19

CARMINE T. PERRAPATO
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COMMISSIONERS

PASSAIC VALLEY SEWERAGE COMMISSIONERS
600 WILSON AVENUE
NEWARK, N.J. 07105
(201) 344-1800

SEYMOUR A. LUBETKIN
CHIEF ENGINEER

JAMES V. SEGRETO
CHIEF COUNSEL

MRS. CHARLES T. SCHAEDEL
CLERK-TREASURER

January 21, 1976

Mr. C. E. Maginn, Jr.,
Division Superintendent - Essex
Electric Transmission and Distribution
Public Service Electric and Gas Co.
938 Clinton Avenue
Irvington, New Jersey 07111

Dear Mr. Maginn:

On Wednesday, January 14, 1976, while conducting a routine inspection to Lawyer's Ditch, a tributary of the Passaic River adjacent to the Public Service Essex Generating Station, PVSC Inspectors encountered employees of the Distribution Division of Public Service pumping an oily type material out of a manhole onto the ground. This liquid formed a large puddle and began slowly seeping into the ground adjacent to Lawyer's Ditch, which was about 75 feet from the manhole. Besides the material reaching the ditch via seepage, that residue which remains on the surface will reach the stream during each storm and therefore PVSC deem this as an unacceptable method of disposal by Public Service.

In the past this type of operation had been called you your attention and, in fact, we have a letter on file from you dated June 19, 1975 which informed us that your manhole cleaning truck will discharge into your skimming facilities located in Irvington and at your Roseland Switching Station.

Mr. D'Ascensio contacted your Mr. Ray Fernandez, who was the Station Engineer of the Essex Generating Station located adjacent to this area, and complained of this operation.

Mr. Rutledge of the Essex Distribution Division called Mr. D'Ascensio on January 19 at approximately 10:40 A.M. and explained that the normal method for removing liquids from the manhole was to pump this material into a tank truck, discharging it subsequently into your oil skimming facilities as previously explained by you. Mr. Rutledge then assured Mr. D'Ascensio that the Essex County Distribution Division was aware of this requirement, but that the occurrence of January 14 was caused by the Hudson County Division personnel who were not aware of this prohibition. Mr. Rutledge then stated that subsequently all personnel concerned had been informed of the prohibition and that he would notify PVSC in writing to that effect.

Later on, just before noon on January 19, while Mr. D'Ascensio was rechecking the area, he encountered another Public Service truck which had just completed pumping out a different manhole in that area, and Mr. D'Ascensio noticed evidence of oil in the street. Upon questioning the drivers, they admitted that they had pumped the residue from the manhole to the street.

It is obvious that this method of cleaning manholes causes pollution of our streams, if not immediately in some cases, then subsequently after the first rain, and I believe it is imperative that Public Service enact a more firm policy than has been enacted in the past, to see that the methods which you have indicated are provided for, are truly enforced.

Please reply to this letter informing PVSC as to exactly what is being done so as to insure that this type of violation which we have observed will not be repeated again within the PVSC district.

Very truly yours,

PASSAIC VALLEY SEWERAGE COMMISSIONERS

S. A. Lubetkin

S. A. Lubetkin,
Chief Engineer

SAL/kl
Certified Mail
Mr. Rutledge - Essex Distribution Division
Mr. McAlpine - Hudson Distribution Division
P.V.S.C.
Messrs. Segreto, D'Ascensio, Goldberg, Cuccinello

U.S. Department
of Transportation

**United States
Coast Guard**

Captain of the Port
U. S. Coast Guard

Governors Island
New York, NY 1004
Tel: (212) 668-7920

16465

PSE+G ESSEX GENERATING STATION
155 RAYMOND BLVD
NEWARK NJ 07105

Gentlemen:

This is to inform you that a pollution incident was discovered at PSE+G ESSEX GENERATING STATION on 28 JAN 198 91 for which your ~~vessel~~/facility may be considered responsible. Under Federal Statutes, the United States Government has an interest in this incident and further, may take appropriate action to minimize any damage which may be caused by this pollution.

The discharge of a harmful quantity of oil is a violatin of the Federal Water Pollution Control Act, as amended (33 USC 1161). Under this Act, you are responsible for taking proper action to remove the pollutant and adequately mitigate its effect. Removal is being done properly if it is in accordance with Federal Statutes and regulations and the procedures and criteria of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300). The adequacy of your actions shall be determined by the U. S. Coast Guard on Scene Coordinator, Captain R. C. NORTH or his representative. As long as you are taking adaquate action in this matter, Federal action will be to monitor progress of cleanup activities as well as to provide guidance as necessary.

If it is determined that you are not taking prompt and appropriate actions to contain, cleanup, and dispose of the pollutants, Federal response may be initiated. Your ~~vessel~~/facility will be held responsible for all costs incurred by the Federal Government as set forth in Section 311(f) of the Fedral Water Pollution Control Act. Should you require further information concerning this matter, you should contact the Pollution Response Office at (212) 668-7920.

Sincerely,
Christopher S [illegible]

Received, this 28 day
of JAN, 198 91 by:
Russell [illegible], CHMM

COTPNY-13 (Rev 7-87)

HWM 00MC
1/90

CASE NO. 91-01-28-1450

New Jersey Department of Environmental Protection
Division of Hazardous Waste Management
2 Babcock Place
West Orange, N.J. 07052
(201) 669-3960

NOTICE OF VIOLATION

DATE 1/31/91

ID NO. ____________

NAME OF FACILITY PSE&G / Essex Generating Station

LOCATION OF FACILITY 155 Raymond BLVD, Newark, ESSEX

NAME OF OPERATOR MR. RUSS FURNARI

You are hereby NOTIFIED that during my inspection of your facility on the above date, the following violation(s) of the Solid Waste Management Act, (N.J.S.A. 13:1E-1 et seq.) and Regulations (N.J.A.C. 7:26-1 et seq.) promulgated thereunder and/or the Spill Compensation and Control Act, (N.J.S.A. 58:10-23.11 et seq.) and Regulations (N.J.A.C. 7:1E-1 et seq.) promulgated thereunder were observed. These violation(s) have been recorded as part of the permanent enforcement history of your facility.

DESCRIPTION OF VIOLATION N.J.S.A. 58:10-23.11(c)
Discharge of a hazardous substance is prohibited (Specifically, kerosene from leaking underground fill line)

Remedial action to correct these violations must be initiated immediately and be completed by A.S.A.P. Within fifteen (15) days of receipt of this Notice of Violation, you shall submit in writing, to the investigator issuing this notice at the above address, the corrective measures you have taken to attain compliance. The issuance of this document serves as notice to you that a violation has occurred and does not preclude the State of New Jersey, or any of its agencies from initiating further administrative or legal action, or from assessing penalties, with respect to this or other violations. Violations of these regulations are punishable by penalties of $50,000 per violation.

Michael Walker
Investigator, Division of Hazardous Waste Management
Department of Environmental Protection

Form DWM-051
1/86

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT

Page 1 of 2

INVESTIGATION

CASE #: 91-01-28-1450

DWM FILE #: 07-14-231

TIME ARRIVED: 5:00 PM

INVESTIGATOR: Greulich

DATE: 2/23/91

TIME DEPARTED: 6:00 PM

LOCATION: PSE+G Generating Station

PROPERTY OWNER: PSE+G.

ADDRESS: Raymond Blvd
Newark County - Essex

MAILING ADDRESS:

BLOCK:

LOT:

RESPONSIBLE PARTY

LOCATION TELEPHONE #:

ADDRESS:

EPA ID #:

LOCAL HEALTH DEPT. REP.

TELEPHONE #:

ORIGIN OF COMPLAINT:

TELEPHONE #:

NATURE OF COMPLAINT:

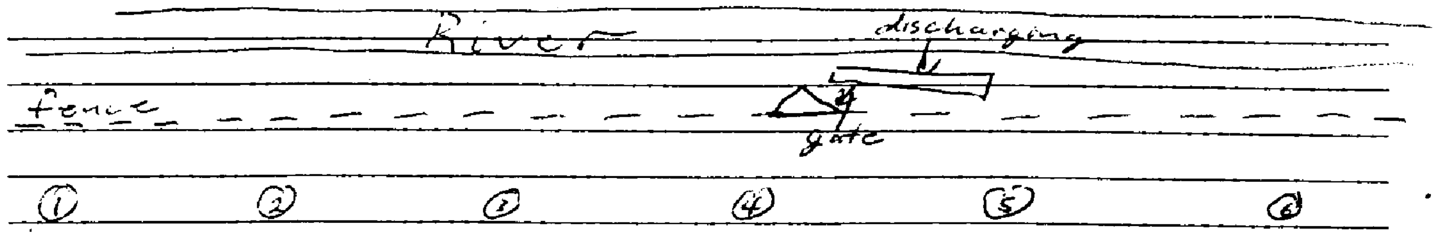
PHOTOGRAPHS TAKEN: N/A

SAMPLE #: N/A

FINDINGS:

As part of the on going remediation of a 13,000 gallon Kerosene discharge at PSE+G generating station in Newark, this office provided • ~~the~~ oversite observers on 2/23 + 2/24. The following are the observations of this writer on 2/23/91.

I arrived at the generating station at 5:00 P.M. and was checked in at gaurd house. Upon arrival I was met by Bob Baldwin of Clean Harbors. The crew was presently removing a ½ inch layer of oil from sump #3. The two end



sumps had a scum film on them with no significate accumulation of product. Sumps 3+4 provided the most significant product recovery. Bob stated that 175 gallons had been recovered on 2/22/91. Any product that continued to discharge

Supervisor Signature

Gary Greulich
Investigator Signature

COPIES: White - DWM File Yellow - Local Health Dept. Pink - Investigator

Form DWM-051 B
1/86

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT

Page 2 of 2

INVESTIGATION

CASE # 91-01-28-1450

DATE 2/23/91

RECOMMENDATIONS AND CONCLUSIONS:

into the river through the shoreline was captured by absorbant booms placed in the water. A hard boom was placed beyond that to trap anything that escaped the absorbant boom.

A walk along the shoreline showed 1 area approximately 10-12 feet wide where some light discharge was still occuring. This was being addressed through the use of absorbant sweep (pads). I instructed Bob to replace the sweeps before ending the days remediation activities. A walk to both ends of the hard boom showed no accumulation of escaping product, with only an occational sheen (spotty) detected outside the absorbant booms.

This site visit concluded at 6:00 PM with the work crews continuing vac-truck operations on the recharging sumps. Recharging at this time has slowed dramaticly and no need was seen for requesting that PSE&G revert back to 24 hr remediation. The current 12 hrs day should be sufficient.

Supervisor Signature

Investigator Signature

COPIES: White - DWM File Yellow - Local Health Dept. Pink - Investigator

343-7222

ON 1/31/91, PSE+G was inspected in response to an I.R. which indicated that ~~a~~ an underground kerosene feed line pipe was found to be leaking. ARRIVING at the site I met with MR. Russel Furnari, an Environmental Engineer for P.S.E+G who accompanied me on a tour of the facility.

MR Furnari confirmed all of the information on the I.R. He further stated that on 1/28/91, the U.S. Coast Guard had contacted him requesting that he check his facility's pipes for possible ~~tel pipe~~ oil leakage. The Coast Guard explained that the Passaic River ~~had~~ was experiencing heavy oil sheening ~~on its surface~~ for the past 24 hours in the area of the river near the PSE+G Generating station. A ~~sub~~ subsequent ~~Search~~ inspection of the PSE+G facility by MR. Furnari revealed ~~a length of contaminated Shoreline~~ a section of shoreline owned by PSE+G ~~being~~ was heavily contamiated with oil which was creating a sheen on the Passaic River.

MR Furnari immedially ordered a shutdown on the kerosene pipe line closest to the River which feeds the 5,000,000 gallon above ground storage

tank on the facility. A close inspection by MR [redacted] Furnari and ~~ot~~ other PSE&G plant employees of the above ground section [of the pipe] did not turne~~d~~ up any ~~no~~ evidence of leaking oil. Excavation was then started on a ~~at~~ ~~the~~ 17' segment of underground pipe. This incidently is the only portion of the ~~entire~~ pipeline that ~~is~~ that is underground. At the depth of approx 4 feet pure product was found within close proximity of the underground pipe.

07-14-441

3/27/91
MP
Yacous
please
coordinate
w/ DWR &
advise me

STATE OF NEW JERSEY
DEPARTMENT OF LAW AND PUBLIC SAFETY
OFFICE OF THE ENVIRONMENTAL PROSECUTOR

RECEIVED
MAR 26 1991
HAZARDOUS WASTE
ENFORCEMENT
H3-257

MEMORANDUM

TO: James Hamilton, Assistant Director for Enforcement
Division of Water Resources

Wayne Howitz, Assistant Director for Enforcement
Division of Hazardous Waste Management

FROM: Kevin P. Moynahan KPM
Assistant State Environmental Prosecutor

RECEIVED
APR 4 1991

DATE: March 20, 1991

SUBJECT: PSE&G - Essex Generating Station
OEP #446

Attached is an investigation report from the New Jersey Marine Police concerning a discharge on February 2, 1991 of Kerosene from the PSE&G facility to the Passaic River.

This Office is forwarding the information to your respective enforcement elements so that the NJDEP may take any appropriate enforcement actions against PSE&G and/or any other parties responsible for this discharge, if the NJDEP has not done so already.

I would appreciate being directly copied on any enforcement actions your elements may take in this matter.

If there is a need to discuss this further, please contact me at 2-3924.

/ju
attachment
c: Steven J. Madonna, State Environmental Prosecutor
Thomas F. Flanagan, Administrator

NEW JERSEY STATE POLICE **INVESTIGATION REPORT**

UCR Case Status:

1. Station Unit Newark Bay	2. Code F010	3. Area Code, Phone Number and Extension 201-578-8173	4. Prosecutor's Case Number	5. Division Case Number F0109120

6. Crime/Incident: Pollution (Kerosene)

7. N.J.S.A.: 23:5-28

8. Weather: Clear

9. Domestic Violence: Yes: No: X

10. Bias Incident: Yes: No: X

11. Drugs: Yes: No: X

Date & Time	12. Between	13. Hour	14. Day & Code	15. Month	16. Date	17. Year
At	X	7:48 AM	Sat. 7	2	2	91

18. Crime/Incident Location: Passaic River - 155 Raymond Blvd.

19. Municipality Newark	20. County Essex	21. Code 0714	22. Type of Premises Gas Distributors	23. Code 41	24. Weapons/Tools N/A	25. Code N/A

26. Victim (First, Middle, Last): State Of New Jersey

27. Victim's Complete Address:

Area Code, Phone Number and Extension:

28. Social Security Number:

29. D.O.B.:

30. Sex:

31. Race Code:

32. Victim's Employer, City, State:

Area Code, Phone Number and Extension:

33. Person Reporting Crime/Incident: MPO James Stewart 9624 NJSP MLEB

34. Complete Address and Phone Number: 400 Corbin St. Port Newark, N.J. 07114 201-578-8173

35. Date and Time Reported: 2-2-91 7:48AM

36. Modus Operandi/How Committed: Leak in underground pipe allowed Kerosene to enter N.J. State waters.

37. Vehicle	38. Year	39. Make and Model	40. Body Type	41. Color	42. Registration No. & State	43. V.I.N. or Distinguishing Marks

VALUE STOLEN PROPERTY	44. Currency	45. Jewelry	46. Furs	47. Clothing	48. Motor Vehicle	49. Miscellaneous	50. Total Value Stolen	51. Total Value Recovered
	N/A	N/A	N/A	N/A	N/A	N/A		

52. Alarm Number/Year:

53. Technical Services:

54. Technician:

55. Technician's Agency:

56. Chemical Lab. Number:

57. Ballistics Lab. Number:

58. Alcohol Involved: Yes: No: Unk.

59. Other Drugs Involved: Yes: No: Unk.

63. VCCB Information and Phone Number Provided (1-800-242-0804): Yes: No: X N/A:

60. Evidence: None X

	Yes	No
NJSP - SBTS		
Retained		
Returned		
Destroyed		

61. Status of:	Yes	No
Arrest Report Pending		X
Prop./Veh. Report Pend.		X
Alarm Pending		X
Evidence Pending		X

62. MV Summons/Warning Number:

Statute Number:

64. No. Arrests/Summ.	65. Adult	66. Juvenile	67. Status Crime	68. Status Case	69. DD Case Number	70. Accident Case Number
0	0	0	Active	Invest.		

List Arrested/Summoned — List and Identify Additional Victims — Describe Perpetrators/Suspects — Date Action Taken, Include Findings and Observations of Investigator — Physical Evidence Found — Where, by Whom — Disposition and Technical Services Performed — Interview of Victims, Witnesses, Persons Contacted — Suspects — Attach Victim Property Loss Report — Attach Statements — Court Action — All NCIC Entry/Inquiries — Prisoner Disposition.

71. Name/Address of Arrested, Summoned 72. Criminal Complaint Warrant/Summons No. 73. Age 74. Sex 75. Race Code 76. D.O.B.

