLEIN	107-02-08	50
ACRYLONITRILE	107-13-1	50
BENZENE	71-43-2	7
BROMOFORM	72-25-2	8
CARBON TETRACHLORIDE	56-23-5	6
CHLOROETHANE	108-90-7	6
CHLORODIBROMOMETHANE	124-48-1	6
CHLOROETHANE	75-00-3	N/A
2-CHLOROETHYL VINYL ETHER	110-75-8	N/A
CHLOROFORM	67-66-3	5
DICHLOROBROMOMETHANE	75-27-4	5
1,1-DICHLOROETHANE	75-34-3	23.5
1,2-DICHLOROETHANE	107-06-2	3
1,1-DICHLOROETHYLENE	75-35-4	6
1,2-DICHLOROPROPANE	78-87-5	30
CIS - 1,3-DICHLOROPROPENE	10061-01-5	5
TRANS - 1,3-DICHLOROPROPENE	10061-02-6	7
ETHYLBENZENE	100-41-4	6
METHYL BROMIDE	74-83-9	9
METHYL CHLORIDE	74-87-3	10
METHYLENE CHLORIDE	75-09-2	6
1,1,2,2-TETRACHLOROETHANE	79-34-5	10
TETRACHLOROETHYLENE	127-18-4	9
TOLUENE	108-88-3	6
1,2-TRANS-DICHLOROETHYLENE	156-60-5	4
1,1,1-TRICHLOROETHANE	71-55-6	6
1,1,2-TRICHLOROETHANE	79-00-5	6
TRICHLOROETHYLENE	79-01-6	5
VINYL CHLORIDE	75-01-4	10

PRIORITY POLLUTANT ACID EXTRACTABLE		RQL (ug/l)
CAS NUMBER		
2-CHLOROPHENOL	95-57-8	20
2,4-DICHLOROPHENOL	120-83-2	10
2,4-DIMETHYLPHENOL	105-67-9	13.5
4,6-DINITRO-O-CRESOL	534-52-1	60
2,4-DINITROPHENOL	51-28-5	40
2-NITROPHENOL	88-75-5	18
4-NITROPHENOL	100-02-7	12
P-CHLORO-M-CRESOL	59-50-7	15
PENTACHLOROPHENOL	87-86-5	30
PHENOL	108-95-2	10
2,4,6-TRICHLOROPHENOL	88-06-2	20

PRIORITY POLLUTANT BASE/NEUTRAL COMPOUNDS		RQL (ug/l)
CAS NUMBER		
ACENAPHTHENE	83-32-9	9.5
ACENAPHTYLENE	208-96-8	10
ANTHRACENE	102-12-7	10
BENZIDINE	92-87-5	50
BENZO (A) ANTHRACENE	56-55-3	10
BENZO (A) PYRENE	50-32-8	20
BENZO (B) FLUORANTHENE	205-99-2	10
BENZO (GHI) PERYLENE	191-24-2	20
BENZO (K) FLUORANTHENE	207-08-9	20
BIS (2-CHLOROETHOXY) METHANE	111-91-1	26.5
BIS (2-CHLOROETHYL) ETHER	111-44-4	10
BIS (2-CHLOROISOPROPYL) ETHER	108-60-1	10
BIS (2-ETHYLHEXYL) PHTHALATE	117-81-7	30
4-BROMOPHENYL PHENYL ETHER	101-55-3	9.5
BUTYL BENZYL PHTHALATE	85-68-7	20
2-CHLORONAPHTHALENE	91-58-7	9.5
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	21
CHRYSENE	218-01-9	20
DIBENZO (A,H) ANTHRACENE	53-70-3	20
1,2-DICHLOROBENZENE	95-50-1	9
1,3-DICHLOROBENZENE	541-73-1	9
1,4-DICHLOROBENZENE	106-46-7	20
3,3-DICHLOROBENZIDINE	91-94-1	60
DIETHYL PHTHALATE	84-66-2	10
DIMETHYL PHTHALATE	131-11-3	10
DI-N-BUTYL PHTHALATE	84-74-2	20
2,4-DINITROTOLUENE	121-14-2	10
2,6-DINITROTOLUENE	606-20-2	9.5
DI-N-OCTYL PHTHALATE	117-84-0	12.5
1,2-DIPHENYLHYDRAZINE		
(AS AZOBENZENE)	122-66-7	N/A
FLUORANTHENE	206-44-0	10
FLUORENE	86-73-7	10
HEXACHLOROBENZENE	118-74-1	10
HEXACHLOROBUTADIENE	87-68-3	10
HEXACHLOROCYCLOPENTADIENE	77-47-4	10
HEXACHLOROETHANE	67-72-1	10
INDENO (1,2,3-CD) PYRENE	193-39-5	20
ISOPHORONE	78-59-1	10
NAPHTHALENE	91-20-3	8(C)
NITROBENZENE	98-95-3	10
N-NITRO-SODIMETHYLAMINE	62-75-9	20
N-NITROSODI-N-PROPYLAMINE	621-64-7	N/A
N-NITROSODIPHENYLAMINE	86-30-6	20
PHENANTHRENE	85-01-8	10
PYRENE	129-00-0	20
1,2,4-TRICHLOROBENZENE	120-82-1	10

PERMIT CONDITIONS RELATING TO RESIDUALS MANAGEMENT

- A. Collected grit and screenings, scums, sand bed sands, slurries, and sludges, and all other solids from the treatment process shall be managed in such a manner as to prevent such materials from entering the ground and/or surface waters of the State except in accordance with the NJPDES permit. If for any reason such materials are placed in the water or on the lands where they may cause pollutants to enter the ground and/or surface waters of the State, the following information shall be reported to the Division of Facility Wide Enforcement, and to the Bureau of Pretreatment and Residuals of the Wastewater Facilities Regulation Program:
- (1) Dates of occurrence;
 - (2) A description of the noncomplying discharge (nature and volume);
 - (3) Cause of noncompliance;
 - (4) Steps taken to reduce and eliminate the noncomplying discharge; and
 - (5) Steps taken to prevent recurrence of the condition of noncompliance.
- B. If the chosen sludge management method is land application, the permittee must make provisions for storage, or some other approved management strategy, for those periods when land application is prohibited, including but not limited to winter months, or when the ground is frozen or saturated with water. The permittee shall not be permitted to store sludge on-site beyond the capacity of the structural treatment and storage components of the treatment facility, except in accordance with a NJPDES Emergency On-site Storage Permit. Nor shall the permittee be permitted to store sludge on-site in any manner which is not in accordance with Solid Waste Management Rules, N.J.A.C. 7:26-1 et seq. Any violations must be reported to the Division of Water Resources, Enforcement Element within 24 hours.
- C. The permittee shall comply with the Sludge Quality Assurance Regulations, N.J.A.C. 7:14-4.1 et seq. Where quality information is required by these regulations, analyses must reflect the quality of the final sludge product which the permittee must remove.