February 2, 1991 ; This date the undersigned along with MPO Langill 9706 and MPO Repsha 9754 were on patrol in the area of the Passaic River in Newark. This officer observed a sheen on the waters surface 100 feet from shore of PSE&G Essex Generating Station 155 Raymond Blvd. Newark, N.J. 07105, 201-430-8964. Also it was observed that from the Rt. 1&9 Skyway, the area had in place a containment boom stretched along the shoreline northward for approximately 100 yards. On approach to the boom I observed that the product inside of the boom was escaping with the inbound tide. On scene, I then spoke with Chris Cieslarczyk of Clean Harbors Inc. 201-805-9355, 250 Lackland Dr. Middlesex, N.J. 08846. Mr. Cieslarczyk advised, that on January 28, 1991 PSE&G had requested their services to contain and clean the area due to an underground pipe leaking kerosene. I was further advised that Clean Harbors had arrived at approximately 5:00 PM on 1-28-91, and since that date to 2-2-91 they had recovered approximately 15,000 gallons of mixed water and kerosene of which 6,000 gallons were kerosene.

77. Rank/Name (Print or Type)	78. Badge No.	79. Page	80. Date of Report	81. Reviewer & Badge Number
MPO James Stewart	9624	1 of 2	2-2-91	

82.

83.

NEW JERSEY STATE POLICE

CONTINUATION PAGE

Station Unit	Code	Prosecutor's Case Number	Division Case Number
Newark Bav	F010		F0109120

On land approximately 20 feet from shore, this officer observed in an excavation ditch six feet deep a 12 inch pipeline with ground water around it and what was identified as kerosene patches floating on top of the ground water. Clean Harbors had a siphon hose at the waters surface skimming water and kerosene which was still seeping in from ground saturation and tide water. I was further advised by Mr. Cieslarczyk that approximately 10,000 to 12,000 gallons of kerosene had leaked from the pipeline.

On scene, I then met with PSE&G shift supervisor Manuel Sargo. Mr. Sargo advised that on Saturday January 26, 1991 the USCG of NY had been checking the river for a source from a sheen on the water, but could not locate it. PSE&G personel had discovered the leak on Monday January 28, 1991 at approximately 11:00 AM. The USCG was contacted, who then issued paperwork for Rules #13 and Observations #15. The NJ DEP was contacted, Division of Waste Management Mike Walker responded, who issued a notice of violation Case#91-01-28-1450, (201)669-3960. This officer then contacted the USCG Pollution Response (212)668-7920 and the NJ DEP (609)669-3960 via phone to advise that kerosene product was still seeping from out of the ground into the water and escaping out of the boomed area. I was also given a copy of a cleanup proposal by Clean Harbors from Mr. Sargo.

Newark Bay Station Commander SFC E Herkloz was notified, who advised that on January 28, 1991 this station had investigated a sheen on the Passaic River with no source found. See Invest F0109115.
To be continued on 2-4-91.

77. Rank/Name (Print or Type)	78. Badge No.	79. Page	80. Date of Report	81. Reviewer & Badge Number
MPO James Stewart	9624	2 of 2	2-2-91	

Signature X

82.

83.

NEW JERSEY STATE POLICE **SUPPLEMENTARY INVESTIGATION REPORT**

UCR Lease State:
Municipal Code: 0714

Station Unit Newark Bav	Code F010	Area Code Phone Number & Extension 201-578-31 3	Prosecutor's Case Number	Division Case Number F0109120

Crime/Incident Pollution (Kerosene)	Weather N/A	Domestic Violence Yes: No: X	Bias Incident Yes: No: X	Yes: No: X
	Date of Crime/Incident 2-2-91	New Crime/Incident if Changes		New N.J.S.A.

Victim First, Middle, Last: State Of New Jersey

Victim's New Address: Area Code Phone Number & Extension

ADDITIONAL VALUE STOLEN PROPERTY	Currency	Jewelry	Furs	Clothing	Motor Vehicle	Miscellaneous	Total Additional Stolen Property	Total Additional Recovered Property
	N/A	N/A	N/A	N/A	N/A	N/A		

Alarm Number/Year:
Technical Services:
Technician:
Technician's Agency:
Chemical Lab. Number:
Ballistics Lab. Number:
Alcohol Involved: Yes: No: X Unit:
Other Drugs Involved: Yes: No: X Unit:

Evidence: None X

	Yes	No
NJSP S&TS	___	___
Retained	___	___
Returned	___	___
Destroyed	___	___

Status of:

	Yes	No
Arrest Report Pending	___	X
Prop./Veh. Report Pend.	___	X
Alarm Pending	___	X
Evid. Pend.	___	X

Additional MV Sum./Warr. No. & Summons No.

No. Arrested/Summoned	New Arrested/Summoned	Adult	Juvenile	Current Status Crime	Current Status Case
0	1	1	0	Adm. Clr.	Court

Pending 39:4-49.1 or 39:4-51 Summons: Yes: ___ No: X

List Name(s) only of Previous Arrested/Summoned – Complete Information on New Arrested/Summoned – Include Additional Perpetrators – Suspects – Record all Developments Since Last Report – Explain any Crime Change – List Additional Interviews of Victims, Persons Contacted, Witnesses – Evidence – Technical Services – Stolen Property – Recovered Property – Court Action – Prisoner Dispositions – Attach Additional Statements – Attach Additional Victim Property Loss Report Etc

Name/Address of Arrested/Summoned — New Criminal Complaint Warrant/Summons No. — Age — Sex — Race Code

PSE&G Essex Generating Station 155 Raymond Blvd. Newark, N.J. 07105

February 4, 1991 the undersigned issued to PSE&G a Summons #55756, who was found to be in violation of NJSA 23:5-28. Prosecutors Copy of summons was delivered to Essex County Superior Court Special Civil Parts Section and signed in the presence of the County Court Clerk.

Reporting Name (Print or Type) MPO James Stewart	Badge No. 9624	Page 1 of 1	Date of Report 9624	Supervisor / Badge Number 857/ 9536

Signature X

N.J. DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF FISH, GAME & WILDLIFE

Nº 55756 RECORD

☒ Municipal Court
☐ Superior Court
0708
of ESSEX County

DOCKET # ______ RECEIPT # ______ AMT $ ______

STATE OF NEW JERSEY } ss.
COUNTY OF ESSEX

THE UNDERSIGNED CERTIFIES THAT ON 0748

VIOLATION DATE 2	MONTH 2	DAY SAT	YEAR 91	TIME HOUR 7:48	DOB / /

NAME PSE&G ESSEX GENERATING STATION
ADDRESS 155 RAYMOND BLVD.
CITY NEWARK STATE N.J. ZIP CODE 07105 TELEPHONE 201-430-8964

LIC NO. RESIDENT ☐ NONRESIDENT ☐ HUNT ☐ FISH ☐ TRAP ☐ S&A ☐ B.L. ☐ OTHER ☐

EYES ______ SEX ______ WEIGHT ______ HEIGHT ______

YOU ARE HEREBY SUMMONED TO APPEAR PERSONALLY BEFORE THIS COURT AT THE TIME AND PLACE SPECIFIED BELOW TO ANSWER THE FOLLOWING VIOLATION(S):

IN THE MUNICIPALITY OF NEWARK
COUNTY OF ESSEX STATE OF NEW JERSEY

DID UNLAWFULLY VIOLATE THE PROVISIONS OF
N.J.S.A. 23:5-28 N.J.A.C. ______

BY COMMITTING THE FOLLOWING VIOLATION(S):
☐ ______ (Activity) without first procuring the proper license (Fish, hunt, trap, claim).
☐ Fish closed (waters) (season)
☐ While (Hunting) (Fishing) (Trapping) fail to (display) (exhibit) the license number tag issued.
☐ Use while hunting a firearm capable of holding more than three shells.
☐ Have in possession a weapon capable of killing deer while casting the rays of an illuminating device in an area where deer may be found.

OTHER VIOLATION DID Allow KEROSENE TO ENTER N.J. STATE WATERS OF THE PASSAIC RIVER

THE UNDERSIGNED FURTHER STATES THAT HE HAS JUST AND REASONABLE GROUNDS TO BELIEVE AND DOES BELIEVE THAT THE PERSON NAMED HEREIN COMMITTED THE OFFENSE(S) HEREIN SET FORTH CONTRARY TO LAW.

DATE 2-4-91 MO J. Stewart 9624
Signature and identification of Conservation Officer or other complainant, to be signed when issuing summons

SUBSCRIBED AND SWORN TO
BEFORE ME THIS ______ DAY
OF ______ 19 ______
Signature of complainant, to be signed when taking oath

COURT APPEARANCE REQUIRED TO BE NOTIFIED
COURT APPEARANCE [illegible] DAY OF [illegible]
COURT ADDRESS [illegible] SUPERIOR COURT SPECIAL CIVIL PART
[illegible] BLVD. 201-[illegible]

DISPOSITION OF CASE

ADJOURNMENTS: (Dates)
TO ______ REASON ______
TO ______ REASON ______

BAIL: AMOUNT $ ______ ☐ CASH ☐ BOND
POSTED WITH (Name & Title) ______
☐ FORFEITURE: AMOUNT $ ______ DATE ______

DISPOSITION DATE ______ BY: ☐ Court or ☐ Viol. Bu

PLEA ______ FINDING ______

SENTENCE: FINE $ ______ COSTS $ ______
JAIL ______ DAYS ______
OTHER ______

OFFICER'S COMMENTS
(See Instructions on Cover)

SUBPOENA ISSUE

WITNESSES: (Name and Address) YES NO
1. ______ ☐ ☐
2. ______ ☐ ☐

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

RESPONSE TO USEPA
APRIL 30, 1996
REQUEST FOR INFORMATION

ESSEX GENERATING STATION

DATED: AUGUST 13, 1996

1.0 Background

1.1 Introduction

The United States Environmental Protection Agency ("USEPA") served Public Service Electric and Gas Company ("PSE&G") with a Request For Information Diamond Alkali Superfund Site, Passaic River Study Area, dated April 30, 1996 under the Comprehensive Environmental Response, Compensation and Liability Act of 1998, as amended, 42 U.S.C. Section 9601 et seq. ("Request For Information"). By this Request For Information, USEPA seeks information and records concerning industrial operations conducted at two PSE&G facilities: the former Harrison Gas Plant in Harrison, New Jersey, and the Essex Generating Station in Newark, New Jersey.

PSE&G's response to this Request For Information was originally scheduled to be provided to USEPA within thirty calendar days of receipt of same. USEPA has extended the time for the submission of this response until August 13, 1996.

PSE&G has prepared this submission as its response to the Request For Information. PSE&G submits that this submission is responsive and, further, it commits to make all relevant records referenced herein available for inspection at the USEPA's request. PSE&G wishes to apprise USEPA of certain background information to consider in connection with evaluating this response.

Industrial operations at the Harrison Site commenced in 1902. Initially, the Site was used as a satellite storage facility for a manufactured gas plant. In 1926, construction of a manufactured gas plant was completed at the Site and commercial operations of this facility began. Base load gas manufacturing operations ceased in 1965. Thereafter, the Site was utilized as a peak-shaving facility operating on average approximately 100 hours per year. Peak-shaving operations were generally terminated after the 1986/87 winter. The gas plant has been dismantled. After operations ceased, there was no concerted effort made to preserve or maintain Plant operating records.

A steam electric generating station commenced commercial operations at the Essex Site in 1915. A substantial portion of the steam generating facility was removed from service in the early 1970s and the entire steam plant was removed from service in 1978. The steam plant was dismantled in 1990. The Site still houses a fleet of combustion turbines which generate electricity on peak demand days in the summer and winter. After steam electric generating operations ceased there was no concerted effort made to preserve or maintain Station operating records.

PSE&G has attempted in good faith to locate and review documents potentially relevant and responsive to the Request For Information. The absence of any organized records has made this task extremely difficult. This difficulty has been compounded by the long history of the operations, the nature and scope of the Request For Information and the limited period within which to respond. This response should be considered in this context. PSE&G recognizes its continuing obligation to supplement this response if information not known or not available as of the date of this response should later become known or available to it.

Finally, PSE&G advises USEPA that this response was prepared by a team of PSE&G employees with assistance from certain external resources. A Project Manager was designated to coordinate its response to the Request for Information for each facility and each Project Manager worked with a small team including Company counsel to prepare a response for that facility. The Project Manager for each such facility is designated as the knowledgeable person for such facility and has executed the required certification.

1.2 Corporate History

Public Service Enterprise Group Incorporated ("Enterprise") was incorporated in 1985 under the laws of the State of New Jersey. Its principal executive offices are located at 80 Park Plaza, Newark, New Jersey 07101. It is a public utility holding company that neither owns nor operates any physical properties. A copy of the Certificate of Incorporation of Enterprise is produced herewith as Appendix A. Enterprise has two direct wholly-owned subsidiaries, Public Service Electric and Gas Company ("PSE&G") and Enterprise Diversified Holdings Incorporated ("EDHI"). Enterprise's principal subsidiary, PSE&G, is an operating public utility engaged principally in the generation, transmission, distribution and sale of electric energy service and in the transmission, distribution and sale of gas energy service in New Jersey. The agent for service of process for PSE&G is E. J. Biggins, Jr., Corporate Secretary.

PSE&G was formed in 1924 by the merger, inter alia, of the Public Service Gas Company and the Public Service Electric Company. The Public Service Gas Company and the Public Service Electric Company were also New Jersey corporations organized in 1873 and 1910, respectively. Both entities were, at the time of the merger, wholly owned subsidiaries of The Public Service Corporation, a New Jersey corporation organized in 1903. PSE&G was, as a result of the merger, and remained until 1948, a wholly owned subsidiary of The Public Service Corporation. The Public Service Corporation was dissolved in 1948 and as part of the Plan for Dissolution, PSE&G became a publicly owned utility.

EDHI is the parent of Enterprise's non-utility businesses: Community Energy Alternatives Incorporated ("CEA"), an investor in and developer and operator of cogeneration and independent power production facilities; Public Service Resources Corporation ("PSRC"), which makes primarily passive investments; Enterprise Group Development Corporation ("EGDC"), a diversified nonresidential real estate development and investment business; PSE&G Capital Corporation ("Capital"), which provides debt financing on the basis of a minimum net worth maintenance agreement from Enterprise; and Enterprise Capital Funding Corporation ("Funding"), which provides privately placed debt financing.

Enterprise Form 10-K for the year ended 1995 is enclosed as Appendix A.

2.0 General Site Development

Section 2.0 provides general information relating to the Essex Generation Station's ("Station" or "Essex") location, property acquisition history and Station infrastructure.

2.1 Site Location

The Station is located in Newark, New Jersey on the west shore of the Passaic River immediately north of the Pulaski Skyway at a river location commonly referred to as "Point No Point" (see Figure 2.1). The street address is 155 Raymond Boulevard.

2.2 Site Ownership

The lands comprising the site of the Station were purchased in a series of transactions over a number of years. Figure 2.2 presents a summary of these transactions. Available conveyance instruments are available for inspection.

2.3 Station Infrastructure

Essex began operation in 1915 with four low pressure stoker boilers and two, 22,500 kilowatt ("kW") turbine/generators. In 1916, four additional low pressure stoker boilers were added. Four more low pressure stoker boilers and a 40,000 kW turbine/generator were installed in 1918. Four more low pressure stoker boilers were added in 1919. Three identical 36,000 kW turbine/generators and eight additional low pressure stoker boilers were installed by 1924 - completing the initial phase of Station construction. As of 1924, the Station was comprised of twenty-four low pressure stoker boilers and six turbine/generators with a combined capacity of 193,000 kW. The low pressure stoker boilers were originally equipped to burn only coal.

The Station also contained electric distribution switching equipment. The switching equipment included buses, oil circuit breakers, transformers, physical disconnect switches and transmission and distribution line connections. Circa 1925, the Station became a key feeder point within the Company's then existing high voltage transmission system. To accommodate this new operation, additional switching equipment was installed.

In 1937, eight of the low pressure stoker boilers were removed and replaced with two high pressure boilers ("Nos. 25 & 26"). The two new boilers were designed to burn both coal and oil as fuel. One turbine/generator (known as "Unit No. 7") was also added. This equipment increased Station capacity by 50,000 kW. Low pressure (225 psi) exhaust steam from Unit No. 7 was not condensed but was fed to the main low pressure steam header and then directed to the existing low pressure turbine/generator units to produce an additional 70,000 kW of electricity.

In 1946, the original Unit No. 1 turbine/generator was retired along with four low pressure stoker boilers. A new 100,000 kW turbine/generator, high pressure boiler combined unit was installed in 1947. The new boiler (referred to as the "New Unit No. 1") provided steam to its dedicated turbine/generator. This boiler was designed to burn coal, oil or gas. With the addition of the New Unit No. 1, the Station possessed its largest electric steam driven generating capacity of 320,500 kW.