- D. The permittee shall manage the sludge from this facility in compliance with the New Jersey Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq., and the New Jersey Water Quality Planning Act N.J.S.A. 58:11A-1 et seq., which require conformance with District Sludge Management Plans, and Water Quality Management Plans. The permittee shall also comply with all applicable rules and regulations promulgated pursuant to the federal Resource Conservation and Recovery Act governing the treatment, storage and disposal of hazardous waste.
- E. The permittee shall at all times have on file with the Department, proof of proper residuals management at a facility/operation duly licensed and permitted by the appropriate entity(ies). To satisfy this requirement the permittee shall submit proof of ownership or contractual arrangement with a permitted facility/operation for the composting, land application, thermal reduction, or other approved method of ultimate residuals management.

Where such permitted residuals management does not extend for the full term of this permit, the permittee shall submit similar proof of new permitted management arrangements which shall become effective no later than the expiration date of the previous arrangements. All such proofs of ultimate management must be submitted in duplicate to:

Chief
Bureau of Pretreatment and Residuals
Wastewater Facilities Regulation Program
CN-029
Trenton, New Jersey 08625

The permittee shall assure that sludge produced by this facility is at all times suitable for management at the site identified on such submitted proof of proper management.

- F. The permittee shall comply with the provisions concerning the management of sludge in the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and the Solid Waste Management Act (N.J.S.A. 13:1E et seq.) and all regulations which address sludge management promulgated under these acts.

PROCEDURES AND REQUIREMENTS FOR CONDUCTING DILUTION STUDIES

Critical Conditions

Critical conditions are those that produce minimal dilution and/or cause the maximum environmental impact on aquatic life and the designated uses of the receiving waterbody. One of the primary concerns in defining critical conditions is stratification of the receiving waterbody. For the purposes of this document stratification refers to salinity and/or thermal variations which occur over a vertical profile in the receiving waterbody.

For non-tidal streams and rivers, critical conditions are periods of low fresh water flows. These conditions generally occur between August 15 and October 15.

In large lakes or stagnant lakes and ponds, critical conditions occur if the water stratifies. Stratification of these waterbodies is most likely during the summer months.

For tidal, non-stratified waterbodies minimal dilution occurs when fresh water inflows are at a minimum and a low water slack period during a spring tide occurs. These conditions should occur between August 15 and October 15. Also, to determine the maximum areal extent of the plume, maximum velocity during a tidal cycle should be examined.

For tidal, stratified waterbodies minimal dilution may occur at either minimal fresh water flows or at times of maximum stratification. In addition to the above non-stratified conditions the following should also be examined. For estuaries and tidal portions of streams that are likely to be salinity stratified maximum stratification would occur during periods of high fresh water inflows at low water slack during a neap tide. This should occur between March 1 and April 15. For coastal waters that are likely to be thermally stratified maximum stratification should occur between May 1 and August 1.

Dye Studies

To conduct effluent dilution studies for mixing zone considerations and determination of critical Instream Waste Concentrations (IWC) requires the release and sampling of a conservative tracer dye during critical conditions and use of a computer model to simulate the movement of the effluent plume under various conditions.

The release and sampling of a conservative tracer dye is used to determine the mixing characteristics and movement of an effluent plume in a receiving waterbody. The results of a dye study are also used to calibrate and verify computer simulation models that can be used to describe the behavior of the effluent plume for conditions not sampled using dye. In order to conduct the study a conservative dye must be continuously introduced into the

effluent maintaining a constant concentration in the effluent. The effluent discharge rate should be kept at as constant a rate as possible at a level that reflects the average discharge rate. Dye concentrations in the receiving waterbody should be sampled and analyzed in sufficient number, horizontal and vertical extent, and time duration to delineate the ZID and the edge of the mixing zone. The recommended dye is Rhodamine WT. Use of another dye requires that the following information be submitted 21 days prior to the planned release of dye:

1. Name of dye.
2. Physical characteristics of the dye.
3. Available toxicity information on the dye.
4. Concentration at which dye is visible.
5. Planned concentration and total mass of dye to be discharged in the effluent.

Before any dye is released the appropriate Bureau of Regional Enforcement shall be notified at least 48 hours prior to release of dye.

Metro Bureau - (201) 669-3900
Bergen, Essex, Hudson, Union Counties

Central Bureau - (609) 426-0786
Burlington, Mercer, Middlesex, Monmouth, Ocean Counties

Northern Bureau - (201) 299-7592
Hunterdon, Morris, Passaic, Somerset, Sussex, Warren Counties

Southern Bureau - (609) 346-8032
Atlantic, Camden, Cape May, Cumberland, Gloucester, Salem Counties

Computer Models

There exist several models developed for USEPA that simulate effluent plumes from submerged or surface discharges. The following are the minimum data requirements to use the models:

Ambient current speed and direction
Outfall characteristics
Number of ports
Port effective diameter
Port spacing
Port orientation
Discharge depth
Effluent flowrate
Density (or salinity and temperature) of effluent
Density (or salinity and temperature) gradient in receiving waterbody

For submerged outfalls the following USEPA models are available:
PLUME, OUTPLM, DKHDEN, MERGE, LINE, CORMIX1

For surface discharges the following USEPA models are available:
PDS, PDSM, MOBEN, PSY

**INTERIM CHRONIC TOXICITY TESTING METHODOLOGIES
FOR USE IN THE NJPDES PERMIT PROGRAM**

Version 1.0

February 1989

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Notice: Mention of trade names or commercial products does not constitute endorsement or recommendation for use.	

AUTHORITY AND PURPOSE

These interim methods for the conduct of whole effluent chronic toxicity testing are established under the authority of the NJPDES permitting program (N.J.A.C. 7:14A-2.9) for discharges to the waters of the State. They are intended as interim measures until the formal establishment of a laboratory certification program to govern the conduct of whole effluent chronic toxicity testing is established under N.J.A.C. 7:18. As such these methods are intended to be used to determine compliance with discharge permits issued under the authority of the NJPDES permit program. Tests are to be conducted in accordance with the general conditions and test organism specific method specifications contained in this document. All other conditions and specifications can be found in the cited USEPA methodologies (USEPA 1988, 1989).

Until a subchapter on chronic toxicity testing within the "Regulations Governing Laboratory Certification and Standards of Performance" (N.J.A.C. 7:18) becomes effective, tests shall be conducted in conformance with the interim methodologies as designated herein. The laboratory performing the testing shall be within the existing acute toxicity testing laboratory certification program established under N.J.A.C. 7:18-6, as required by N.J.A.C. 7:9-4.5(c)5.

Testing shall be in conformance with the subchapter on chronic toxicity testing within the "Regulations Governing Laboratory Certification and Standards of Performance" (N.J.A.C. 7:18) when such regulations become effective. The laboratory performing the toxicity testing shall be within the chronic toxicity testing laboratory certification program to be established under that subchapter when it becomes effective.

These interim methods are incorporated into discharge permits as enforceable permit conditions. Each discharge permit will specify in Part IV of the permit the test species specific methods from this document which will be required under the terms of the discharge permit. Therefore, each individual permittee affected by these permit conditions has the right to comment on the methods applicable to their specific discharge during the public comment period on each individual permit. Although the test species specific methods for each permit are determined on a case-by-case basis, the purpose of this methods document is to assure consistency among dischargers and to provide certified laboratories with information on the universe of tests to be utilized so that they can make the necessary preparations.

GENERAL CONDITIONS

LABORATORY SAFETY, GLASSWARE, ETC.

All safety procedures, glassware cleaning procedures, etc., shall be in conformance with "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, 2nd edition", (USEPA 1989), "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms" (USEPA 1988), or "Regulations Governing Laboratory Certification and Standards of Performance" (N.J.A.C. 7:18).

TEST CONCENTRATIONS

All testing is to be performed at a minimum of five effluent concentrations plus a dilution water control. One effluent concentration shall be the chronic permit limitation unless the existing data for the discharge indicate that the NOEC is expected to be significantly less than the permit limit. An effort shall be made to bracket the anticipated NOEC/LOEC test result.

DILUTION WATER - MARINE AND ESTUARINE WATERS

A high quality natural water, such as the Manasquan River Inlet (collected at high tide), is strongly recommended as the dilution water source for chronic toxicity testing with marine and estuarine organisms. The use of the receiving water as the dilution water source is not required. Saline waters prepared with hypersaline brine and deionized water may also be used as the base dilution water. Hypersaline brines shall be prepared from a high quality natural seawater and shall not exceed a concentration of 100 ppt.

The standard test salinity shall be 25 ppt, except for Champia parvula, which shall be tested at 30 ppt. Since most effluents are freshwater based, in most cases it will be necessary to adjust the salinities of the test concentrations to the standard test salinity.

The use of artificial seawater, prepared using artificial sea salts, is permitted but not recommended, only for the sheepshead minnow test (USEPA 1988, Method 1004) and for the mysid shrimp test (USEPA 1988, Method 1007). The acceptable sea salts include FORTY FATHOMS and HW MARINEMIX, as per the EPA marine chronic methods document (USEPA 1988). Use of any other salt(s) will require the submission in advance of adequate documentation, including at a minimum adequate standard reference toxicant data to demonstrate the acceptability of the salt(s) for use in chronic toxicity testing. They must be approved by the Department prior to the use.

Unless artificial seawater is to be used as the dilution water, hypersaline brine, concentrated to no more than 100 ppt, shall be the primary means of adjusting the test concentrations' salinities. In any test concentration, if the standard test salinity cannot be attained using 100 ppt hypersaline brine, the following procedure shall be used. This procedure shall not apply for any chronic toxicity testing using Champia parvula as the test organism.

1. Hypersaline brine, 100 ppt, shall be used to adjust the salinities of all test concentrations up to the standard test salinity, or the highest salinity attainable.
2. In those test concentrations where the standard test salinity cannot be attained using 100 ppt hypersaline brine, the salinity shall be brought up to the maximum attainable salinity using 100 ppt. hypersaline brine and shall then be adjusted above that salinity using artificial sea salts. Restrictions on the type of artificial sea salts as discussed above also apply.
3. A control prepared with hypersaline brine shall be included. An additional control prepared with artificial sea salts is recommended if sea salts are utilized as per paragraph 2, above.

The type of a dilution water for a permittee may not be changed without the prior approval of the Department.

Special attention should be given to the presence of required micronutrients in waters to be used for crustaceans. Refer to the specific test methodologies for more details.

If any distilled or deionized water is used, it should be prepared with Millipore Super Q^R or equivalent.

DILUTION WATER - FRESH WATERS

A high quality natural water, such as Round Valley Reservoir (if access is allowed) or Lake Hopatcong, is strongly recommended as the dilution water source for chronic toxicity testing with freshwater organisms. It is not required to perform the toxicity testing with the receiving water as dilution water. Tests performed with a reconstituted water or up to 20% Diluted Mineral Water (DMW) as dilution water are acceptable. The hardness of the dilution water must be within 10% of the hardness of the receiving water or 50 mg/L as CaCO_3 , whichever is greater. The source of a dilution water for a permittee may not be changed without the prior approval of the Department. Reconstituted water and DMW should be prepared with Millipore Super Q^R or equivalent.

Special attention should be given to the presence of required micronutrients in waters to be used for crustaceans. Refer to the specific test methodologies for more details.

EFFLUENT SAMPLE COLLECTION

Effluent samples shall be representative of the discharge being regulated. For each discharge serial number (DSN), the effluent sampling location shall be the same as that specified in the NJPDES permit for other sampling parameters unless an alternate sampling point is specified in the NJPDES discharge permit. For industrial dischargers with a combined process/sanitary waste stream, effluent sampling shall be after chlorination, unless otherwise designated in the permit.

For continuous discharges, effluent sampling shall consist of 24 hour composite samples consisting either of equal volumes taken once every hour or of a flow-proportionate composite sample, unless otherwise approved by the Department. Effluent holding times and test solution renewal shall be consistent with the test organism specific methods in USEPA 1988 and 1989. For all other types of discharges, effluent sampling shall be conducted according to specifications contained within the discharge permit, or otherwise specified by the Department.

Except for filtration through a 2 mm or larger screen or an adjustment to the standard test salinity, no other adjustments to the effluent sample shall be made without prior written approval by the Department.

PHYSICAL CHEMICAL MEASUREMENTS

At a minimum, the physical chemical measurements must be consistent with the referenced test methodology (USEPA 1988, 1989).

The photoperiods should be phased in and out over a period of thirty (30) minutes for each transition period.

STATISTICS

Statistical analysis should follow the protocols in USEPA (1988, 1989) to evaluate adverse effects. Generally, a significance level of 0.05 will be utilized to evaluate such effects.

A dilution factor of 0.3 or 0.5 can be used. However, the Department recommends the use of the 0.5 dilution factor due to the increased test precision. Note that this may require more than five dilutions to cover the entire range of effluent concentrations.

If separate NOEC's can be calculated from multiple test end-points, as for example a reproductive end-point and a growth end-point, the most sensitive end-point will be used to determine permit compliance.

NOTE: Use of nonparametric statistical analyses requires a minimum of four (4) replicates per test concentration. If the data for any particular test is not conducive to parametric analyses and if less than four (4) replicates were included, the test may not be acceptable to the Department.

STANDARD REFERENCE TOXICANT TESTING

All chronic testing shall be accompanied by testing with a standard reference toxicant as a part of the each laboratory's internal quality control program. Such a testing program should be consistent with the quality assurance/quality control protocols described in the USEPA chronic testing manuals for freshwater organisms and for marine and estuarine organisms (USEPA 1989, 1989). Laboratories may utilize the standard reference toxicant of their choice.