A major reconstruction of the electrical switching operation was completed by 1940. Additional switching equipment was installed at the Station in 1946, 1950, 1970 and 1991 to upgrade switching operations to handle increased electric power routed through the Station for distribution to customers.

Commencing in the early 1970s, the Station began a phase-out of its steam-powered electric generation. The last steam unit was removed from service in 1978 and the steam Station was demolished in 1991.

Commencing in 1963, combustion turbine peaking units were installed at the Station to provide supplemental generating capacity during peak periods of demand. Combustion turbines are pre-fabricated, self-contained electric generating units which combust fuel (low sulfur distillate oil or natural gas) producing exhaust gases that drive a coupled turbine/generator to produce electricity. The first unit (known as "Unit No. 8") commenced operations in 1963. Four additional units were installed, three in 1971 (known as "Units Nos. 9 through 11") and a fourth in 1972 (known as Unit No. 12). As of 1972, the Station reached combustion turbine electric generating capacity of 585,333 kW (nameplate rating).

In 1980, combustion turbine Unit No. 8 was removed from service. In 1990, Unit No. 9 was replaced with a new combustion turbine unit ("New Unit No. 9") with an electric generating capacity of 90,000 kW, the same capacity as former Unit No. 9. Four combustion turbine units remain in service today with a combined total capacity of 664,333 kW (nameplate capacity).

Available engineering drawings of Station generating and auxiliary equipment are available for inspection. Figures 2.3 through 2.7 depict the layout of the Station as of 1925, 1940, 1951, 1974 and 1996.

3.0 Site Processes and Related Operations

Section 3.0 provides a description of the electric generation processes as well as auxiliary and maintenance processes used at the Station over its operating life. Information relative to the raw materials used and the residuals generated is also provided.

This section has been prepared from, among other things, information contained in various available Plant records and relevant corporate history references. In addition, the Electric Power Research Institute "Power Plant Integrated Systems: Chemical Emissions Studies" has been referenced to identify and characterize many of the materials utilized and generated at the Plant.

3.1 Low Pressure Turbine/Generators and Boilers

This section presents a discussion of the electric generation process and auxiliary processes involved with the generation of electricity using low pressure boilers and turbine/generators. A process flow diagram is provided as Figure 3.1.

3.1.1 Process Description

The Station's initial electric generation process began in 1915 using a combination of Babcock & Wilcox wet bottom underfeed, coal fired, low pressure stoker boilers and General Electric turbine/generator units. By 1924, twenty additional boilers and four additional turbine/generator units were installed. The six turbine/generators were all housed in the turbine building and the 24 low pressure boilers were housed in three integrated sections, without separating walls within the boiler house in sets of eight to a section. Table 3.1 provides the operating parameters for the low pressure boilers and turbine/generator units. Table 3.2 lists the raw materials used in both the generation and auxiliary processes at Essex.

Steam was generated by burning coal, fed into the boiler at the bottom of the furnace by stokers. City water was heated in the boiler to an approximate temperature of 545° F, creating steam at a pressure of 225 pounds per square inch ("psi"). City water was treated with chemicals prior to use in the boiler to prevent boiler tube internal scaling and corrosion which adversely affected boiler tube heat transfer efficiency and created the potential for boiler tube overheating. The boilers were equipped with forced draft and induced draft fans. The forced draft fans supplied air via a duct to the boiler from the bottom of the furnace. The induced draft fans at the top of the boiler provided draft which facilitated movement of combusted (heated) gases within and through the boiler. The heated combustion gases passed around the boiler tubes to heat the boiler feedwater in the boiler tubes to produce steam. A fire brick baffle in each of the boilers forced the heated combustion gases to turn and pass around the boiler tubes several times before exiting the boiler through the stack. The residual combusted gases were exhausted to the atmosphere. This boiler design optimized heat transfer and reduced particulate emissions, as materials trapped in the combustion gases tended to drop to the furnace floor.

Low pressure steam generated in the boilers was delivered to the turbines by means of carbon steel pipelines and expanded through the turbines. Each turbine was comprised of a series of blades attached to a hardened steel shaft. Low pressure steam expanded against the turbine blades and caused the turbine shaft to rotate at a rate of 1800 revolutions per minute ("rpm"). Each generator rotor, which consisted of a hardened steel shaft and a series of copper conductors, was directly coupled to the turbine shaft and thus rotated at the same speed as the turbine. The generator rotor rotated inside a stator, consisting of a series of copper windings, which produced an electromagnetic field resulting in generation of electric power.

The steam exited the turbine under vacuum entering the water-cooled condenser located directly below the turbine. The steam was condensed, and the condensate was pumped to a surge tank from where it was gravity fed to boiler feed pumps for reuse in the electric generation process. The non-contact cooling water used to condense the process steam was withdrawn from the Passaic River through an intake canal, passed through the condenser, and discharged back to the Passaic River via a discharge canal.

Circa 1933, oil burners were installed in the low pressure boilers. By 1949, all the remaining low pressure boilers were converted to oil, thus eliminating the use of coal stokers. Eight low pressure boilers were removed from service and dismantled in 1937, and by 1955 another eight low pressure boilers were removed from service. The remaining eight low pressure boilers continued to be available to supply steam to the low pressure turbine/generators until they were taken out of service circa the mid 1970s.

3.1.2 Auxiliary Processes

This Subsection describes the ancillary processes associated with the generation of electricity using low pressure boilers including boiler water treatment, non-contact cooling of the main condensers and auxiliary equipment, and the Station's internal sewer system.

3.1.2.1 Boiler Water

The water supplied as makeup to the boilers to create steam was purchased from the City of Newark water supply. Minerals (such as calcium and magnesium bicarbonates and silica) and oxygen in city water have the potential to cause scaling and corrosion on the inner walls of boiler tubes, which in turn reduces the heat transfer efficiency of the boiler and can also lead to overheating of boiler tubes. The boiler tubes in the low pressure boilers were made of carbon steel and were four inches in diameter. City water was initially fed to a surge tank and then gravity fed to open heaters. The open heaters were designed to drive off dissolved oxygen, which corrodes boiler tubes and Station piping systems. The removal of oxygen from the boiler feedwater significantly limited the buildup of corrosion products on the inner wall of the boiler tubes. Treatment chemicals were added to the city water in the open heaters to control boiler water chemistry and to prevent scaling and corrosion. Treatment chemicals included soda ash, caustic soda, sodium sulfate, phosphoric acid and disodium phosphate. (See Table 3.2) Typical boiler chemistry limits are provided in Table 3.3. These limits are consistent with prevailing industry practice at the time. Because the minerals contained in the city water concentrated in the boiler, boiler water was periodically blown down by bleeding the lower header of the boiler to limit the concentration of minerals in the boiler. Blowdown was conducted once per day. The average volume of blowdown per day was approximately 52,000 gallons total for the twenty-four low pressure boilers. (Available data regarding chemical composition of the low pressure boiler blowdown is contained in Table 3.4).

The boiler blowdown was routed to a blowdown pit, an in-ground concrete structure. Available documentation indicates that the construction of the blowdown pit was of a type that facilitated the evaporation of the hot blowdown water. Residual minerals and water were percolated to the ground.

3.1.2.2 Non-Contact Cooling

Non-contact cooling water used to condense turbine exhaust steam was withdrawn from the Passaic River. The non-contact cooling water was pumped through the condensers and discharged directly back to the river.

The cooling water intake was equipped with twelve circulating water pumps (two per condenser) with an original non-contact cooling water design capacity (as of 1924) of 378,500 gallons per minute ("gpm").[1] The water intake was equipped with a trash rack, traveling screens and a trash sluice which were used to remove and manage debris from the water withdrawn from the Passaic River.

The low pressure boiler plant had six condensers. The condensers were steel or cast iron closed box-like vessels, consisting of an inlet water box, condenser tube bundles (supported by tube sheets) and an outlet waterbox. Tubes were approximately 3/4" in diameter. The flooded capacity of the waterside of the condensers were: two condensers at 7,800 gallons, two condensers at 13,500 gallons, and two condensers at 15,550 gallons. The condensers were mounted under the turbines so that the steam from the turbines exhausted directly into the top of the condensers. Exhaust steam entered the top of the condensers, passed down, around and between the tubes. The outside of the condenser tubes were exposed to steam and the inside to the non-contact cooling water. Condensate formed by the cooling of the steam was collected and routed to a surge tank for re-use in the generation of steam. In condensing this relatively

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[1] The cooling water system was upgraded in 1947. The upgrade resulted in an increase in the non-contact cooling water flow design capacity to 430,500 gpm.

large volume of steam into a smaller volume of water, a vacuum is created on the steamside of the condenser which reduces the back pressure on the turbine and increases the unit's efficiency.

The river water used for non-contact cooling entered the inlet water box and flowed through the condenser tubes in sufficient quantity to condense the turbine exhaust steam. The non-contact cooling water exited the condenser at the outlet water box and was directly discharged to the river through the discharge canal.

Organisms in the river water (e.g., barnacles, algae and river grass) attached themselves and grew on the interior of the inlet and outlet water boxes of the condenser, inside the condenser tubes and on the tube sheets. The growth of these organisms fouled the water boxes and the inner walls of the condenser tubes causing cooling water flow restriction which in turn reduced the cooling efficiency of the condensers.

A chlorination system was installed in 1933 which allowed the automatic injection of chlorine into the non-contact cooling water ahead of the condensers. Chlorine was used as a biocide to control the growth of organisms on the heat exchange surfaces of the condenser. Chlorination of the river water substantially reduced biofouling conditions in the condensers, thereby maintaining the cooling efficiency of the condensers. Chlorine was stored on-site in a pressurized metal storage container, typically a thirty (30) ton railcar.

Information concerning the frequency and/or volume of chlorine injection is limited over the operating life of the steam units. Available information indicates that when all units were in service, each section of the intake canal would have received the chlorine at the same rate. This information also indicates that the total daily use would have ranged from 1400 to 2000 pounds per day.

In 1974 when the Station filed its application for a National Pollutant Discharge Elimination System ("NPDES") permit, only Unit No. 1 was operating and only one of the three sections of the intake canal was in service. The Station's May 1974 application indicates that the non-contact cooling water was chlorinated twice a day for 135 minutes per period at a rate of 125 lbs per hour for a maximum daily consumption rate of approximately 565 lbs of chlorine per day.

Lubricating oils were used to cool and lubricate rotating equipment, such as the boiler feed pumps and the turbine shaft load-bearing surfaces. The heated lubricating oils needed to be cooled for reuse. River water used for non-contact cooling was pumped through small tubed heat exchangers which cooled the lubricating oils flowing through the oil space of the heat exchangers. Heat exchanger design and operation was similar to that of the condensers.

City water and condensate were also used to cool certain auxiliary equipment in a similar manner in heat exchanger-type equipment which operated in a manner similar to that of the condenser. All cooling water (river water and city water) was directly discharged to the Passaic River via the discharge canal. Condensate, however, was recovered for re-use in the steam generation process.

3.1.2.3 Station Sewer System (Non-Sanitary)

The Station had a system of sewer piping ("Station Sewer System") which was used to convey process wastewaters to the Passaic River. The Station Sewer System fed directly to the Station non-contact cooling water system. Based on available engineering drawings, the core component of this system may be summarized as follows:

- Two 8 inch and two 24 inch ceramic tile lines from the Boiler House -- these lines ran from south to north and were placed in an alternative sequence starting with an 8" on the west side of the building followed by a 24", an 8" and a 24", all of these lines discharged into the non-contact cooling water discharge canal. Roof drains and floor drains from the Boiler House, coal bunker and the east side of the Turbine Building; sump pump and direct pipe equipment drains were believed to be discharged into these lines. Discharges from these lines other than storm water were ended circa 1978 with the deactivation of the steam generation equipment.

- 18 inch ceramic tile line from the Switch House/Turbine Building - this line ran from south to north between the two buildings and originally crossed through the Intake Structure foundation and discharged into the non-contact cooling water discharge canal. In 1959, this line was cut at a point just west of the Intake

Structure foundation and rerouted directly to the river. Roof drains from the east side of the Switch House and the west side of the Turbine Building, some Turbine Building floor drains and sump pumps were believed to discharge to this line. Discharge from the line was ended in 1986.

- 12 inch ceramic tile line from the Switch House - this line was from south to north along the west side of the building and originally crossed through the Intake Structure foundation and discharged into the non-contact cooling water discharge canal. In 1959, this line was cut at a point just west of the Intake Structure foundation and rerouted directly to the River. Roof drains from the west side of the building and sump pump discharges were believed to be discharged to this line. Discharges from this pipe ended circa 1897 and the discharge point was reactivated as part of the 1995 permit renewal.

3.1.2.4 Equipment Lubrication

Station moving equipment required lubrication. Lube oil was heated as it flowed past the rotating bearing surface and was then cooled with non-contact river cooling water for reuse. The turbine lube oil system included equipment which would filter and/or separate solid particles (sludge) contained in the lube oil. The lube oil was reused until its lubricating properties were spent (i.e., the viscosity of the oil was diminished). An early Station print (dated 1917) indicates that water and sludge drains from lube oil filters, and drains from a lube oil storage tank were directed to the discharge canal where it was commingled with non-contact cooling water prior to discharge to the Passaic River. Later information indicates that waste oil generated through change-out of lubricants was collected in waste oil tanks. The waste oil was sold (or given) to a waste oil recycler, and for some period of the Station's history, was burned in the boilers and/or spread on the roads. Circa 1989, the spent lube oil was manifested off-site for dust control.

3.1.3 Raw Materials

Raw materials used in this electric generation process were coal and oil for boiler fuel, city water for makeup to boilers (and some auxiliary equipment cooling), river water for non-contact cooling, water treatment chemicals, air to facilitate combustion and chemicals for equipment cleaning. Table 3.2 presents a list of these raw materials associated with the operation of the low pressure boilers.

Information concerning the type and quantity of fuels used in the generation of electricity at the Station by year from 1915 until 1995 is summarized in Table 3.5. Station-specific information concerning the physical characteristics and chemical composition of fuels used during operation of the low pressure boilers have not been located. Therefore, relevant literature that describes typical physical characteristics and identifies constituents in the fuels has been used to develop the information in this response.

The primary low pressure boiler fuel was bituminous coal coming primarily from mines in

West Virginia and Pennsylvania. Coal was delivered by barge and stored both in the yard and in a coal bunker house. Coal was crushed in a Bradford breaker to a nominal size of two inches or less prior to introduction in the boilers. Tables 3.6 through 3.9 provide a list of the typical properties and constituents of bituminous coal. Only those constituents identified on the Comprehensive Environmental Response Compensation and Liability Act ("CERCLA") hazardous substance list as a hazardous substance are identified.

Fuel oil used in these boilers in later years was No. 6 Fuel Oil. Fuel oil was delivered by barge, stored on site in above-ground tanks and delivered to the boilers by an intra-faciltiy pipeline. No. 6 Fuel Oil is not listed on CERCLA's hazardous substance list as a hazardous substance. Table 3.10 presents a list of the properties of No. 6 Fuel Oil and Table 3.11 identifies constituents in oil that have been listed on the CERCLA hazardous substance list as hazardous substances.

Chemicals were used in the low pressure boilers to maintain proper water chemistry. (See Section 3.1.2.1). The list of these chemicals is presented in Table 3.2. Low concentrations of these treatment chemicals were used to maintain the boiler chemistry within given limits. Typical low pressure boiler water chemistry limits obtained from relevant literature are presented in Table 3.3, which are consistent with prevailing industry practice at the time.

Chemicals were used in the low pressure boiler to clean condenser tubes. The list of these chemicals is presented in Table 3.2. NEP-22 identified in Table 3.2 was used as an additive to hydrochloric acid to inhibit or reduce the aggressiveness of the acid when used in boiler or condenser cleanings. Station records and/or data from relevant literature concerning the composition of NEP-22 is not available. Oakite (trisodium phosphate) also identified in Table 3.2 was used as a surfactant and an alkalizer in the cleaning process.

Chlorine was used as a biocide to treat the non-contact river cooling water.

3.1.4 Products

Electric power was the only product generated at this facility. Table 3.5 provides a listing by year from 1915 to 1924 and from 1938 through 1995 of the electric power generated at Essex. Records of the annual production of electricity produced during the years of 1925 through 1937 are unavailable. Annual production for these years has been estimated based on electric power generation in 1923 and 1924, when the first phase of Station construction was completed.

3.1.5 By-Products

The coal used in the low pressure stoker boilers prior to 1949 was of a coarse size, two inches or less, and was fed into the boilers at the bottom of the furnace. Burning of coal as a fuel in the low pressure boilers resulted in the production of coal bottom ash. The ash produced was gravity fed along the slope of the stokers into a rotating clinker grinder, where the hot ash was quenched with river water, fragmented, crushed and then gravity fed into an ash hopper. The ash was transported via the hopper to a small hand-pushed rail car which transported the ash and water to an ash pit. The ash pit was wood-lined on four sides. The dock side was reinforced by a concrete retaining wall. The bottom ash material deposited in the pit settled out of the water to the bottom of the pit. The water which accumulated in the ash pit was decanted via a pipe and discharged to the Passaic River. Given that water was used solely for quenching (cooling and fragmentation), it is believed that the volume of water transferred to the ash pit via the hand-pushed rail cars was not substantial.