At a minimum, this testing should include an initial series of at least five reference toxicant tests for each test species method. This testing should be completed prior to the initiation of any chronic effluent toxicity testing for each test species method. The laboratory should forward two copies of the initial testing, including control charts, the name of the standard reference toxicant utilized, the supplier, and appropriate chemical analysis of the toxicant, to the following address:

Municipal/Industrial Biomonitoring Programs
Wastewater Facilities Management Element
Division of Water Resources
CN-029
Trenton, NJ 08625-029

Subsequent testing should include testing of each batch of organisms obtained from a supplier and/or monthly testing of organisms cultured by the laboratory. Control charts should be maintained by the laboratory. Two copies of the control charts are to be forwarded annually to the Biomonitoring Programs at the above address. Results of appropriate chemical analyses of each lot of standard reference toxicant utilized must be included.

If standard reference toxicant tests fall outside the expected range of the control chart at a frequency greater than one in any twenty tests, a report shall be forwarded to the Biomonitoring Programs at the address above. This report shall include the identified problem which caused the value to fall outside the expected range and the corrective actions that have been taken by the laboratory. The Department may not accept or may require repeat testing for any required toxicity testing that may be affected by such an occurrence.

METHODS SPECIFICATIONS

SUMMARY OF TEST CONDITIONS FOR
THE FATHEAD MINNOW (PIMEPHALES PROMELAS)
LARVAL SURVIVAL AND GROWTH TEST

- | | |
|---|---|
| 1. Test Type: | Static Renewal |
| 2. Test Duration: | 7 days |
| 3. Renewal of Test Solution: | Daily |
| 4. Age of Test Organisms: | Newly hatched larvae (<24 hours old). Testing with organisms up to 48 hours is allowed if they are all within one age group |
| 5. Dilution Factor: | 0.3 or 0.5 |
| 6. Number of Test Concentrations: | minimum 5 plus a control (a second control is optional when a dilution water other than the culture water is used) |
| 7. Number of Replicates per Each Concentration & Control: | 4 (minimum of 3) |
| 8. Number of Larvae per Replicate: | 15 (minimum of 10) |
| 9. Test Chamber Size: | 500 ml recommended (covered) |
| 10. Test Solution Volume: | minimum 250 ml/chamber |
| 11. Loading Factor: | 20 ml/organism |
| 12. Test Dilution Water: | natural water (60 micron mesh filtered), reconstituted water or up to 20% diluted mineral water (DMW). Reconstituted and DMW waters should be prepared with Millipore Super-QR or equivalent water. Aerate a minimum of 24 hours. |
| 13. Test Temperature: | 25 \pm 1° C |
| 14. Aeration: | none, unless the DO concentration falls below 40% saturation then all |

PART V

15. Feeding Regime:

replicates. Rate should be less than 100 bubbles/min.

Feed 0.1 ml newly hatched brine shrimp naupli twice daily, 6 hr. between feedings (at the beginning of the work day at time of renewal and at the end of the work day). No feeding day 7. Sufficient naupli should be added to produce an excess.

16. Photoperiod:

16 hr. light, 8 hr. darkness. 30 min. phase in and phase out recommended.

17. Light Intensity:

Ambient laboratory levels (10-20 uE/m²/s or 50-100 ft-c)

18. Cleaning:

Siphon daily, immediately before test solution renewal

19. Effects Measured:

Survival and growth (dry weight)

20. Test Acceptability:

≥80% control survival, ave. dry weight of surviving controls ≥ 0.25 mg

21. Weighing/Drying Procedures:

Immediately prepare for drying and weighing or preserve in 70% ethanol to dry and weigh at a later date. Dry at 100°C for a min. 2 hrs or until constant weight is achieved.

22. Other Test Specifications in:

USEPA, 1989. Method 1000.0

SUMMARY OF TEST CONDITIONS FOR
CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

- | | |
|--|---|
| 1. Test type: | Static renewal |
| 2. Test duration: | 3 broods (see 19) |
| 3. Temperature (°C): | 25 + 1°C |
| 4. Light quality: | Ambient laboratory illumination |
| 5. Light intensity: | 10-20 $\mu\text{E}/\text{m}^2/\text{s}$, or 50-100 ft-c
(ambient laboratory levels). Caution
should be taken to avoid excessive
photosynthetically mediated elevations
in pH. |
| 6. Photoperiod: | 16 h light, 8 h dark |
| 7. Test chamber size: | 30 ml recommended (covered) |
| 8. Test solution volume: | 15 ml recommended. Test chambers
should contain sufficient test solution
to provide adequate surface area to
maintain dissolved oxygen concentra-
tions at or above 40 percent saturation |
| 9. Loading factor: | Minimum 15 ml/animal |
| 10. Renewal of test solutions: | Daily |
| 11. Age of test organisms: | Less than 24 h; and all released
within a 8-h period |
| 12. Number of neonates per
replicates: | Maximum of 1 |
| 13. Number of replicates per
each concentration and
control: | Minimum of 10 |
| 14. Number of test
concentrations: | Minimum of 5 effluent concentrations
and a control. (A second control is
optional when a dilution water other
than the culture water is used.) |

15. Feeding regime:

Diet must include an algal component. USEPA (1989) recommends feeding 0.1ml/15ml each of YTC (yeast, trout chow and Cerophyl) and Selenastrum capricornatum suspension per exposure chamber daily. Alternatives include algal diets of: 1. Ankistrodesmus convolutus and Nitzschia frustulum, and 2. A. convolutus, Chlamydomonas reinhardtii and N. frustulum (Cowgill et al., 1985, 1988; Keating and Dagbusan, 1986). Algal feeding rates and other algal diets must be approved prior to use.

16. Aeration:

None.

17. Dilution water:

Natural water (60um mesh filtered), reconstituted water, or up to 20% diluted mineral water (DMW). Reconstituted and DMW waters should be prepared with Millipore Super Q^R or equivalent. Addition of 5 ug/l selenium (2 ug/l selenium with natural water) and 1 ug/l vitamin B12 is recommended (Keating and Dagbusan, 1984; Keating, 1985 1988). Aerated prior to the test for a minimum of 24 hours, but not supersaturated.

18. Dilution factor:

0.3 or 0.5

19. Test duration:

Until 60% of control females have three broods, up to a maximum of eight days.

20. End points:

Survival and reproduction

21. Test acceptability:

80% or greater survival and an average of 15 or more young/surviving female in the controls. At least 60% of surviving females in the controls produced their third brood within eight days. No ephippa produced in the controls. The number of males in the controls and test concentrations should be minimal and not influence the determination of the NOEC and LOEC

22. Other test specifications in:

USEPA, 1989. Method 1002.0

SUMMARY OF TEST CONDITIONS FOR
ALGAL (SELENASTRUM CAPRICORNUTUM)
GROWTH TEST

- | | |
|---|--|
| 1. Test Type: | Static, Non Renewal |
| 2. Test Duration: | 96 hours |
| 3. Age of Test Organisms at Test Start: | 4 to 7 days |
| 4. Dilution Factor: | 0.3 or 0.5 |
| 5. Number of Test Concentrations: | Minimum of 5 plus a control (A second control is optional when a dilution water other than the algal culture medium is used). |
| 6. Number of Replicates per Each Concentration and Control: | 4 (Minimum of 3) |
| 7. Initial Cell Density per Replicate: | 10,000 cells/ml |
| 8. Test Chamber Size: | 125 ml or 250 ml chamber recommended (covered) |
| 9. Test Solution Volume: | 50 ml or 100 ml recommended |
| 10. Dilution Water: | Algal culture medium or filtered natural surface waters using a 0.45 um pore diameter filter, followed by addition of nutrient solutions (USEPA 1989, Method 1003, Table 1). The use of EDTA or other nutrient solutions is not recommended. |
| 11. Reagent Water: | Carbon filtered distilled or deionized water which does not contain substances which are toxic to the test organism. A water purification system may be used to generate reagent water (ie. Millipore Super Q [®] or equivalent). |
| 12. Test Temperature: | 25° ± 1°C |
| 13. Photoperiod: | Continuous illumination |

14. Light Quality: "Cool White" Fluorescent lighting
15. Light Intensity: $86 \pm 8.6 \text{ uE/m}^2/\text{s}$ ($400 \pm 40 \text{ ft-c}$)
16. Shaking Rate: 100 cpm continuous or twice daily by hand
17. Effects Measured: Growth (cell counts, chlorophyll content, fluorescence, absorbance, biomass)
- The algae in the test solutions must be checked under a microscope to detect abnormalities in cell size or shape.
- Algal growth determined daily
18. Test Acceptability: Algal density $\geq 2 \times 10^5$ cells/ml in the controls (without EDTA). Variability of controls should not exceed 20 percent.
19. Other Test Specifications in: USEPA, 1989. Method 1003.

SUMMARY OF TEST CONDITIONS FOR
SHEEPSHEAD MINNOW (CYPRINODON VARIEGATUS)
LARVAL SURVIVAL AND GROWTH TEST

- | | |
|---|--|
| 1. Test Type: | Static Renewal |
| 2. Test Duration: | 7 days |
| 3. Renewal of Test Solutions: | Daily |
| 4. Age of Test Organisms at Test Start: | Newly Hatched Larvae. (24 hrs old). Testing with organisms up to 48 hrs old is permitted if they are all within one age group. |
| 5. Dilution Factor: | 0.3 or 0.5 |
| 6. Number of Test Concentrations: | Minimum of 5 plus a control (a second reference water control is optional when a dilution water other than the culture water is used). |
| 7. Number of Replicates per Each Concentration and Control: | Minimum of 3 |
| 8. Number of Organisms per Replicate: | Minimum of 10 |
| 9. Test Chamber Size: | Minimum of 600 mL chamber (covered) |
| 10. Test Solution Volume: | Minimum of 500 mL/replicate |
| 11. Loading Factor: | Minimum 50 mL/larvae |
| 12. Dilution Water: | Natural sea water or hypersaline brine |

13. Salinity of Test Concentrations: 25 ppt +/- 2 ppt (varying not more than 2 ppt among replicate chambers each day)
14. Adjustment of Salinity of Test Concentrations: Hypersaline brine to 75‰ effluent. Acceptable artificial sea salts above 75‰ effluent.
15. Test Temperature: 25 +/- 2°C
16. Aeration: None unless the Dissolved Oxygen falls below 60% saturation, then all chambers. Rate less than 100 bubbles/min
17. Food Source: 24 hour post hatch Artemia nauplii. (Other supplements or variations approved prior to use.)
18. Feeding Regime: Days 0-2: feed once per day 0.1 g wet weight Artemia nauplii per replicate.
Days 3-6: feed once per day 0.15 g wet weight Artemia nauplii per replicate.
19. Photoperiod: 16 Light:8 Dark
20. Effects Measured: Survival and Growth
21. Weighing / drying Procedures: Immediately prepare for drying and weighing or preserve in formalin or ethanol to dry and weigh at later date.
22. Test Acceptability: 80% survival in controls and an average dry weight of 2 0.60 mg (unpreserved larvae) or 0.50 mg (preserved larvae)
23. Other test specifications available in: USEPA 1988, Method 1004

SUMMARY OF TEST CONDITIONS FOR
INLAND SILVERSIDE (MENIDIA BERYLLINA)
LARVAL SURVIVAL AND GROWTH TEST

- | | |
|---|---|
| 1. Test Type: | Static Renewal. |
| 2. Test Duration: | 7 days |
| 3. Renewal of Test Solutions: | Daily |
| 4. Age of Test Organisms at Test Start: | 7-11 days post hatch Larvae |
| 5. Dilution Factor: | 0.3 or 0.5 |
| 6. Number of Test Concentrations: | Minimum of 5 plus a control (a second reference water control is optional when a dilution water other than the culture water is used) |
| 7. Number of Replicates per Each Concentration and Control: | Minimum of 3 |
| 8. Number of Organisms per Replicate: | Minimum of 10 |
| 9. Test Chamber Size: | Minimum of 600 mL chamber (covered) |
| 10. Test Solution Volume: | Minimum of 500 mL/replicate |
| 11. Loading Factor: | Minimum 50 mL/larvae |
| 12. Dilution Water: | Natural sea water or hypersaline brine |
| 13. Salinity of Test Concentrations: | 25 ppt +/- 2 ppt (varying not more than 2 ppt among replicate chambers each day) |

14. Adjustment of Salinity of Test Concentrations: Hypersaline brine to 75% effluent. Acceptable artificial sea salts above 75% effluent.
15. Test Temperature: 25 +/- 2°C
16. Aeration: None unless the Dissolved Oxygen falls below 60% saturation, then all chambers. Rate less than 100 bubbles/min
17. Food Source: 24 hour post hatch Artemia nauplii. (Other supplements or variations approved prior to use.)
18. Feeding Regime: Days 0-2: feed once per day 0.1 g wet weight Artemia nauplii per replicate.
Days 3-6: feed once per day 0.15 g wet weight Artemia nauplii per replicate.
19. Photoperiod: 16 Light:8 Dark
20. Effects Measured: Survival and Growth
21. Weighing / drying Procedures: Immediately prepare for drying and weighing or preserve in formalin or ethanol to dry and weigh at later date.
22. Test Acceptability: 80% survival in controls and an average dry weight of 2 0.50 mg (unpreserved larvae) or 0.43 mg (preserved larvae)
23. Other test specifications available in: USEPA 1988, Method 1006

SUMMARY OF TEST CONDITIONS FOR
MYSID (MYSIDOPSIS BAHIA) SURVIVAL, GROWTH,
AND FECUNDITY TEST

- | | |
|---|--|
| 1. Test Type: | Static Renewal |
| 2. Test duration: | 7 days |
| 3. Renewal of Test Solutions: | Daily |
| 4. Age of Test Organisms at Test Start: | 7 days; 8 days maximum (all released within 24 hours from a single source). |
| 5. Dilution Factor: | 0.3 or 0.5 |
| 6. Number of Test Concentrations: | Minimum of 5 plus a control (a second control is optional when a dilution water other than the culture water is used). |
| 7. Number of Replicates per Each Concentration and Control: | Minimum of 5 recommended |
| 8. Number of Organisms per Replicate: | Minimum of 10 recommended |
| 9. Test Chamber Size: | Minimum of 500 ml recommended (covered) |
| 10. Test Solution Volume: | Minimum of 400 ml recommended |
| 11. Dilution Water: | Natural Sea Water or Hypersaline Brine |
| 12. Salinity of Test Concentrations: | 25 ppt \pm 2 ppt (varying not more than 2 ppt among replicates each day) |
| 13. Adjustment of Salinity of Test Concentrations: | Hypersaline Brine to 75 percent effluent. Artificial sea salts acceptable above 75 percent effluent. |
| 14. Test Temperature: | 26°- 27°C recommended |