The settled ash was subsequently removed from the ash pit by a mobile crane and transported off-site for sale or use as fill material. Company records indicate that revenues were derived from the sale of coal ash from 1950 through 1966. While Company documentation for the pre-1950 period has not been located, it is believed that a market for coal ash existed during the pre-1950 period.

Relevant literature indicates that the average ash percentage in West Virginia and Pennsylvania coal was approximately 10% (Table 3.6). This literature also indicates that the underfeed low pressure stoker boilers were capable of capturing 85% of this coal ash as bottom ash. Station-specific information concerning the chemical composition of bottom ash and fly ash have not been located. Compounds identified on the CERCLA hazardous substance list as hazardous substances have been identified in Pennsylvania and West Virginia coal ash, but at trace levels. (See Tables 3.12 - 3.15.)

Station-specific information concerning the chemical composition of the water overflow from the ash pit is not available. Typical trace chemical constituents listed on the CERCLA hazardous substance list as hazardous substances for ash pit overflow water have, however, been located in relevant literature (Tables 3.16 and 3.17). Relevant literature concerning organic substances are not available for sluice water and ash pit water overflow. As indicated above, relevant literature does indicate that bottom ash contains very low and/or non-detectable levels of organic substances (See Table 3.14). Therefore water overflow from the ash pit would contain even lower levels of such substances.

Burning oil as a fuel in the low pressure boilers also resulted in the production of ash. The ash produced was predominantly (98%) fly ash. Neither Station-specific nor relevant literature concerning the chemical composition of the No. 6 Fuel Oil ash have been located. No. 6 Fuel Oil however contains lower levels of ash than coal, usually in the range of 0.01 percent to 0.5 percent (Table 3.10). Accordingly, ash emissions from No. 6 fuel oil would have been significantly less than ash emissions when firing coal in the boilers.

A residual not captured in the steam electric generation process is the flue gas resulting from fuel combustion. This residual is released via the boiler stack to the atmosphere. The composition of the flue gas emitted varies dependent upon the fuel fired, the equipment design and the level of emission control. Station specific data on emission characteristics are not available. The EPRI PISCES Database and other relevant literature provide information on the identity of the trace constituents in the flue gas from boilers fired by either coal, oil or natural gas which have been identified by EPA under the Clean Air Act Amendments as hazardous air pollutants. This database also presents emission factors for these trace constituents. Attachment I provides the list of these trace constituents and their associated emission factors.

3.1.6 Maintenance Processes

3.1.6.1 Boiler Cleanings

The generation of steam in the boilers caused minerals originally contained in boiler feedwater and city water makeup to settle out in the boiler. While certain quantities of minerals collected in the boiler, some would form scale deposits on the inner walls of the boiler tubes. The dissolved oxygen remaining in the boiler water would also react with boiler tube material, forming a thin corrosion layer on the inner surface of the boiler tubes. The presence of the corrosion products and mineral scale deposits decreased the heat transfer efficiency of the boiler tubes. Periodic removal of the corrosion products and mineral scale deposits was required to maintain boiler heat transfer efficiency. The tubes were cleaned by a mechanical process which involved the use of small rotating scrapers, referred to as turbines, which were driven through each tube with water pressure. Station records are not available on the frequency of the mechanical cleanings; however, it is believed, based on prevailing industry practice, that this type of cleaning would have been done on average once per year. The tube cleaning residues were collected at the lower header of the boiler, where the residues were directed by water to a floor drain which was connected to the Station Sewer System. The residues were then directed to the discharge canal, where they were commingled with the non-contact cooling water and discharged to the Passaic River. Station records are also not available on the chemical composition of the boiler scale, but it is believed that the principal constituents in the boiler scale would have included metal oxides of copper and zinc. Small amounts of these oxides would be expected in the discharge that was commingled with the non-contact cooling waters in the discharge canal.

3.1.6.2 Fireside Cleaning

Boiler maintenance procedures also included the periodic removal of combustion soot deposited on the exterior of the boiler tubes in the furnace. This soot was removed with the use of air and steam lances with the boiler out of service. Force draft fans at low operating speed were used to move the soot from the furnace chamber to the flue duct. The soot was exhausted to the atmosphere. Some of the heavier soot would have settled in the base of the boiler stack which was periodically cleaned. These materials would have been deposited in the ash pit. Station records concerning the chemical composition of the soot are not available. It is believed, however, that the chemical composition would be similar to that of fly ash.

Circa 1933, the Station began the use of No. 6 Fuel Oil in some of its boilers. An ash residue from combustion of the fuel would build up on the exterior of the boiler tubes. Over time, this ash residue would have reduced heat transfer within the boiler. The boiler was periodically taken out of service and the exterior of the boiler tubes was washed with high pressure city water. The water and the combustion ash residue (carbon black) were flushed to the bottom of the furnace. The residual would either have passed through a floor drain to the Station Sewer System for discharge to the Passaic River via the discharge canal or have been collected and commingled with other ash in the ash pit. The chemical composition of the ash removed in the washwater is believed to be similar to the ash composition of No. 6 Fuel Oil, the composition of which has not been identified.

3.1.6.3 Condenser Chemical Cleanings

The use of river water for cooling caused biofouling and the deposition of a corrosion scale on the internal condenser tube surfaces. Although injection of chlorine into the river cooling water substantially reduced biofouling, corrosion scale remained an operating problem. During the early years of operation, the internal tube surfaces were cleaned manually by brushes and the inlet and outlet water boxes and tube sheets were manually scraped. The residuals removed during the manual cleanings were primarily organic materials which would have been handled as trash.

Available Station records indicate that the turbine/generator was out of service for approximately 250 hours per year as a result of these cleanings. This cleaning operation required the turbine/generator to be taken out of service because the low pressure turbine/generators were provided with a single condenser per turbine. The flooded capacity of the waterside of the condensers was 7,800 to 15,500 gallons depending on the condenser.

Later, the Station conducted chemical cleaning of the condenser to remove scales and biofouling materials. Station records concerning the frequency and procedures for chemical cleanings prior to 1945 have not been located. Station records have been located, however, with respect to the frequency and method associated with chemical cleanings from 1945 until the Station's steam boilers were taken out of service in the mid to late 1970s. Available information indicates that a total of twenty-four chemical cleanings were performed on the waterside of the low pressure condensers during the operating history of the Station. Table 3.18 presents a list of cleanings and relevant details concerning each of these cleanings.

The methods utilized in each of these cleanings was generally the same. A chemical cleaning solution was prepared in a chemical mix tank consisting of water, hydrochloric acid ("HCl") and NEP-22. NEP-22 was used as an inhibitor to reduce the dissolution rate of the base metals by the hydrochloric acid. Station records indicate that the solution was prepared and maintained at a concentration ranging from 2% to 5% of HCl. After isolating the condenser, the cleaning solution was pumped into the condenser and recirculated in the condenser tubes for one to two hours. Given that the flooded capacity of the water side of the condensers ranged from 7,800 to 15,500 gallons, an equivalent volume of spent cleaning solution may have been drained directly to the discharge canal where it was commingled with the non-contact cooling water. Considering the flow of the non-contact cooling water in the canal, spent solution would have been diluted by approximately 25 to 1 if discharged over a period of one minute. River water was used to flush any residual material in the waterside of the condenser. Station records as to the chemical composition of the discharge have not been located. A search of relevant literature fails to identify typical chemical composition data. The discharge to the Passaic River would, however, have contained biological materials (e.g., barnacles), certain metals (e.g., copper and zinc), and a dilute HCl solution.

3.2 Unit No. 7 High Pressure Turbine/Generator and Nos. 25 and 26 High Pressure Boilers

This section presents a discussion of the electric generation process and auxiliary processes involved with the generation of electricity using high pressure turbine/generators and boilers. A process flow diagram has been provided as Figure 3.2.

3.2.1 Process Description

Eight of the low pressure boilers were demolished in 1937 and two high pressure pulverized coal fired boilers (Nos. 25 & 26) and one high pressure non-condensing turbine/generator (Unit No. 7) were installed. Electric power was generated using the same processes used to generate electric power in the low pressure process. A detailed list of operating parameters of this equipment is provided in Table 3.19.

Boilers Nos. 25 and 26 generated steam at a higher pressure (1250 psi) and a higher temperature (950°F). The steam was fed to a new, high pressure turbine/generator which rotated at a rate of 3600 RPM. Exhaust steam at a pressure of 225 psi from the high pressure turbine was piped to the existing low pressure turbine/generators rather than to condensers, as in the low pressure system design. The volume/mass of low pressure steam exhausted from the new high pressure turbine effectively replaced the volume/mass of low pressure steam for generation previously produced by the eight low pressure boilers removed from service. The steam was exhausted from the low pressure turbines to the low pressure condensers where it formed condensate. The condensate was pumped to a surge tank where it was combined with condensates from the other low pressure boilers for reuse in the generation of steam. A portion of this water was also pumped to a condensate storage tank for use as a makeup water source for the high pressure units.

Boilers Nos. 25 and 26 were more efficient than the low pressure boilers for a number of reasons, which may be summarized as follows:

- Fuel Preparation: The coal type used in these boilers was the same as that used in the low pressure boilers, but the preparation process was improved. The coal was pulverized and reduced to a fine powder which was blown into the boilers with air from the forced draft fan duct. By using pulverized coal, more of the surface area of the fuel was exposed to the oxygen in the air during the combustion process. The pulverized coal was blown through the burners and exited the burner tips where it mixed with air from the forced draft fan in the furnace. This resulted in an increase in the rate at which fuel was heated, resulting in an increase in the boiler combustion temperature by several hundred degrees.

- Boiler Design: Two changes in boiler design improved boiler heat transfer efficiency.

The boiler tubes were designed with a smaller diameter, thereby providing more heat transfer surface per unit volume of water. In addition, boiler waterside tubes were installed along the walls and floors of the furnace, increasing the volume of water heated per unit of furnace volume.

- Economizers and Superheaters: Boilers Nos. 25 and 26 contained an economizer and a superheater which are heat recovery equipment. Boiler water preheated by feedwater heaters was routed to the economizer for further preheating prior to circulation through the boiler drum and the furnace boiler tubes. Heated water from the boiler tubes was then circulated to a drum where it separated into water and saturated steam phases. The saturated steam was piped to the superheater section of the boilers where the temperature of the steam was raised to 950°F at a pressure of 1250 psi. This section of the boiler utilized waste flue gases (heated combustion gas) as a heat source, which in the lower pressure boiler had been exhausted out the stack. This use of heat recovery equipment resulted in greater boiler thermal efficiency.

- Air Preheaters: Boilers Nos. 25 and 26 were equipped with air preheaters. Air preheaters are sections of metal plates, called baskets, fitted into a circular form which are rotated at a point between the exhaust duct and the air inlet duct. When the baskets were in the exhaust duct, they received heat from the flue gases exhausted from the boiler. This waste heat would raise the temperature of the metal plates in the air heater baskets. As the baskets rotated out of the flue gas area and into the air inlet duct, the heat stored in the metal plates would have been released (transferred) into the incoming air for use in the combustion process. As was the case with the superheater and economizer, the air heaters utilized as a heat source what had previously been waste flue gases in the low pressure boilers. The use of air heaters to pre-heat the combustion air to the boiler also increased the overall Station thermal efficiency.

- Feedwater Heaters: Boilers Nos. 25 and 26 were equipped with feedwater heaters, which used extracted (bleed) steam from the turbines to pre-heat boiler feedwater. Preheating of the boiler water increased the overall thermal efficiency of the Station by reducing the amount of fuel required to generate a unit value of electricity.

- Electrostatic Precipitators: Boilers Nos. 25 and 26 were equipped with electrostatic precipitators ("ESPs") collected fly ash particles from the exhaust flue gases, thus reducing particulate emissions associated with the generation of fly ash. Collected fly ash from the precipitators was fed to stationary hoppers and then piped to the bottom ash collection pit in the bottom of the boiler.

3.2.2 Auxiliary Process

3.2.2.1 Boiler Water

Boiler water for operation of the high pressure boilers was supplied by condensate from the condensate storage tank that was fed from the low pressure boiler system. Condensate from this source had been chemically treated, deaerated and distilled in the low pressure boiler system process. This condensate was gravity fed from the condensate storage tank to the high pressure boilers by way of a feed water deaerator, which preheated the condensate. The deaerator was a more efficient design compared to the low pressure boiler system open heaters.

Sodium sulfite was added to the feed water at the deaerator to remove dissolved oxygen. Trisodium phosphate was also fed to the deaerator to establish and maintain a boiler water pH low enough to prevent caustic embrittlement of boiler tubes. Typical high pressure boiler water chemistry limits employed by the Station are presented in Table 3.21. These limits were consistent with industry practice at the time. The water was gravity fed to the condensate pumps, which pumped the condensate through the low pressure feedwater heater for further preheating. The water was then directed to the boiler feed pumps, then through a high pressure feed water heater before entering the boiler. Minerals in the water (boiler feed) collected in the boiler drum. The quantity of minerals in the high pressure boiler water was considerably less than in the low pressure boiler water because of the use of the pure condensate from the lower pressure boiler system for makeup. This reduced the amount of boiler chemicals required. Blowdown was conducted on a continuous basis at a rate of 10 to 20 gpm. The boiler blowdown was collected and routed to a drain tank, and then to the open heaters for preheating and reuse in the generation of steam in the low pressure boilers.

3.2.2.2 Non-Contact Cooling

As discussed above, the high pressure turbine/generator (Unit No. 7) that was installed with the two high pressure boilers (Nos. 25 & 26) was a topping, non-condensing turbine. There was no condenser for Unit No. 7 and therefore no non-contact cooling water was required for the system. The steam exhausted from Unit No. 7 was routed to the low pressure turbines to generate electricity. This steam, when exhausted from the low pressure turbines, was then routed to the existing low pressure condensers for condensing. The condensate was then routed to the condensate tank for reuse in the steam generation process.

Lubricating oils were used to cool and lubricate rotating equipment, such as the boiler feed pumps and the turbine shaft load-bearing surfaces. The lubricating oils were in a closed looped system and accordingly, once heated the lubricating oils needed to be cooled for reuse. Non-contact river cooling water was pumped through small tubed heat exchangers where the river water cooled the lubricating oils. Heat exchanger design and operation were similar to that of the condensers.

3.2.2.3 Equipment Lubrication

Station moving equipment required lubrication. Lube oil was heated as it flowed past the rotating bearing surface and was then cooled with non-contact river cooling water for reuse. The turbine lube oil system included equipment which would filter and/or separate solid particles (sludge) contained in the lube oil. The lube oil was reused until its lubricating properties were spent (i.e., the viscosity of the oil was diminished). An early Station print (dated 1917) indicates that water and sludge drains from lube oil filters, and drains from a lube oil storage tank were directed to the discharge canal where it was commingled with non-contact cooling water prior to discharge to the Passaic River. Later information indicates that waste oil generated through change-out of lubricants was collected in waste oil tanks. The waste oil was sold (or given) to a waste oil recycler, and for some period of the Station's history, was burned in the boilers and/or spread on the roads. Circa 1989, the spent lube oil was manifested off-site for dust control.

3.2.3 Raw Materials

Raw materials used in this electric generation process were coal and oil for boiler fuel, city water for some auxiliary equipment cooling, boiler water treatment chemicals, air to facilitate combustion and chemicals for equipment cleaning. Table 3.20 presents a list of these raw materials.

Information concerning the type and quantity of fuels used in the generation of electricity at the Station by year from 1915 through 1995 is summarized in Table 3.5. Station-specific information concerning the physical characteristics and chemical composition of fuels used during operation of these high pressure boilers has not been located.

The coal used at the Station was bituminous coal coming primarily from mines in West Virginia and Pennsylvania. Coal for these units was delivered to and managed by the Station in the same manner as the coal for the low pressure boilers. Coal was crushed in a Bradford breaker to a nominal size of two inches or less. After crushing, the coal was delivered to the pulverizers and reduced to a fine powder. This coal powder was then blown in the boilers with air through specially designed burners. Table 3.6 presents the typical chemical composition of these coals and Tables 3.7 through 3.9 list the constituents of these coals that are on the CERCLA hazardous substance list as hazardous substances.

In later years, the fuel oil used in these boilers, was No. 6 Fuel Oil. Fuel oil was delivered by barge, stored on site in above-ground tanks and delivered to the boilers by pipeline. Tables 3.10 and 3.11 present a list of the properties of the oil and constituents of No. 6 Fuel Oil that are on the CERCLA hazardous substance list as hazardous substances.

Chemicals were used in the high pressure boilers to maintain proper boiler water chemistry. The list of these chemicals is presented in Table 3.20. Low concentrations of these treatment chemicals were used to maintain the boiler chemistry within given limits. Typical high pressure boiler water chemistry limits employed by the Station are presented in Table 3.21. These limits were consistent with industry practice at the time.