15. Aeration: None unless the Dissolved Oxygen falls below 60% saturation, then all chambers.
16. Food Source: 24 hour post hatch Artemia naupli (other supplements or variations should be approved prior to use).
17. Feeding Regime: 150 naupli per mysid (approximately 0.1 ml of concentrated naupli) - half after test solution renewal and half at 8 - 12 hours.
18. Photoperiod: 16 h light, 8 h dark
19. Light Intensity: 50-100 ft-c
20. Effects Measured: Survival, Growth and Fecundity
21. Weighing/Drying Procedures: Animals examined within 12 hours of test termination. Pieces of aluminum foil or small aluminum foil weighing boats less than 10 mg in weight.
22. Physical/Chemical Measurements (In additon ot those specified in the General Conditions Section): Ammonia, Nitrite and Nitrate shall be measured in the controls at the test beginning.
23. Recommended Culture Water Specifications (Ward, 1989, 1989b):
Salinity = 25 ppt
Temperature = 25 degrees
pH = 7.8 - 8.2 SU
Dissolved Oxygen = 6.5 - 7.1 mg/l
Ammonia = 40.05 mg/l
Nitrite = 20.05 mg/l
Nitrate = 220 mg/l
Alkalinity = 45 - 120 mg/l
24. Test Acceptability: $\geq 80\%$ control survival, an average weight of ≥ 0.2 mg. per mysid in the controls and egg production by 50 percent of the control females.
25. Other Test Specifications in: USEPA, 1988. Method 1007.

SUMMARY OF TEST CONDITIONS FOR
CHAMPIA PARVULA SEXUAL REPRODUCTION TEST

1. Test type: Static, non-renewal
2. Test duration: 2-day exposure to effluent, followed by 5- to 7-day recovery period for females only in control medium for cystocarp development
3. Test solution volume: 100 mL
4. Dilution water: 30 ppt salinity natural seawater, or a combination of 50% - 30 ppt salinity natural seawater and 50% - 30 ppt salinity artificial seawater as per USEPA (1988), method 1009.
5. Dilution factor: 0.3 or 0.5
6. Number of test concentrations: At least 5 and a control, the concentration of effluent used in this test is limited to a maximum of 50%.
7. Number of replicates per each concentration and control: 4 (minimum of 3)
8. Number of organisms per replicate: 5 female branch tips approximately 1cm in length and 1 male plant approximately 2cm in length (visibly producing spermatia).
9. Salinity: 30 ppt \pm 2 ppt
10. Temperature: 22 - 24°C
11. Photoperiod: 16 h light, 8 h dark
12. Light intensity: 100 $\mu\text{E}/\text{m}^2/\text{s}$ (500 ft-c)
13. Light source: Cool-white fluorescent lights
14. Test chamber: 200 mL polystyrene cups (covered), or 250 mL Erlenmeyer flasks (recommended)
15. Aeration: None during exposure period; chambers are either shaken at 100 rpm rotary shaker or handswirled twice a d
16. Effects measured: Significant reduction in the number of cystocarps formed in test concentration compared to controls.

17. Test acceptability:

80% survival in the controls (generally there is no control mortality), controls shall average 10 cystocarps or more per plant, plants in the control and lower test concentrations shall not fragment so that individual plants cannot be identified.

18. Other test specifications in:

USEPA, 1988. Method 1009.

TERATOGENICITY ENDPOINTS

If for any reason the Department has concerns regarding the teratogenicity of a particular effluent to aquatic life, in addition to the methods contained in the Methods Specifications section, the following methods may be used:

Fathead Minnow (Pimephales promelas) Embryo-larval Survival and Teratogenicity Definitive Test, Method 1001.0. (USEPA 1989).

Sheepshead Minnow (Cyprinodon variegatus) Embryo-larval Survival and Teratogenicity Definitive Test, Method 1005. (USEPA 1988).

DEED OF CONSERVATION RESTRICTION

This Deed of Conservation Restriction is made and entered into this _____ day of _____, 1993, between _____, whose address is _____, hereinafter referred to as "Grantor", and the State of New Jersey, Department of Environmental Protection and Energy, having its principal office located at 401 East State Street, Trenton, New Jersey 08625, hereinafter referred to as "Grantee".

EXISTING USE OF PROPERTY. The Property is currently being used by Grantor as follows:

TAX MAP REFERENCE. Grantor owns in fee simple certain lands in the _____ of _____, County of _____ and State of New Jersey, the tax map, block and lot numbers for which are specified in Schedule A hereto, and which lands are more fully described on Schedule B attached hereto and incorporated by this reference (hereinafter referred to as the "Property").

PURPOSE. Except as same may otherwise impair or interfere with existing use(s) or enjoyment of the Property, it is the purpose of this easement to ensure that: the Property will be retained forever predominantly in a natural, scenic, and undeveloped condition; and/or that the Property will be used for recreation, conservation and agricultural purposes; and/or that the Property will be open and accessible for public use and enjoyment; and/or that any use of the Property will be prohibited that will significantly impair or interfere with the recreation and conservation values of the Property and/or the function of the Property as a wetland buffer.

TRANSFER OF OWNERSHIP. Except as may otherwise impair or interfere with existing use(s) or enjoyment of the Property, Grantor, for and in consideration of one dollar and other good and valuable consideration Grantee and/or Public Service Electric and Gas Company ("PSE&G") including Grantee's issuance of a surface water discharge permit to PSE&G for the Salem Generating Station (NJPDES Permit No. NJ0005622) authorizing the operation of the Salem Generating Station with once through cooling, hereby transfers, assigns, and grants to Grantee, its successors, and its assigns, a conservation restriction on the Property for the purpose of providing an upland buffer and/or restricting development and/or restricting use to recreation, conservation and agricultural purposes, as that term is defined in the Open Space Bond Act of 1989, L. 1989, c. 183.

PROMISES BY GRANTOR. Except as same may otherwise impair or interfere with a continuation of an existing use(s) or enjoyment of the Property, Grantor, for itself, its successors, assigns, transferees and devisees, agrees to maintain, protect, and use the Property only for recreation, conservation and agricultural purposes and, further, Grantor (its successors, assigns, transferees and devisees) may not use the Property for other than recreation, conservation and agricultural purposes without the prior written approval of the Commissioner of the New Jersey Department of Environmental Protection and Energy, or his designated representative.

Except as may otherwise be required to comply with the special terms and conditions of NJPDES Permit No. NJ0005622 and, except as same may otherwise be necessary for the continued current use(s) and enjoyment of the Property, Grantor covenants that:

- 1) No trees, shrubs or other vegetation now existing on the Property shall be removed or destroyed, except when consistent with the use of the Property for recreation, conservation or agricultural purposes;
- 2) No topsoil, sand, gravel, loam, rock or other mineral substance shall be excavated, dredged, removed from or placed upon the Property except when consistent with the use of the Property for recreation, conservation or agricultural purposes;
- 3) Only buildings, structures and roads agreed to by both parties shall be constructed on the Property; and,
- 4) No dumping or placing of soil or other substance or materials as landfill, and no dumping or placing of trash, waste or unsightly or otherwise offensive materials shall be permitted on the Property.

RIGHTS OF GRANTEE. To accomplish the purpose of this easement, and except as same may otherwise impair or interfere with existing use(s) and enjoyment of the Property, the following rights are conveyed to Grantee, their designees, representatives, agents and/or assigns by this easement:

- 1) to preserve and protect the recreation and conservation values of the Property;
- 2) to enter upon the Property at reasonable times to conduct activities as may be necessary to implement the NJDEPE-approved Management Plan for the Property;

3) to enter upon the Property at reasonable times in order to monitor Grantor's maintenance of the Property and compliance with the terms of this restriction; and,

4) to prevent any activity on or use of the Property that is inconsistent with the purpose of this easement and to require the restoration of such areas or features of the Property that may be damaged by any inconsistent activity or use;

provided, however, Grantee may take no action(s) under this Deed which will impair or interfere with the current use(s) and enjoyment of the Property.

In the event that a violation of any of the restriction(s) is found to exist, the Grantee may institute suit or take any other action it deems necessary in its sole discretion to enjoin ex parte such violation and to require restoration of the easement area to its prior condition and additionally to seek damages and costs incurred in bringing the action; provided, however, Grantee may take no action(s) under this Deed which may impair or interfere with the current use(s) or enjoyment of the Property. Grantor further agrees to pay whatever costs the Grantee incurs in enforcing the Grantor's obligations herein. Such costs shall include, but not be limited to personnel costs, attorneys' fees and court costs.

Grantor and Grantee agree that this easement imposes no restrictions on existing use or enjoyment of the Property by Grantor, except as specifically set forth herein. Nothing contained herein shall be construed to interfere with the right of the Grantor, its successors, assigns, and lessees to utilize the Property, subject to the terms and conditions of this easement.

PUBLIC ACCESS. Grantor and Grantee agree that this easement will benefit the public by virtue of preserving the Property in its natural state. In addition, subject to the rights of Grantor and others in privity with Grantor to maintain existing use(s) and enjoyment of the Property, the public is conveyed a right of access in a manner mutually agreeable to Grantor and Grantee and as same is consistent with an NJDEPE-approved Management Plan.

RECORDATION. Grantor shall record this instrument in the official records of _____ County, New Jersey immediately upon obtaining, and simultaneously with the recordation of the deed for the property. The Grantee may re-record this instrument at any time as may be required to preserve its rights in this easement.

SIGNATURES. This Deed of Conservation Restriction is signed and attested to by the Grantor's and Grantee's proper and authorized officers or directors as of the date at the top of the first page.

Attest:

GRANTOR

By: _____
(Signature)

By: _____
(Signature)

(Print name and title)

(Print name and title of
authorized officer)

Attest:

GRANTEE
STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL
PROTECTION AND ENERGY

By: _____
(Signature)

By: _____
(Signature)

(Print name and title)

(Print name and title)

SCHEDULE A

SCHEDULE B

PLACE AND DATE OF ISSUE: NEWARK, N.J. ____ DATE ____
LETTER OF CREDIT NO. _____

*****DIRECT*****

APPLICANT:
PUBLIC SERVICE ELECTRIC AND GAS COMPANY
TREASURER'S CASH MANAGEMENT (6B)
PO BOX 570, NEWARK, NJ 07101

BENEFICIARY:
COMMISSIONER
NEW JERSEY DEPARTMENT OF
ENVIRONMENTAL PROTECTION AND
ENERGY, CN 028, TRENTON,
NEW JERSEY 08625

AMOUNT: USD _____
(AND 00/100)

ATTENTION: ASSISTANT DIRECTOR, DIVISION OF FISH, GAME AND WILDLIFE

RE: NJPDES Permit No. NJ0005622
Salem Generating Station

SIR OR MADAM:

WE HEREBY ESTABLISH OUR IRREVOCABLE STANDBY LETTER OF CREDIT NO. _____ IN
YOUR FAVOR, AT THE REQUEST AND FOR THE ACCOUNT OF PUBLIC SERVICE ELECTRIC AND
GAS COMPANY ("PSE&G"), 80 PARK PLAZA, NEWARK, NEW JERSEY 07101, UP TO THE
AGGREGATE AMOUNT OF _____ U.S. DOLLARS (\$ _____) AVAILABLE UPON
PRESENTATION BY YOU OF:

(1) YOUR SIGHT DRAFT, BEARING REFERENCE TO THIS LETTER OF CREDIT NO.
_____, AND

(2) YOUR SIGNED STATEMENT READING AS FOLLOWS: "I CERTIFY THAT A FAILURE
HAS OCCURRED UNDER AND, ACCORDINGLY, THE AMOUNT OF THE DRAFT IS PAYABLE
PURSUANT TO THE PROVISIONS OF PARAGRAPH H.7 OF PART IV-B/C OF NJPDES
PERMIT NO. NJ0005622.

THIS LETTER OF CREDIT IS IRREVOCABLE AND ISSUED FOR A PERIOD OF AT LEAST ONE
(1) YEAR. THIS LETTER OF CREDIT IS EFFECTIVE AS OF _____ AND SHALL
EXPIRE ON _____, BUT SUCH EXPIRATION DATE SHALL BE AUTOMATICALLY
EXTENDED FOR A PERIOD OF ONE (1) YEAR AND ON EACH SUCCESSIVE EXPIRATION DATE
UNTIL _____ WHEN IT SHALL EXPIRE. ISSUER MAY TERMINATE THIS LETTER OF
CREDIT IF AT LEAST 120 CALENDAR DAYS BEFORE THE EXPIRATION DATE, WE NOTIFY BOTH
YOU AND PSE&G BY CERTIFIED MAIL THAT WE HAVE DECIDED NOT TO EXTEND THIS LETTER
OF CREDIT BEYOND THE THEN CURRENT EXPIRATION DATE. IN THE EVENT YOU ARE SO
NOTIFIED, ANY UNUSED PORTION OF THE CREDIT SHALL BE AVAILABLE UPON PRESENTATION

DRAFT - FOR DISCUSSION PURPOSES ONLY

SIGHT DRAFT AS DEFINED ABOVE FOR 120 CALENDAR DAYS AFTER THE DATE OF RECEIPT BY BOTH YOU AND PSE&G AS SHOWN ON THE SIGNED RETURN RECEIPTS.