Chemicals were used to clean boiler tubes and feedwater heaters. A list of these chemicals is presented in Tables 3.22 and 3.23 respectively.

3.2.4 Products

Electric power was the only product produced at this facility. Table 3.5 provides a listing by year from 1915 to 1924 and from 1938 through 1995 of the electric power generated at Essex. Documentation of the annual production of electricity produced during the years of 1925 through 1937 is unavailable. Annual production for these years has been estimated based on electric power generation and fuel usage in 1923 and 1924 when the first phase of Station construction was completed.

3.2.5 By-Products

The use of pulverized coal changed the type of ash generated from primarily bottom ash or cinders to primarily a fly ash. The fly ash suspended in the combustion gases would move through the boiler to the stack where it would be collected in ESPs. Relevant literature indicates that these ESPs were very efficient (i.e. 90%) in removing fly ash from the flue gas. Fly ash collected by the ESPs dropped into stationary hoppers and was piped to a slag tank pit at the bottom of the boiler, mixed with the bottom ash and sluiced via a concrete lined sluice trench to the ash pit. The bottom ash was collected on the floor of the furnace as a molten slag and flowed over a water-cooled dam into a slag tank pit where it was quenched with river water. The resultant sluice was gravity fed to the sluice trench, and transported to the ash pit.

The ash handling system was modified in 1947, coincident with the construction of New Unit No. 1. The bottom ash was collected on the floor of the furnace as a molten slag, which flowed over a water-cooled dam into a slag tank where it was quenched with river water. The resultant sluice was pumped to an ash lake, where solids were settled out and the sluice water was decanted to the Passaic River by means of an overflow box and discharge pipe.

The ash produced was generally collected by material handling equipment on the property for sale or other off-site disposition such as for fill. Company records indicate that revenues were derived from the sale of this coal ash from 1950 through 1966. Although documentation for the pre-1950s is not available, it is believed that a market for coal ash existed during the pre-1950 period.

Relevant literature indicates that the average ash percentage in West Virginia and Pennsylvania coal was approximately 10% (Table 3.6). Station-specific information concerning the chemical composition of bottom ash and fly ash is not available. Tables 3.12 through 3.15 identify the constituents in the bottom and fly ashes from these coals which are on the CERCLA hazardous substance list as hazardous substances.

Station-specific information concerning the chemical composition of the water overflow from the ash pit is not available. Tables 3.16 and 3.17 identify the constituents that may have been in the sluice water and overflow from the ash pit which are on the CERCLA hazardous substance list as hazardous substances. Relevant literature concerning organic substances are not available for sluice water and water overflow. As indicated above, relevant literature does indicate that bottom ash contains very low and/or non-detectable levels of organic substances. (See Table 3.14). Therefore, sluice water and water overflow from the ash pit/pond would contain even lower levels of such substances.

Burning of oil as a fuel also resulted in the production of ash, predominantly fly ash (98%). Station specific information concerning the chemical composition of fuel oil bottom and fly ash is not available. Fuel oil typically contains only 0.01-0.5% by weight ash (Table 3.10).

A residual not captured in the steam electric generation process is the flue gas resulting from fuel combustion. This residual is released via the boiler stack to the atmosphere. The composition of the flue gas emitted varies dependent upon the fuel fired, the equipment design and the level of emission control. Station specific data on emission characteristics are not available. The EPRI PISCES Database and other relevant literature provide information on the identity of the trace constituents in the flue gas from boilers fired by either coal, oil or natural gas which have been identified by EPA under the Clean Air Act Amendments as hazardous air pollutants. This database also presents emission factors for these trace constituents. Attachment I provides the list of these trace constituents and their associated emission factors.

3.2.6 Maintenance Processes

3.2.6.1 Boiler Cleanings

Periodic removal of corrosion and scale on the interior of the boiler tubes was required to maintain boiler heat transfer efficiency. The tubes in the high pressure boilers were more numerous and smaller in diameter than in the low pressure boilers, making the cleaning of the tube surfaces using mechanical methods impossible. A cleaning process using chemicals was necessary. Chemical cleaning of the boilers generally involved the cleaning of only the waterside boiler tubes and drums. The maximum flooded capacity of these boiler components was 13,000 gallons. The economizers were generally not chemically cleaned. The superheaters were not cleaned.

Available information indicates that the waterside of each of the two high pressure boilers (Nos. 25 and 26) was chemically cleaned twenty-three times. A chemical solution of HCl and NEP-22 was used in the first twenty-one cleanings. The solution was prepared and maintained at a concentration ranging from 1% to 5% HCl. The twenty-first cleaning of each boiler was done using Vertan 675 (tetra ammonium ethylene diamine tetra acetic acid). The twenty-second cleaning for each boiler was done using Citrosolv, an ammoniated citric acid. Table 3.22 lists the cleanings and presents details associated with each cleaning.

For the cleanings which used inhibited HC1, the boiler tubes were drained. Chemical solutions were mixed with water in a chemical cleaning tank and the resultant solution was pumped into the boiler waterside and circulated through the boiler water tubes. The boiler tubes were filled once, with the chemical cleaning solution, circulated and drained. The solution was recirculated to the chemical cleaning tanks for concentration analysis, additional chemicals were added as required, and then the solution was pumped back to the waterside of the boiler for recirculation through the boiler tubes. After the boiler tubes were drained, the boiler waterside was flushed with fresh water. Station records documenting the methods used to handle the spent cleaning solution or rinse waters from these cleanings or the chemical composition of the spent solution or rinse waters have not been located. Prevailing industry practice, however, was to direct the spent cleaning solution to the discharge canal where it was commingled with the non-contact cooling water and discharged to the Passaic River. Relevant literature provides typical compositional makeup of the spent solution and the first rinse drain. The compositional data are presented in Table 3.24.

Subsequent cleanings (Nos. 21 and 22) utilized alternate chemical cleaning methods that improved cleaning efficiency, i.e. iron and copper removal. Vertan 675 or CitroSolv was used in these cleanings. The waterside was isolated after introduction of the chemicals. The solution was circulated through the boiler waterside by periodically heating and cooling the solution. The spent cleaning solution was either directed to the other boiler (No. 25 if 26 were being cleaned and No. 26 if 25 were being cleaned) and evaporated in the furnace of the boiler, or trucked off site (see Table 3.22). The boiler waterside was flushed with water after the boiler tubes were drained of solution. Rinse water was drained to the discharge canal where it was commingled with the non-contact cooling water and discharged to the Passaic River.

3.2.6.2 Chemical Cleaning of Feedwater Heaters

The electric generation process associated with the use of higher pressure boilers (Nos. 25 and 26) utilized feedwater heaters to pre-heat water for steam generation. Feedwater heaters are heat exchange devices containing tubing similar to condensers. Station records concerning the flooded capacity of the waterside and steamside for Units 25 and 26 feedwater heaters are not available. The capacities, however, would have most likely been similar to the capacities for the New Unit No. 1 feedwater heaters, i.e. flooded capacity of the waterside of 400 gallons and of the steamside of approximately 1,500 gallons (See Section 3.3.6.3).

As was the case for the boiler tubes, the flow of water in the feedwater heater tubes created the potential for deposition of corrosion scale and mineral deposits on the inside of the tubes. This reduced the heat transfer efficiency of the feedwater heaters. Chemical cleanings were performed to remove scale and mineral deposits to increase effectiveness of heat transfer.

Available information indicates that fourteen cleanings were performed. Table 3.23 lists the cleanings and relevant details associated with each of the cleanings.

The method for all of these cleanings was generally the same. A cleaning solution consisting of water, a chemical cleaning agent and an inhibitor was prepared in the chemical mix tank. The cleanings were one volume cleanings. Cyanide and, later, HCl were used as the cleaning agents. The cleaning solution was circulated within the tubes in the feedwater heater. The tubes were likely rinsed with city water. Station records documenting the discharge of the spent cleaning solution and rinses have not been located. Prevailing industry practice, however, was to direct the spent cleaning solution to the discharge canal where it was commingled with the non-contact cooling water and discharged to the river.

3.2.6.3 Air Heater Washes

Air heaters were washed with river water to remove ash, dust, and soot from the air heater baskets to ensure maintenance of heat transfer efficiency. The air heaters were cleaned one to two times each year. The washwater was directed to the ash sluiceway and routed to the ash pit until 1947, when it was routed to the ash lake. Circa 1970, when the ash lake was removed, the wash water was rerouted to the chemical waste basin (See Section 4.1.5).

3.2.6.4 Fireside Wash

When firing No. 6 Fuel Oil, combustion ash residues (e.g., soot) would build up on the exterior of the boiler tubes. Over time, this residue would reduce heat transfer within the boiler. The boiler was periodically taken out of service and the exterior of the boiler tubes was washed with high pressure city water.

The water and combustion ash residues were flushed to the bottom of the furnace. The residual was drained to a floor drain, directed to the discharge canal, commingled with the non-contact cooling water, and discharged to the Passaic River.

3.3 High Pressure Unit No. 1

This section presents a discussion of the electric generation process and auxiliary processes involved with the generation of electricity using a unitized high pressure boiler and multi-stage turbine/ generator. A process flow diagram is depicted in Figure 3.3. The boiler and turbine/generator are tied together in a unitized system, and are independent from the rest of the generating Station equipment.

3.3.1 Process Description

Circa 1946, four low pressure boilers and one low pressure turbine/generator (original Unit No. 1) were removed from service. One high pressure boiler with one high pressure tandem compound double-flow turbine/generator ("New Unit No. 1") was installed. The boiler supplied steam only to the New Unit No. 1 high pressure turbine. The New Unit No. 1 boiler was designed to burn coal, oil or gas. All three fuels were used interchangeably in this unit depending on a myriad of factors including fuel cost and availability.

Electric power was produced in this unit in a manner similar to that in the other Station electric generation processes described in Sections 3.1 and 3.2. While physically larger, the boiler design included a number of the same component equipment as high pressure boiler Nos. 25 & 26 (i.e., furnace with wall and floor tubes, economizer and superheater sections, feedwater heaters, air pre-heaters, pulverizers, and electrostatic precipitators). The boiler design incorporated a more sophisticated feedwater heating system and boiler tubes that were even smaller in diameter than the tubes in Nos. 25 and 26 boiler. Again, as with the design of Nos. 25 and 26 boilers, the design was focused on the capture for reuse of water and waste energy, thereby increasing the net Station thermal efficiency.

The boiler generated steam at a pressure of 1265 psi at a temperature of 1000°F. The turbine/generator shaft rotated at a rate of 3600 rpm. Exhaust steam was directed to a dedicated condenser where the steam was condensed to water. The waterside flooded capacity of this condenser was 17,460 gallons. Condensate was collected in a hotwell and gravity fed to condensate pumps. The hotwell operated under a vacuum and served a function similar to that of the deaerator removing oxygen from the condensate. The condensate was pumped through a condensate cooler (containing water-filled tubes) for further cooling using river water as the non-contact coolant. The cooled condensate water was then pumped to generator coolers and other miscellaneous coolers for use as a coolant for auxiliary equipment. This was the first stage for the preheating of the condensate water for reuse as boiler feedwater. The feedwater to the boiler was then routed through a series of feedwater heaters for further preheating prior to being routed to the boiler for steam generation. The heat source for the feedwater heaters was steam, extracted from various stages of the turbine exhaust. This steam was re-routed to the hotwell as a condensate after passing through the feedwater heaters, and subsequently re-circulated through the feedwater heaters and back to the boiler for steam generation.

The unit had an ESP which captured the fly ash. When coal was used as the boiler fuel, fly ash captured by the ESP was returned to the furnace and fired. This significantly reduced the volume of fly ash and improved overall Station thermal efficiency. Fly ash returned to the boiler would increase the quantity of bottom ash.

3.3.2 Auxiliary Processes

3.3.2.1 Boiler Water

Water used to generate steam in New Unit No. 1 boiler was supplied by condensates from the existing low pressure boilers. The condensate had been chemically treated, deaerated and distilled in the low pressure boilers. This condensate was gravity fed from the condensate storage tank where it had been collected from the low pressure system, and pumped to a hotwell. The hotwell replaced the function performed by the deaerator used in Boilers No. 25 and 26. The water was then routed to the condensate cooler for cooling and then circulated through the condensate and feedwater system for use in the boiler for steam generation. Sodium sulfite solution was pumped into the feed water to the boiler drum to remove any residual oxygen. Trisodium phosphate solution was pumped to the boiler drum to maintain pH between 10.5 and 10.8. Typical boiler chemistry limits are provided in Table 3.27. These limits are consistent with prevailing industry practice at the time. Boiler blowdown was conducted on a continuous basis at a rate of 10 to 20 gpm, piped to a drain tank and routed to the low pressure boiler open heaters. The open heaters fed condensate/blowdown to the existing low pressure boilers for reuse in the generation of steam, as the quality of the high pressure boiler blowdown was better than that of city water. Overflow from the drain tank was routed to the Passaic River.

3.3.2.2 Non-Contact Cooling

New Unit No. 1 was equipped with one condenser. The non-contact cooling process exhausted steam for New Unit No. 1 was the same process utilized for non-contact cooling of exhausted steam in the low pressure system. In connection with the installation of this unit, the cooling water intake system was upgraded, increasing the non-contact cooling water flow design capacity to 430,500 gpm.

Lubricating oils were used to cool and lubricate rotating equipment, such as the boiler feed pumps and the turbine shaft load-bearing surfaces. The heated lubricating oils needed to be cooled for reuse. River cooling water was pumped through small tubed heat exchangers where the river water cooled the lubricating oils. Heat exchanger design and operation were similar to that of the condensers. The cooled lubricating oils were reused in a closed cycle for equipment lubrication and cooling.

3.3.2.3 Equipment Lubrication

Station moving equipment required lubrication. Lube oil was heated as it flowed past the rotating bearing surface and was then cooled with non-contact river cooling water for reuse. The turbine lube oil system included equipment which would filter and/or separate solid particles (sludge) contained in the lube oil. The lube oil was reused until its lubricating properties were spent (i.e., the viscosity of the oil was diminished). An early Station print (dated 1917) indicates that water and sludge drains from lube oil filters, and drains from a lube oil storage tank were directed to the discharge canal where it was commingled with non-contact cooling water prior to discharge to the Passaic River. Later information indicates that waste oil generated through change-out of lubricants was collected in waste oil tanks. The waste oil was sold (or given) to a waste oil recycler, and for some period of the Station's history, was burned in the boilers and/or spread on the roads. Circa 1989, the spent lube oil was manifested off-site for dust control.

3.3.3 Raw Materials

Raw materials used in this electric generation process were coal, oil, or gas for boiler fuel, city water for some auxiliary equipment cooling, river water for non-contact cooling, boiler water treatment chemicals, air to facilitate combustion and chemicals for equipment cleaning. Table 3.25 presents a list of these raw materials.

Information concerning the type and quantity of fuels used in the generation of electricity at the Station by year from 1915 through 1995 is summarized in Table 3.5. Station-specific information concerning the physical characteristics and chemical composition of materials used during operation of the high pressure boilers is unavailable.

The coal was bituminous coal primarily from mines in West Virginia and Pennsylvania. Coal was crushed in a Bradford breaker to a nominal size of two inches or less. After crushing, the coal was delivered to the pulverizer and reduced to a fine powder. This coal powder was then blown in the boiler with air through specially designed burners. Table 3.6 presents a list of the chemical properties of these coals and Tables 3.7 through 3.9 identifies those constituents which are on the CERCLA hazardous substance list as a hazardous substance.

The fuel oil used in New Unit No. 1 boiler was No. 6 Fuel Oil. Tables 3.10 and 3.11 present a list of the properties of the oil and constituents identified in No. 6 Fuel Oil that are on the CERCLA hazardous substance list as a hazardous substance. Fuel oil was delivered by barge, stored on site in above ground storage tanks and delivered to the boilers by pipeline. Natural gas was also used as a boiler fuel New Unit No. 1. Natural gas was fed to the Station via a high pressure transmission line from Transcontinental Gas Pipe Line Corporation. Table 3.26 presents the typical chemical composition of natural gas.

Chemicals were used in the high pressure boilers to maintain proper water quality. The list of these chemicals is presented in Table 3.25. Low concentrations of these treatment chemicals were used to maintain the boiler chemistry within given limits. Typical high pressure boiler water chemistry limits employed by the Station are presented in Table 3.27. These limits were consistent with prevailing industry practice at that time.

Chemicals were used to clean the boiler condensers and feedwater heaters. These chemicals are presented in Table 3.25.

Chlorine was used to treat the non-contact cooling water. Chlorine was stored on-site in pressurized metal storage containers.

3.3.4 Products

Electric power was the only product generated at this facility. Table 3.5 provides a listing by year from 1915 to 1924 and from 1938 through 1995 of the electric power generated at Essex. Station records as to the annual production of electricity during the years of 1925 through 1937 are unavailable. Annual production for these years has been estimated based on electric power generation in 1923 and 1924, when the first phase of Station construction was completed.