WHENEVER THIS LETTER OF CREDIT IS DRAWN ON UNDER AND IN COMPLIANCE WITH THE TERMS OF THIS CREDIT, WE SHALL DULY HONOR SUCH DRAFT UPON PRESENTATION TO US, AND WE SHALL DEPOSIT THE AMOUNT OF THE DRAFT DIRECTLY INTO THE STANDBY TRUST FUND OF PSE&G IN ACCORDANCE WITH YOUR INSTRUCTIONS.

THIS LETTER OF CREDIT IS SUBJECT TO THE UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDITS (1983 REVISION), INTERNATIONAL CHAMBER OF COMMERCE PUBLICATION NUMBER 400 OR THE UNIFORM COMMERCIAL CODE.

VERY TRULY YOURS,

FIRST FIDELITY BANK, N.A., NEW JERSEY

NAME:

TITLE:

TRUST AGREEMENT

This Trust Agreement, ("Agreement"), entered into as of _____ 1993, by and between Public Service Electric and Gas Company, known as the "Grantor", and _____, known as the "Trustee".

Whereas, the New Jersey Department of Environmental Protection and Energy, ("NJDEPE"), an agency of the State of New Jersey, has issued a surface water discharge permit (NJPDES Permit No. NJ0005622, dated _____) to Grantor for the Salem Generating Station, which requires, in pertinent part, that Grantor will implement certain Special Conditions more specifically described as H.3 through H.6 of Part IV-B/C of the NJPDES Permit NJ0005622;

Whereas, the NJPDES Permit No. NJ0005622 further provides, in pertinent part, for the issuance by Grantor of a Letter of Credit and the establishment of a trust fund to assure the availability of funds to secure the performance of Grantor's obligations under Special Conditions H.3 through H.6 of Part IV-B/C of the NJPDES Permit No. NJ0005622, all as more specifically described in Special Conditions H.7 of the Permit; and,

Whereas, the Grantor, acting through its duly authorized

officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee.

Now, Therefore, the Grantor and the Trustee agree as follows:

Section 1. Definitions

As used in this Agreement:

- (a) The term "Grantor" means PSE&G and any successors or assigns of the Grantor.
- (b) The term "Trustee" means the Trustee who enters into the Agreement and any successor Trustee, who has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or New Jersey agency. The name, address, and title of the Trustee is:
- (c) The term "Commissioner" means the Commissioner of the New Jersey Department of Environmental Protection and Energy.
- (d) The term "Beneficiary" means the New Jersey Department

of Environmental Protection and Energy.

- (e) The term "NJDEPE" means the New Jersey Department of Environmental Protection and Energy.

Section 2. Identification of Project

This Agreement pertains to Special Conditions H.3 through H.6 of NJPDES Permit No. NJ0005622.

Section 3. Establishment of Fund

The Grantor and the Trustee hereby establish a trust fund, the "Fund", for the benefit of NJDEPE. The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. The Fund will be established initially with a deposit of One Hundred Dollars (\$100.00). This deposit of monies and any other deposit of monies subsequently transferred to the Trustee is referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as herein provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by the NJDEPE.

Section 4. Payments

The Trustee shall make payment(s) from the Fund as the NJDEPE Commissioner shall direct, in writing, to make payment for costs of performing Grantor's obligations under Special Condition H.3 through H.6 of Part IV-B/C of NJPDES Permit No. NJ0005622.

Section 5. Payments Comprising the Fund

Payments made to the Trustee for the Fund shall consist of cash or cash equivalents.

Section 6. Trustee Management

The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income. In investing, reinvesting, exchanging, selling and managing the Fund, the Trustee shall discharge his/her duties with respect to the Trust fund solely in the interest of the beneficiary and with the care, skill, prudence and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

- (i) Securities or other obligations of the Grantor, or any other owner or operator of the facilities or any of their affiliates, as defined in the Investment Company

Act of 1940, as amended, 15 U.S.C. 80a-2(a), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

- (ii) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal or State government; and
- (iii) The Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment

The Trustee is expressly authorized in its discretion:

- (a) To transfer from time to time any or all of the assets of the Fund to any common, commingled or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and
- (b) To purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C.

80a-1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee

Without in any way limiting the powers and discretion conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

- (a) To sell, exchange, convey, transfer or otherwise dispose of any property held by it, by public or private sale. No person dealing with the Trustee shall be bound to see to the application of the purchase money or to inquire into the validity or expedience of any such sale or other disposition;
- (b) To make, execute, acknowledge and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;
- (c) To register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in

other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depository with other securities deposited therein by another person or to deposit or arrange for the deposit of any securities issued by the United States Government or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all securities are part of the Fund;

- (d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal or State government; and
- (e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses

All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of

this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation

The Trustee shall annually, at least 30 calendar days prior to the anniversary date of establishment of the Fund, furnish to the Grantor and to the NJDEPE a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 calendar days prior to the anniversary date of establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 calendar days after the statement has been furnished to the Grantor and the NJDEPE shall constitute a conclusively binding assent by the Grantor, barring the Grantor from asserting any claim or liability against the Trustee with respect to matters disclosed in the statement.

Section 11. Advice of Counsel

The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any questions arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

Section 12. Trustee Compensation

The Trustee shall be entitled to reasonable compensation for its services, as agreed upon in writing from time to time with the Grantor.

Section 13. Successor Trustee

The Trustee may resign or the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason, the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the Trust in a writing sent to the Grantor, the NJDEPE and the present Trustee by certified mail 10 calendar days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee

All orders, requests and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are designated in the attached Schedule. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests and instructions. All orders, requests, and instructions by the NJDEPE to the Trustee shall be in writing, signed by the NJDEPE Commissioner or his/her designee and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or NJDEPE hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests and instructions from the Grantor and/or NJDEPE, except as provided for herein.

Section 15. Amendment of Agreement

This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee and the NJDEPE or by the Trustee and the NJDEPE if the Grantor ceases to exist.

Section 16. Irrevocability and Termination

Subject to the right of the parties to amend this Agreement, as

provided in Section 15, this Trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee and the NJDEPE or of the Trustee and the NJDEPE, if the Grantor ceases to exist. Upon termination of the Trust, all remaining Trust property, less final Trust administration expenses, shall be delivered to the Grantor.

Section 17. Immunity and Indemnification

The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this Trust or in carrying out any directions by the Grantor or the NJDEPE issued in accordance with this Agreement. The Trust shall be indemnified and saved harmless by the Grantor or the Trust Fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 18. Choice of Law

This Agreement shall be administered, construed and enforced according to the laws of the State of New Jersey.

Section 19. Interpretation

As used in this Agreement, words in the singular include the

plural and words in the plural include the singular. The descriptive headings for each Section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

In Witness Whereof the parties have caused this Agreement to be executed by their respective officers, duly authorized, and their corporate seals to be hereunto affixed and attested, as of the date first above written:

Public Service Electric & Gas Company

ATTEST:

Assistant Secretary

ATTEST:

Vice President and Trust Officer

SCHEDULE