3.3.5 By-Products

The use of pulverized coal changed the type of ash generated. Similar to Nos. 25 and 26 boilers, the ash produced was primarily fly ash; the balance was bottom ash. The fly ash would be carried suspended in the combustion gases through the boiler. Fly ash was collected by the electrostatic precipitator and then gravity fed to stationary hoppers and returned to the boiler for refiring. Fly ash was introduced back into the furnace through "dust nozzles" for recombustion, forming additional bottom ash.

The electrostatic precipitators installed at Essex were some of the earliest applications of this technology. Relevant literature indicates that these emission control systems were very efficient in removing fly ash from the boiler exhaust gases generally 90% or greater.

The ash handling system was modified in 1947, coincident with the construction of the New Unit No. 1. The bottom ash was collected on the floor of the furnace as a molten slag and flowed through a slag tap into a slag tank where it was quenched with river water. The resultant ash sluice was then pumped to an ash lake where solids were settled out. Water was decanted to the River by means of an overflow box and discharge pipe.

Relevant literature indicates that the average ash percentage in West Virginia and Pennsylvania coal was 10% (Table 3.6). Station-specific information concerning the chemical composition of bottom ash and fly ash is not available. Tables 3.12 through 3.15 identify the constituents identified for bottom and fly ash from West Virginia and Pennsylvania coals that are on the CERCLA hazardous substance list as hazardous substances.

Station-specific information concerning the chemical composition of the water overflow from the ash lake is not available. Using data available from relevant literature, Tables 3.16 and 3.17 present the constituents that were believed to be present for this water which are on the CERCLA hazardous substance list as hazardous substances. Relevant literature concerning organic substances is not available for sluice water and water overflow. As indicated above, relevant literature does indicate that bottom ash contains very low and/or non-detectable levels of organic substances. (Table 3.14) Therefore, sluice water and water overflow from the ash lake would contain even lower levels of such substances.

The ash produced was generally collected by material handling equipment on the property for sale or other off-site disposition. Company records indicate that revenues were derived from the sale of this coal ash from 1950 through 1966. Although documentation is not available, it is believed that a market for coal ash existed during the pre-1950 period.

A residual not captured in the steam electric generation process is the flue gas resulting from fuel combustion. This residual is released via the boiler stack to the atmosphere. The composition of the flue gas emitted varies dependent upon the fuel fired, the equipment design and the level of emission control. Station specific data on emission characteristics are not available. The EPRI PISCES Database and other relevant literature provide information on the identity of the trace constituents in the flue gas from boilers fired by either coal, oil or natural gas which have been identified by EPA under the Clean Air Act Amendments as hazardous air pollutants. This database also presents emission factors for these trace constituents. Attachment I provides the list of these trace constituents and their associated emission factors.

3.3.6 Maintenance Processes

3.3.6.1 Boiler Cleanings

Periodic removal of corrosion and scale on the interior of the boiler tubes was required to maintain boiler heat transfer efficiency. As was the case with high pressure boilers Nos. 25 and 26, the tubes in the high pressure Boiler No. 1 were more numerous and smaller in diameter than in the low pressure boilers, making the cleaning of the tube surfaces using mechanical methods impossible. A cleaning process using chemicals was necessary. Chemical cleaning of the boilers involved only the cleaning of the waterside boiler tubes, drum and economizer. The flooded capacity of these components was 40,000 gallons. The superheater was not cleaned.

Available information indicates that this high pressure boiler was chemically cleaned once prior to commercial operation (see below) and eight times during its operating history. Table 3.28 presents a list of the cleanings performed during New Unit No. 1 Boiler's operating history and relevant details associated with each of the cleanings. The chemical cleaning done prior to commercial operation used different chemicals and procedures than used to perform the boiler cleanings after commercial operations began.

The pre-operational chemical cleaning was performed on November 15, 1947 utilizing the following procedures: an alkaline boil-out using trisodium phosphate, sodium hydroxide and sodium meta-silicate followed by a rinse; then a conventional acid cleaning using hydrochloric acid (with an inhibitor); and finally three rinses with condensate water. Available documentation indicates that the concentration of HCl in the cleaning solution was 3.8%. The first rinse used city water and condensate from the low pressure system. Available documentation indicates that the concentration of HCl in the first rinse was 0.15%. The second rinse used 0.25% caustic soda and 0.5% trisodium phosphate solution. The third rinse used condensate. Station records documenting the chemical composition of the spent solution or rinse waters have not been located.

The next six cleanings used HCl and were performed during the period from 1949 to 1958. These acid cleanings were performed utilizing methods similar to those used for Boiler Nos. 25 and 26. In addition, the management of the spent cleaning solution and its chemical composition would likely have been the same as that for Boiler Nos. 25 and 26 (See Section 3.2.6.1 and Table 3.24).

An eighth cleaning was performed in October 1965 by an outside contractor - Dow Industrial Services. The cleaning consisted of two stages. The first stage, or "Bromate Stage", was performed for copper oxide removal and utilized a bromate solution consisting of a total of 3,250 gallons of aqua ammonia, 4,900 pounds of ammonium carbonate, and 2,700 pounds of sodium bromate. This solution was placed in the boiler for a six hour soak. Neutralization was performed using 6,000 gallons of 28% HCl. The boiler was then rinsed twice using city water.

The second stage, referred to as the hydrochloric acid stage, used 9,850 gallons of 28% hydrochloric acid (diluted to approximately 7.5%), 120 gallons of A-120 inhibitor, and 10,100 pounds of thiourea (for copper removal -- copper sources being condenser tubes, feedwater heater tubes, etc.). The solution was placed in the boiler for a six hour soak.

Four rinses were performed. The first rinse used condensate. The following three rinses used condensate with 0.50% citric acid, and 100 ppm hydrazine. This was followed by a neutralizing boil out with 0.5% tri-sodium phosphate, 100 ppm hydrazine, and 40,000 gallons of condensate.

Boiler cleaning solutions for this cleaning were collected and routed to an ash sump where river water was added. This solution was pumped from the ash sump to the ash lake. En route a neutralization chemical, caustic soda was added to the solution. The solids settled out and were mixed with the ash in the ash lake. Water was decanted from the ash lake via an overflow pipe and discharged to the Passaic River.

The ninth and last, chemical cleaning of New Unit No. 1 boiler was performed in December 1973. This cleaning was performed by an outside contractor, Dow Industrial Services. The cleaning solution consisted of 6% hydrochloric acid, 2% thiourea, and 0.30% inhibitor. This solution was introduced into the boiler tubes and the furnace temperature was maintained at 140°F to 150°F for a period of approximately 6.5 hours. The first rinse was performed with condensate. The second rinse was performed using 0.10% citric acid. The third rinse used 0.5% caustic which was left to soak in the boiler while the furnace temperature was maintained at 180°F to 190°F. The spent solution was then drained from the boiler, collected in tanker trucks and transported off-site for disposal. The rinse water was believed to have been routed to the chemical waste basin. The cleaning solution and first two rinses were drained under nitrogen to protect the newly-cleaned surfaces.

Station records are not available concerning the chemical composition of the spent solutions and rinse waters. A search of relevant literature has not identified typical compositions for these streams.

3.3.6.2 Condenser Chemical Cleanings

The use of river water for cooling caused biofouling and deposition of a corrosive scale on the condenser tube internal surfaces. While injection of chlorine into the river cooling water substantially reduced biofouling, corrosion of condenser tubes remained an operating problem. Station records indicate that the Station conducted condenser chemical cleanings to maintain the thermal efficiency of the condensers.

Station records have been located describing the frequency and method associated with chemical cleanings of New Unit No. 1 condenser. Nine chemical cleanings were performed between 1953 and 1973. Table 3.29 presents a list of these cleanings and relevant information with respect to each of the cleanings.

The methods used in each of these cleanings were generally the same. A chemical cleaning solution was prepared in a chemical mix tank consisting of water, HCl and an inhibitor. The solution was monitored to maintain a concentration of from 2% to 5% HCl. After isolating the condenser, the condenser was pumped full of cleaning solution. The water flooded capacity of the New Unit No. 1 condenser was 17,460 gallons. The solution was then recirculated in the condenser for one to two hours. The solution was drained to the Station Sewer System and to the discharge canal where it was commingled with the non-contact cooling water and discharged to the Passaic River. Given that the flooded capacity of the waterside of the condensers was 17,460 gallons, an equivalent volume of spent solution was drained directly to the discharge canal where it was commingled with the non-contact cooling water. Considering the flow of the non-contact cooling water in the canal, the spent solution would have been diluted by approximately 25 to 1, if discharge over a period of one minute.

3.3.6.3 Chemical Cleaning of Feedwater Heaters

The electric generation process associated with the use of the New Unit No. 1 boiler utilized feedwater heaters to preheat water for steam generation. Feedwater heaters are heat exchange devices containing tubing similar to those in condensers. The flooded capacity of the waterside of the feedwater heater tubes was 400 gallons and the flooded capacity of the steamside of the heaters was less than 1,500 gallons. As was the case with boilers Nos. 25 and 26, the flow of water in the feedwater heater tubes created the potential for deposition of metal oxide corrosion layers on the inside of the feedwater heater tubes. This deposition reduced heat transfer efficiency. Chemical cleanings were performed to remove the deposition and restore heat transfer efficiency. These cleanings involved both the steamside and waterside; however, they were generally done separately. Station records indicate that cleanings were performed on four separate dates over the operating life of this unit. Table 3.30 lists these cleanings and the details associated with each of the four documented cleanings events.

The method for these cleanings was generally the same. A solution consisting of water, cleaning agent chemicals and an inhibitor was prepared in the chemical mix tank. HCl was generally used as the cleaning agent. The cleaning solution was circulated within the feedwater heater tubes. The cleaning solution was drained from feedwater heaters to a floor drain to the Station's sewer system routed to the discharge canal, commingled with the non-contact cooling water and discharged to the Passaic River. The tubes were likely rinsed with city water. The rinse was likely discharged in a manner similar to the cleaning solution. Station records and relevant literature documenting the chemical composition of the spent solution or rinse waters have not been located.

3.3.6.4 Air Heater Washes

Air heaters were washed with river water to remove ash, dust, and soot from the air heater baskets to maintain heat transfer efficiency. The air heaters were cleaned one to two times each year. The washwater was directed to the ash sluiceway and routed to the ash pit until 1947 when it was routed to the ash lake. Circa, 1970 when the ash lake was removed, air heater washes were rerouted to the chemical waste basin as described in Section 4.1.5.

3.4 Combustion Gas Turbines (1963 - Present)

This section presents a discussion of the electric generation process involved with the generation of electricity using combustion turbines. A process flow diagram is provided as Figure 3.4. Table 3.31 provides the operating parameters for the combustion turbine units.

3.4.1 Process Description

Commencing in 1963, combustion turbine units were installed at the Station. The first unit (Unit No. 8) was installed in 1963 and burned only natural gas. Four additional units were installed, three (Units No. 9 - 11) in 1971 and one (Unit No. 12) in 1972. These units are capable of burning both gas and low sulfur distillate oil as a fuel. As of 1972, the capacity of the combustion turbine units was 585,333 kW (generator nameplate rating). In 1989, Unit No. 9 was destroyed by a fire and retired. In 1990, a new combustion turbine ("New Unit No. 9") was installed. The New Unit No. 9 is capable of burning either low sulfur distillate oil or natural gas. These generating units supply electricity during peak load periods, typically the warmest days in the summer and the coldest days in the winter.

The combustion turbines are pre-fabricated, self-contained electric generating units which combust fuel producing exhaust gases, that drive turbine/generators to produce electricity. Specifically, the combustion turbine units operate as follows: the engine continuously draws filtered air from an inlet plenum, compresses it and mixes it with fuel in the combustion chamber. The fuel is combusted producing hot gases, which are directed to a free turbine. The flow of hot gases exhausts through the turbine and rotates a drive shaft at 3,600 rpm which is coupled to the generator rotor. The generator rotor rotates inside a stator, consisting of a series of copper windings, which produces an electromagnetic field resulting in the generation of electric power. The hot gases are exhausted through the turbine to the atmosphere.

Tables 3.26 and 3.32 and 3.33 present the typical chemical compositions of natural gas, low sulfur distillate fuel oil and kerosene used as fuel in combustion turbines.[2] Tables 3.34 and 3.35 identify constituents in low sulfur distillate fuel oil and kerosene that have been identified on the CERCLA hazardous substance list as hazardous substances. Raw materials used in the operation of combustion turbine generators are identified in Table 3.36.

There is no solid waste or wastewater effluent stream generated during the combustion turbine generation process other than the discharge of non-contact cooling water that is used in Unit No. 8 to cool lubricating oils (see Section 3.4.2.3).

Unit Nos. 10, 11 and 12 use a smoke suppressant to control the visible emissions (opacity) associated with exhaust gases. Former Unit No. 9 also used a smoke suppressant. The suppressant is (was) continuously injected into the fuel at a rate of one gallon to 2,000 to 2,500 gallons of fuel prior to the combustion chamber. The suppressants that have been used include initially a barium and manganese based formula and later a cerium based formula.

The design of the New Unit No. 9 incorporates a water injection system as part of the combustion process. Demineralized water is injected into the combustion chamber to reduce the emissions of nitrogen oxides ("NO_x") in gases exhausted to the atmosphere. The water is consumed in the combustion process. The demineralized water is supplied by a contractor and

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[2] PSE&G notes that while the data in these tables are typical for the types of fuels burned in these types of units, PSE&G's combustion turbines burn fuels which comply with New Jersey's more stringent sulfur content regulations (set forth at N.J.A.C. 7:27-9) as well as the more stringent limit imposed in New Unit No. 9's Air Permit.

stored on site for use in the unit.

A residual not captured in the combustion turbine electric generation process is the flue gas resulting from fuel combustion. This residual is released via the exhaust stack to the atmosphere. The composition of the flue gas emitted varies dependent upon the fuel fired, the equipment design and the level of emission control. Station specific data on emission characteristics are limited. The EPRI PISCES Database and other relevant literature provide information on the identity of the trace constituents in the flue gas from boilers fired by either coal, oil or natural gas which have been identified by EPA under the Clean Air Act Amendments as hazardous air pollutants. This database also presents emission factors for these trace constituents. While EPRI has not completed work on the combustion turbine portion of this database, Attachment I provides the list of these trace constituents and their associated emission factors.

3.4.2 Ancillary Operations

3.4.2.1 Engine Cleanings

Combustion of fuel over time causes carbon deposits to build up in the engine's combustion chamber, reducing combustion efficiency of the unit. The combustion chambers are periodically cleaned to remove these carbon deposits. Three different methods have been used to perform these cleanings.

The first method involved the introduction of pulverized walnut (or pecan) shells into the combustion chamber with the engine running at idle speed. The walnut shells acted as a blasting agent to grind carbon deposits from the metal surfaces. The shells and the carbon deposits were then combusted and exhaust gases discharged through the unit's stack. (It is believed that the characteristics of the exhaust gases during these cleanings may have been similar to the exhaust gases during normal operation).

The second method involved the injection of untreated city water into the combustion chamber with the engine running at idle speed. The water was vaporized and the vapor exhausted to the atmosphere. The carbon deposits were combusted in the combustion chamber and exhaust gases discharged through the stack.

The third method involved the washing of the combustion manifold with the unit off-line with a solution of water and a cleaning surfactant. This technique has been and continues to be conducted once a year when the fuel source is switched from natural gas to oil. One frequently used surfactant is Penetone 19. The Material Safety Data Sheet for this product is available for inspection. The cleaning solution was initially discharged to the Station Sanitary Sewer which discharged to the Passaic Valley Sewerage Commission ("PVSC"). The solution is now collected in drums and disposed off-site by a contractor.

3.4.2.2 Purge Oil Collection System

The combustion turbines have an automatic purge system which allows unburned distillate oil to drain automatically to underground collection tanks upon unit shut down. The original collection tanks were periodically pumped and the oil was returned to above ground storage tanks for reuse as fuel in the combustion turbine.

Circa 1990, the auxiliary equipment associated with the purge system was upgraded to mitigate the potential for discharges occasioned by a purge valve malfunction. The upgrade included the removal of underground collection tanks and their replacement with new collection tanks inside concrete vaults which act as secondary containment. The purge oil gravity drains into these collection tanks and is automatically pumped via pipeline to an above ground fuel oil storage tank for reuse.

3.4.2.3 Equipment Coolers

Rotating equipment (e.g., rotors and drive shafts) within the combustion turbines must be lubricated with lube oil at bearing surfaces to minimize friction. The combustion turbines have lube oil reservoirs with capacities ranging up to 3,300 gallons (see Table 3.37). The lube oil is circulated to the bearing where it becomes heated in the process and requires cooling prior to reuse in the system. The lube oil was generally changed during routine maintenance. Table 3.38 identifies constituents in typical lube oil that are listed on the CERCLA hazardous substance list as a hazardous substance.

Lube oil is cooled by passing it through an air-cooled radiator. The lube oil in former Unit No. 8 (dismantled in 1980) was cooled by tubed heat exchangers using city water. The non-contact cooling cycle was a closed looped system. Unless operating conditions required otherwise, the cooling water would have been drained twice annually -- once in the summer to remove the anti-freeze and once in the winter to add anti-freeze. Anti-freeze was added to prevent freezing of the cooling water. Cooling water drained from the system was discharged to a sump pit that also collected storm water. The waters collected in the sump pit were routed to a catch basin and discharged to the Passaic River via Lawyers Ditch. A corrosion inhibitor was added to the cooling water to protect the tubing. Station records do not contain any information on the inhibitor that was used.

3.4.2.4 Stormwater Discharges

The design of the combustion turbines allowed stormwater to collect in the unit's equipment compartment. This stormwater would enter the unit through exhaust stacks. The stormwater would eventually drain to the floor of the equipment compartment. The stormwater in former Unit No. 8 would collect and be directed to a sump and was pumped via a catch basin to Lawyers Ditch. Stormwater from old Unit No. 9 and Unit Nos. 10, 11 and 12 would pass through the compartment and drain to the ground.

Lube oil or fuel oil drips and leaks on the equipment compartment floor may have mixed with the stormwater prior to discharge. Circa 1990, systems were installed on Units 10, 11 and

12 and incorporated in New Unit No. 9's design to collect storm water that collects in the combustion turbine units. These systems include piping which gravity feeds the water collected on the equipment compartment floor to a collection tank in a concrete vault. This water is then pumped to a double-walled, above ground storage tank. Periodically this water is either disposed of off-site at an approved facility.

3.5 House Heating Boiler

A York Shipley fire tube boiler was installed in 1979 for house heating. The boiler was physically small, approximately 10 feet long and 6 feet in diameter, and burned No. 2 Fuel Oil. This boiler supplied steam for house heating and hot water during the heating season. Hot water during the non-heating season was supplied by means of electric heaters. Auxiliary equipment included a fuel oil storage tank and condensate collection system. The boiler was removed from service in 1994.

Feed water for this boiler was city water, treated with trisodium phosphate. This boiler was a closed loop system. Until the chemical waste basin was removed from service circa 1984, boiler blowdown was routed to the basin where it was allowed to evaporate. After the chemical waste basin was removed from service, the blowdown was collected in a flash tank in the Switch House basement and pumped to the sewage pit, where it was discharged to the PVSC system. Station records concerning the frequency and the volume of blowdown are not available. Available information, however, suggests that the boiler was only blown down when a high level alarm was activated. The volume of blowdown was de minimis.

3.6 Yard Operations

This section describes the yard operations which were performed in support of electric production. These operations were common to all units and included fuel handling and storage, dock-side operations (e.g., dredging), and ash handling.

3.6.1 Coal Handling and Storage

Coal was the primary source of fuel for steam operations at Essex from 1915, when the first boilers were installed, until the late 1930s. Commencing circa 1953, fuel oil and later natural gas became the primary boiler fuel(s). The Station ceased using coal as a fuel in 1970.

Coal was delivered to the Station by barge and rail car. Coal was unloaded from the barges using the two coal tower clamshell buckets and placed on conveyors. Coal was unloaded from rail cars by means of a track hopper and placed on conveyors. The conveyors transported the coal to a Bradford Breaker where the coal was broken to a maximum size of two inches. Upon exiting the Bradford Breaker, the coal was directed via conveyor to coal bunkers for inside storage or to the yard for outside storage. Coal directed to the coal bunkers was fed by gravity from the bunkers into a Lorry Crane, which was a traveling hopper. The Lorry Crane dispensed coal into each stoker. Coal directed for outside storage was staged as reserve. Coal was conveyed to the boilers from outside staging areas, through a "grizzly" (metal grid) for removal of oversized materials and then to the coal bunkers. From the coal bunkers, the coal followed the same path into the stokers as described above.

Pulverizers were introduced into the system with the installation of high pressure boilers Nos. 25 and 26 in 1938. Coal was removed from the barges using a coal tower clamshell bucket and placed on conveyors leading to the Bradford Breaker. Coal exiting the Bradford Breaker was directed to the new coal bunker for Nos. 25 and 26 boilers, the remaining coal bunkers for the stoker boilers, or to the yard for outside storage. By 1941, on-site storage capacity for coal was approximately 134,000 tons. The outside coal storage area was not surrounded by a containment system. Coal exited the coal bunker for Nos. 25 and 26 boilers via Redler conveyors and transported to the pulverizer hoppers. Coal was then gravity fed into the pulverizers, where it was pulverized to the consistency of talcum powder and injected into the boilers through the burners under pressure, using air. Coal from the yard was conveyed via a grizzly to the coal bunkers and then to the pulverizers prior to introduction into the boilers.

Available information indicates that Station personnel reclaimed coal which entered the river during coal barge unloading operations. A clamshell on a railroad steam crane was used. The clamshell was capable of reaching approximately 25 feet out from the dock for a distance of approximately 100 to 125 feet along the dock. The reclaimed coal was used as fuel at the Station.

A supply of Coal Trol was discovered at the Station during demolition. Product packaging indicated that its use was to protect coal stored in outdoor areas from freezing. Station records do not indicate whether it was used, and if so, for what period of time.

3.6.2 No. 6 Fuel Oil Handling and Storage

The Station began to use No. 6 Fuel Oil circa 1933. Fuel oil was brought to the Station primarily by barge. It was unloaded at a barge unloading station at the dock and pumped via pipeline using barge pumps to the Station's fuel oil storage tanks. Circa 1942, Essex installed equipment to allow fuel oil delivery by railcar. Fuel oil was also delivered by truck. In 1973, an Amerada Hess Corporation underground fuel oil pipeline, originating at Hess' Bayonne terminal, was installed and placed into service. This pipeline was the primary source of No. 6 Fuel Oil for the Station through 1978.

A 20,000 barrel steel fuel oil storage tank (Fuel Oil Tank No. 1) was installed circa 1933 on a bed of sand inside a ringwall foundation which was supported by an 18" thick concrete mat. The ringwall partially served as a containment system. The tank was also surrounded by an approximately ten foot high earthen dike. The tank was equipped with a tank oil heater with 1,000 square feet ("sf") of heating surface. This tank was dismantled in 1990.

A 100,000 barrel fuel oil storage tank (Fuel Oil Tank No. 2), which was equipped with two suction heaters, was installed in 1951. It was installed on a bed of sand inside a ringwall foundation which was supported by a 12" thick concrete mat. The ringwall partially served as a containment system. The tank was also surrounded by an approximately twenty-five foot high steel wall on a concrete foundation. This tank is now used to store demineralized water for New Unit No. 9's water injection system.

3.6.3 Natural Gas Supply

The New Unit No. 1, which was installed in 1947, was designed to burn natural gas, in addition to coal and No. 6 Fuel Oil. Natural gas became available to the Station in 1951 when a Transcontinental Gas Pipeline Corporation natural gas supply pipeline was tied into a PSE&G natural gas line installed at the Station. Natural gas use at the Station increased with the installation of combustion turbines beginning in 1963. All combustion turbine units possessed the capability to burn natural gas. The Station's natural gas supply capacity was increased in 1986 by a tie-in with the Texas Eastern Gas Pipeline ("TETCO") natural gas pipeline at an off-site location.

All Station units which utilized natural gas as a fuel were equipped with scrubbers which collected moisture and other residuals in the natural gas including polychlorinated biphenyls ("PCBs"). Circa 1987, the scrubbers were collecting condensates with PCB contamination. These condensates were collected and drained to 55-gallon drums for storage and eventual off-site disposal.

3.6.4 No. 2 Fuel Oil and Kerosene Storage

No. 2 Fuel Oil and kerosene were used as fuels for combustion turbine Unit Nos. 9, 10, 11 and 12. These fuels were brought to the Station initially by barge. Subsequent to removal of the steam Station from service, No. 2 Fuel Oil and kerosene were brought to the Station by truck.

The fuels were stored in Fuel Oil Tank No. 3 which was installed in 1971. Fuel Oil Tank No. 3 has a capacity of 120,000 barrels and was constructed on a four inch sand bed underlain by a three foot thick concrete slab on wood piles at grade. The tank was surrounded by an earthen dike approximately ten foot high. A claymax liner was installed in 1989 inside the earthen dike containment to provide complete secondary containment for the tank. In 1990, this tank was upgraded by repairing the old floor, which involved installing a new floor with an underlay of an 80 mil polyethylene liner six inches above the old floor.

An 8,000 gallon above ground storage tank was installed in 1979 on a concrete pad for storage of No. 2 Fuel Oil for the house heating boiler. A concrete containment system was constructed in 1986 on a concrete foundation. Fuel was piped via an above ground pipe to the house heating boiler. This tank was removed from service in 1994.

3.6.5 Diesel Fuel and Gasoline Storage and Use

Diesel fuel and gasoline underground storage tanks were installed at the Station. A 1,000 gallon gasoline storage tank was installed in 1924 and a 1,000 gallon steel diesel fuel tank was believed to have been installed circa 1930. A 3,000 gallon steel diesel fuel tank was installed in 1952. A 1,000 gallon fiberglass gasoline tank had also been installed. Date of installation unknown. Station records documenting the removal of the 1924 tank have not been located. These remaining tanks were removed in 1988. Since 1988, fuel for vehicles has been supplied from an above ground tank and/or an off-site source. (See Section 4.5 and Table 3-39).

3.6.6 Ash Handling and Removal

Until 1947, as previously discussed, ash generated in the stoker boilers and Unit Nos. 25 and 26 boilers was deposited in the hoppers and transported to an ash pit, a 20 ft. deep wood-lined excavation with a reinforced concrete wall on the dock side. The ash pit was a settling basin with an overflow line to the Passaic River. The ash settled out and was removed by crane. The decanted water was discharged to the Passaic River.

The Station's ash handling systems were modified in 1947 with the construction of New No. 1 Unit. The new system included an ash sluice system and ash lakes. Ash generated after 1947 was quenched with river water and sluiced out to ash lakes. Dust which collected in the precipitator for New Unit No. 1 was sluiced to the ash lake if it could not be re-fired in the furnace. The ash lakes were man-made above ground structures constructed of earthen diked walls approximately nine feet high. The ash lakes had an overflow piping system for discharging ash lake overflow directly to the Passaic River. Like the ash pit, the ash lake functioned as a settling basin.

The ash produced was generally colelcted by material handling equipment on the propety for sale or other off-site disposition. Company records indicate that revenues were derived from the sale of this coal ash from 1950 through 1966. Although documentation for the pre-1950s is not available, it is believed that a market for coal ash existed during the pre-1950 period.

3.6.7 Refuse

Refuse generated at the Station was burned on site in a small incinerator unit during the period from 1915 to approximately 1950. The incinerator was a brick pit with a grate. The refuse was deposited in the pit and burned. Incinerator operations ceased circa 1950. Incinerator ash from the incinerator was removed using a crane bucket and placed in the adjacent ash pit. Circa 1950, the Station commenced using trash haulers for refuse disposal.

3.6.8 Sewage

From 1917 through 1927, sanitary sewage consisting of wastes from cafeteria, bathrooms and showers was collected and transported via pipeline to a cistern. No information is available with respect to the specific character of the wastes and whether, and, if so, what treatment of the wastes was performed there. Available information indicates that the cistern discharged to the Passaic River.

The cistern was abandoned in 1927. Sewage ejectors, receiving pits, sewage pumps and piping were installed and the Station's sanitary sewer piping system was connected to the PVSC system. Thereafter, all sanitary sewage from the Station was routed to the PVSC. Circa 1970, wastewater from the Station's laundry was also routed to the PVSC.

3.6.9 Dredging Operations

Dredging operations were routinely performed within the Passaic River adjacent to the Station by the Army Corps of Engineers ("ACOE") and PSE&G.

The ACOE dredged the lower Passaic River to maintain the navigational channel. PSE&G dredged the area in front of the inlet channel to maintain adequate flow of non-contact cooling water and insure adequate depth for barge ingress and egress to and from the dock fuel unloading area.

Table 3.40 contains available information concerning ACOE dredgings encompassing the period from 1917 through 1983.

Available Station records document PSE&G dredging from 1922 through 1975. These records may be summarized as follows:

July 1922 No recorded information is available to estimate quantities. (No information on

	disposal.)
May 1924	Approximately 10,972 cubic yards ("cu. yd.") of material were dredged. (Material was to have been disposed "according to law".)
May 1926	No recorded information is available to estimate quantities. (No information on disposal.)
Jan. 1928	12,300 cu. yd. of material dredged. (Material was to have been disposed "in accordance with law".)
Jan. 1929	10,019 cu. yd. of material dredged. (No information on disposal.)
Feb. 1932	15,055 cu. yd. of material dredged. (Material was to have been disposed "in accordance with law".)
May 1941	3,500 cu. yd. of material dredged . (Material disposed at sea)
July 1943	2,500 cu. yd. of material dredged. (No information on disposal)
Jan. 1946	8,000 cu. yd. of material dredged. (No information on disposal)
Dec. 1946	5,481 cu. yd. of material dredged. (No information on disposal)
April 1948	19,620 cu. yd. of material dredged. (Disposal of materials is uncertain)
Feb. 1956	7,680 cu. yd. of material dredged. (Material disposed at sea)
April 1967	27,000 cu. yd. of material dredged. (No information on disposal)
Feb 1975	81,781 cu. yd. of material dredged (Material disposed at sea)

Available Station records concerning PSE&G dredgings are available for inspection.

3.7 Demolition Activities

PSE&G retained Interstate Wrecking Company, Inc. to decommission and demolish the

Station steam Station. Malcolm Pirnie was retained to ensure that materials resulting from the demolition were handled and disposed in compliance with applicable regulatory requirements. The Essex steam Station consisted of four main structures: the turbine building area, the boiler house, the coal bunker, and the switch house. The structural demolition began in June 1990 and was completed in August 1992. The turbine building, boiler house and coal bunker were demolished. The cooling water intakes were sealed. The switch house was not demolished. The demolition consisted of the removal of all asbestos-containing material, mechanical equipment, electrical equipment, and structures. All structural metal removed during the demolition was salvaged by Interstate Wrecking. A total of 3,800 tons of scrap metal went to Naparano Scrap Metal and 10,702 tons of scrap metal went to Trenton Iron. Materials handling activities were generally documented. Relevant documents related to the demolition and related activities are available for inspection.

3.8 Substation and Switchyard Operations

Electrical power from generating stations is directed to switch yard and substation facilities ("Electrical Switching Facility" or "Facility"). Electric Switching Facilities have electric switching equipment which facilitate delivery of the generated electric power to customers at the desired voltage level over a system of wires ("Electrical Conductors"). The Electric Switching Facility and Electric Conductors system is collectively referred to as the utilities' transmission and distribution system. The Electric Switching Facility contains the above-ground equipment necessary to ensure reliable, safe and efficient control necessary for the delivery of electric power to customers. This equipment includes buses, transformers, breakers, disconnect switches, reactors, and certain low voltage control devices such as relays, potential transformers and current transformers. This equipment may be described as follows:

- Transformers convert electric energy from one voltage level to another to facilitate efficient transportation of power from one location to another and eventually for customer use. The transformers are oil-filled equipment. The oil provides a medium to dissipate heat generated within the transformer's core as a result of electric current flow and also acts as a dielectric insulator to isolate the transformer's internal components.
- Circuit breakers provide a mechanism to interrupt the current between electrical devices for system protection and maintenance. Breakers operate automatically on information from a relay or can be operated manually. Most breakers are oil-filled. The oil serves to extinguish electrical arcing formed by the separating contacts under load.
- Disconnects are manual switches to separate electrical components where and as necessary. Typically, disconnects are not oil-filled and are not designed to be operated automatically. Disconnects are used to provide the required electrical separation necessary to perform regular maintenance operations safely.
- Busses are interconnected copper tubes, supported by ceramic insulators mounted on rigid steel structures, which route electric power to and through equipment in the Electrical Switching Facility. Buses operate in the open air. No further insulation or cooling is required.
- Reactors provide a buffer between two electrical components to protect against surges of

current. Reactors can be oil-filled to provide a means of cooling the internal components. Most are not designed to contain oil.

- Relays, potential transformers and current transformers work as a system to provide protection for Electrical Switching Facility equipment in the event of a system failure. Potential transformers and current transformers are generally oil-filled.

Electrical power is distributed from the Electrical Switching Facility to electric conductors either by overhead wires or underground cables. Underground cables are utilized for transmission with high voltage transmission systems. These cables are generally encased in steel pipe for protection. They contain oil to act as a coolant and a dielectric insulator.

The oil contained in Electrical Switching Facility equipment and underground cables is referred to as transil oil, a dielectric mineral oil. The characteristics of transil oil are described in Tables 3.41 and 3.42.

When the Station commenced commercial operation circa 1915, it housed both indoor and outdoor Electrical Switching Facility equipment. The Electrical Switching Facility was expanded and upgraded in 1925 to tie the Station into PSE&G's high voltage transmission system. This connection enabled PSE&G to have a greater flexibility in the management of peak power demands. This expansion and upgrade included a system to maintain the quality of the oil used in the Electrical Switching Facility Equipment. This system which included above-ground piping, pumps, and a purification facility (containing filter press equipment) provided the Electrical

Switching Facility with the capability to route the oil in the equipment for purification and dehydration and subsequent reuse in connection with routing equipment maintenance. Oil impurities were entrained in the filters and disposed with the filters as a waste. Station records have not been located concerning disposal of these wastes. This system was upgraded circa 1940. It is believed that this system was removed from service circa 1970. Station-specific information has not been located concerning the actual date when the system was removed from service.

In 1936, a fire destroyed a major portion of the Electrical Switching Facility. Over the ensuing four-year period, the facility was rebuilt and expanded to accommodate the Station's upgraded generation capacity and the growth in the surrounding service territory. The Electrical Switching Facility was expanded again in 1953 (to facilitate the tie-in of additional distribution locations) and in the early 1970s (to allow the facility to receive high voltage transmission from outside the Station). An underground oil static cable was also installed in 1953 in place of a bus due to lack of required overhead clearance. Additional underground oil static cables were installed as part of an upgrade of PSE&G's high voltage transmission system.

Table 3.37 presents an inventory of the Electrical Switching Facility equipment that contains transil oil as of circa 1980.

PSE&G conducted a test of the oils in transformers at Electrical Switching Facilities in 1986 to check for the presence and/or levels of PCBs. The data did not disclose the presence of

PCBs in excess of 50 ppm in any Station transformer. PSE&G conducted a second test of oils in transformers at Essex in 1995 which confirmed the results of the initial test.

Tests performed on OCBs, potential transformers and current transformers from New Unit No. 1 in connection with the demolition indicate the presence of elevated levels of PCBs in the transil oil. In addition, these tests indicated elevated levels in the oil purification equipment and three 4,440 lighting transformers.

Tests performed on oil from reactors in 1994 and 1995 indicated that certain units contained elevated levels of PCBs. Records relating to laboratory analyses for the tests described in this section are available for inspection.

4.0 Regulatory Programs

This section presents a summary of relevant available information concerning certain PSE&G regulatory programs/activities and/or contacts with environmental regulatory agencies related thereto. Correspondence by and between PSE&G and environmental regulatory agencies concerning regulatory programs/activities are available for inspection.

4.1 Effluent Discharges

The Station supplemented steam electric generation capacity circa 1947 with the installation of New Unit No. 1 high pressure boiler and tandem compound double-flow turbine/generator, reaching its largest steam electric generating capacity.

The Station's management of non-contact cooling and wastewater effluents changed in 1947. New equipment and facilities for the management of bottom and fly ash were installed at that time. This equipment included new ash collection equipment (i.e., ash tanks and sumps), a new ash transfer system (i.e., piping and ash sluice pumps) and new settling facilities (i.e., ash lakes). The ash collection and transfer equipment for Nos. 25 and 26 boilers were also re-engineered to make use of the new settling facilities. This reengineering included the modification of the ash sluice trench. The modified sluice trench was connected directly to the ash pit overflow outfall. The ash pit was removed from service.

4.1.1 Circa 1948 Effluent Discharges

Circa 1948, after New Unit No. 1 commenced commercial operations, non-contact cooling and wastewater effluents were managed for discharge by outfall to the Passaic River as follows:[3]

4.1.1.1 Discharge Canal Outfall

(i) *Turbine Room Discharges to Discharge Canal Outfall*

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[3] Effluent discharges are depicted graphically on Figures 2.3 through 2.7.

Saltwater

Discharge and drains from #1-6 Condensers.

Discharge and drains from #11-12 Condensate Coolers.

Discharge and drains from #3-6 Generator Air Coolers.

Discharge and drains from #2-6 Turbo Air Pumps.

Discharge and drains from #6A Steam Jet Air Pump.

Discharge and drains from #2-6 Turbine Oil Cooler.

Discharge and drains from #7 Turbine H_2 & Oil Coolers.

Cooling water and gland leak-off #2-6A Circulators.

Cooling water and gland leak-off #4-5-6 Saltwater Pumps.

Cooling water and gland leak-off #1-4-5 Air Compressors.

Sump pump and steam syphon discharges.[4]

Condensate - City or Service Water

Seal catch-all drains #11 & 12 Circulators.

Seal catch-all drains #11 & 12 Condensate Pumps.

Seal catch-all drains #3 & 7 Saltwater Pumps.

Seal catch-all drains #2-6A Condensate Pumps.

Drain from #1 Condenser Hotwell.

Overboard from #2-6A Condensate Pumps.

(ii) *No. 2 Pump Room Discharges To Discharge Canal Outfall Indirectly Via Station Sewer*

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[4] These discharges were re-routed in 1959 directly to the Passaic River.

System

Saltwater

Cooling water #1-3 Primary Feedwater Pumps.

Cooling water #1-3 Secondary Feedwater Pumps.

Turbine seal evactor #1-3 Secondary Feedwater Pumps.

No. 16 Sump Pump and syphon.

Condensate - City or Service Water

Gland leak-off catch-alls #1-3 Primary Feedwater Pumps.

Gland leak-off catch-alls #1-3 Secondary Feedwater Pumps.

Freeblows on steam headers.

Overboard and drain from #7 Open Drip Tank.

Overflow from #7 Turbine seals.

Steam Trap discharge from chemical mix tanks.

Overflow from #3 Station Hotwell.

Boiler Water

Drains from #25 & 26 Boilers.

Feedwater Treatment

Drains from #11-12 & Triplex Chemical Mix Tanks drain to sewer.

(iii) *No. 3 Pump Room Discharges To Discharge Canal Outfall Indirectly Via Station Sewer System*

Saltwater

Cooling water #6-8 Boiler Feedwater Pumps.

Steam syphon from trench.

Discharge from steam header manifolds.

Condensate

Gland leak-off catch-alls #6-9 Boiler Feedwater Pumps.

Drains from #6-9 Boiler Feedwater Pumps.

Overflow and drains #5-6-7 Open Heaters.

Overflow #3 Surge Tank.

Freeblows and traps from steam headers.

(iv) *Fuel Oil Room Discharge To Discharge Canal Outfall Indirectly Via Station Sewer System*

Saltwater

Cooling water #1-3 Fuel Oil Pump Reduction Gears.

Condensate

L.P. Steam Traps on #1-3 Fuel Oil Pump Turbines.

(v) *Switch House Discharge To Discharge Canal Outfall Indirectly Via Station Sewer System*

Sump pump discharges condensate from steam traps and seepage.[5]

(vi) *Chlorine and Screen House Discharges to Discharge Canal Outfall*

Saltwater

Wash water for Canal Screens.

Condensate

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[5] This line was rerouted directly to the Passaic River in 1959.

Heating system traps.

(vii) *No. 1 Unit - Elev. 100'*

Saltwater

Cooling water #11-12-13 Mills.

Drain and overflow #11-12 Acid Cleaning Tanks.

Overflow from seal #11-12 Ash Tanks.

Condensate

Catch-all drains #11-12-13 Boiler Feedwater Pumps.

Drain from #11 Drain Tank.

Drain from Condensate System.

Boiler Water

Drains from #1 Boiler.

4.1.1.2 Ash Pit Overflow Outfall

Circa 1948, the ash sluice trench was modified and the ash pit was removed from service. The modified ash sluice trench was tied directly to the ash pit overflow outfall. Wastewater effluents routed to this modified outfall included the following:

- Surface runoff
- Laundry effluent
- Boiler Nos. 25 and 26 sluiceway effluents included boiler seal water overflow and miscellaneous leakage from piping and valves

- Surface water runoff and spillage from the chemical unloading area
- Miscellaneous roof and floor drains

4.1.1.3 Cable Vault Sump Pump Outfall

Groundwater and surface water runoff in an electrical cable vault located in the northwest section of property.

4.1.1.4 Ash Lake Overflow Outfall

- Overflow in ash lake from ash sluice from No. 1, No. 25 and No. 26 boilers
- Overflow in ash lake from Air Heater Wash Water from No. 1, No. 25 and No. 26 boilers

4.1.1.5 Drainage Ditch

Certain wastewater effluents were routed to a naturally occurring on-site drainage ditch which flowed to the Passaic River. Wastewater effluents routed to the drainage ditch included groundwater and surface water collections in the Station's other electrical cable vault.

Circa 1963, the following effluents were routed to the drainage ditch:

Boiler blowdown pit overflow

No. 8 combustion gas turbine building and equipment drain and non-contact cooling water

Surface water runoff

4.1.2 Circa 1970 Modifications to Effluent Discharge System

Circa 1970, the Station modified certain of the processes associated with the management of cooling and wastewater effluents. The principal modification involved the installation of a 288,000 gallon chemical waste basin. The basin was an above ground structure with a liner and a dike. Approximate dimensions of the basin were 50 ft wide, 100 ft long, and 8 ft deep. The basin discharge was routed to the former ash pit overflow outfall (hereinafter referred to as Discharge Serial Number - "DSN" 342). Certain of the wastewater effluents were re-routed to the basin for primary treatment prior to discharge to the Passaic River via DSN 342. These wastewater effluents included wastewaters from low pressure boiler blowdown, high pressure boiler air heater washes and high pressure boiler washes. This modification coincided with the termination of the Station's use of coal as a fuel, and the removal of the ash lakes and ash lake overflow outfall from service. The final modification involved a change in practice with respect to chemical cleanings. Spent cleaning solutions generated by the chemical cleaning of major equipment were no longer discharged to the Passaic River, but disposed off-site.

4.1.3 NPDES Permitting

Subsequent to the enactment of the Federal Water Pollution Control Act of 1972 and

USEPA's assumption of primary responsibility for implementation of the NPDES permitting program, PSE&G submitted a revised application for an NPDES permit in November 1973. This revised application reflected the cooling and wastewater management system described above. The application was supplemented in May 1974, when PSE&G advised USEPA that the low pressure and certain of the high pressure steam electric generating equipment had been removed from service. These submissions identified discharges directly to the Passaic River consisting of: river water for condenser and condensate cooling and miscellaneous heat exchanger cooling; condensate and city water leakage from equipment; roof and floor drains; and traveling screen wash water. These submissions also identified other discharges (i.e., fireside washes, boiler blowdowns and air heater washes) to the chemical waste basin and then to the Passaic River. In January 1975, USEPA issued PSE&G NPDES Permit No. NJ0000565 for Station outfalls DSNs 341 and 342 with an effective date of January 30, 1975.

By letter dated August 15, 1978, PSE&G advised the USEPA that it had placed on inactive status all steam electric generating equipment at the Station. PSE&G advised that it would, however, have periodic batch discharges of approximately 10,000 gallons per year of boiler blowndown and drains associated with the continued operation of a low pressure boiler for house heating. PSE&G further advised that these wastewater effluents would be routed to the chemical waste basin for primary treatment prior to discharge to the Passaic River. Operations of the remaining low pressure boiler were terminated in 1979 with the installation of a package boiler for house heating. The low pressure boiler remained inactive and was eventually dismantled and removed from the site circa 1990.

PSE&G submitted an application for renewal of the Station's NPDES permit in August 1979. The renewal application generally identified two outfalls to the River, DSNs 341 and 342, and a sanitary sewer connection to PVSC. Effluent described as rainwater or groundwater seepage from Station building sumps was identified as being routed to the discharge canal (DSN 341) or the overboard line adjacent to the discharge canal for discharge to the Passaic River. Annual flow was estimated at 50,000 gallons per year. No pollutants were identified as being present since all equipment had been deactivated, drained and/or flushed. With respect to DSN 342, the application indicated that approximately 25,000 gallons per year would enter the chemical waste basin -- 10,000 gallons would have been effluent from boiler blowdown and boiler drains and 15,000 gallons would have been rain water that would collect in the basin. The application indicated that there would be no discharge via DSN 342 to the Passaic River since the basin's outlet valve would remain closed and the influents would be allowed to evaporate in the basin.

Circa 1980, Station operations consisted of electric power generation using combustion turbines. Net generating capacity was 664,333 kW. Electric generation by use of combustion turbine did not involve the discharge of cooling or wastewater effluents to surface waters. The one low pressure boiler then in operation had been removed from service, as the steam used for house heating was then being supplied by a package boiler. Blowdown from the package boiler was initially routed to the chemical waste basin where it was evaporated. The blowdown was subsequently routed to a flash tank in the Switch House basement where it was pumped to the sewage ejector pit for discharge to the PVSC system. Circa 1980, effluent discharges from the

Station generally were limited to stormwater and groundwater seepage in buildings. These effluents were being routed to existing outfalls for discharge to the Passaic River.

The NJDEP issued the Station a renewal permit in 1986 which authorized the Station to discharge non-process waste waters, specifically untreated stormwater, through three outfalls. The permit provided that neither discharge of non-contact cooling water via the discharge canal outfall nor discharge of process water via the former ash pit overflow outfall would be permitted without prior approval from NJDEP since the steam units had been retired.

PSE&G submitted a permit renewal application for the Station in 1990. Supplements to this application were filed. Circa 1990, field work activities associated with the demolition of the Station commenced. Demolition of the Station was completed in 1992. Equipment remaining at the Station includes combustion turbines, above ground fuel oil storage structures and electrical switching equipment located in the Switch House. The NJDEP issued a renewal NJPDES permit for the Station effective July 1995 permitting the discharge of stormwater from existing process areas associated with the combustion turbines and oil storage structures.

4.1.4 Discharges to Passaic Valley Sewerage Commission

In 1927, the Station's sanitary sewer system was connected to the PVSC System. Circa 1970, wastewaters from the Station's laundry were also routed to the PVSC.

In 1975, the PVSC advised PSE&G that all industries were required to remove incompatible pollutants prior to discharge to the PVSC system and requested certain information regarding Essex's discharges to the PVSC and to the Passaic River. PSE&G's response indicated that the only discharge to the PVSC from the Station was sanitary wastes. PSE&G supplied analytical results for sanitary waste waters collected at its Hudson Generating Station since no data were available relative to the effluent discharged from Essex. PSE&G stated that the Hudson data were deemed to be representative of the sanitary waste effluent from Essex. PSE&G provided analytical data used in NPDES applications relative to the quality and quantity of pollutants present in effluents discharged to the Passaic River via two outfalls: (1) the "Main Discharge Canal" which consisted of river water treated with chlorine used for non-contact cooling; and (2) the "Overboard Line" which consisted primarily of blowdown from the low pressure boiler used for house heating and, occasionally, wash waters from air heater and fireside washes.

The quantity of effluent discharged to PVSC decreased as Station operations were removed from service. In 1988, PVSC requested and PSE&G completed a Questionnaire for Potential Large Industrial User. PVSC forwarded to PSE&G in 1989 an application for a sewage connection permit. PSE&G completed the application, advising the PVSC that the Station did not produce process wastes and there were no manufacturing process discharges to the PVSC system. The Station's sanitary sewer system continues to discharge to the PVSC system.

4.2 Air Permits and Emissions

New Jersey amended its air pollution control statute in 1967 to provide, in pertinent part, that "no person shall construct, install, or alter any equipment or control apparatus" unless an application had been filed and the NJDEP had issued a permit to construct and/or a certificate to operate ("Air Permit") such equipment or apparatus. The statute also provided the NJDEP with the requisite discretion to phase in the statutorily mandated air permit program. Commencing in 1968, the N.J. Department of Health ("NJDOH") and then the NJDEP adopted implementing regulations under N.J.A.C. 7:27-8.1, et seq. specifying the types of equipment requiring an air permit, if such equipment were installed, constructed or altered after the dates specified in the regulations. In effect, the regulations exempted from the air permitting requirements equipment which was constructed or installed (and not altered) after a given date ("Grandfathered Equipment").

Section 2.0 above describes the various types of equipment at Essex and provides the installation dates for each. Although the types of equipment at Essex (e.g., boilers, fuel oil tanks) were among the types of sources requiring air permits under N.J.A.C. 7:27-8.1 et seq., the equipment was deemed Grandfathered Equipment in that it was constructed prior to the designated date triggering an air permit.

Although much of the equipment at Essex was not subject to the requirements of N.J.A.C. 7:27-8.1 et seq., air permits have been obtained for the following Station equipment:

- PSE&G installed an Auxiliary Boiler, commonly referred to as a "House Heating Boiler" in 1979. The boiler had a maximum heat input of 4.0 MMBtu/hr. PSE&G applied for and was issued an Air Permit for this boiler in 1979. The boiler was removed from service in 1994, and its Air Permit was canceled.

- PSE&G installed an 8,000 gallon fuel oil tank in 1979 to serve the House Heating Boiler referred to as the "No. 2 Fuel Oil Tank at the Switch House". Although an Air Permit had been issued for this tank, a subsequent review indicated that no permit was actually required for this tank because it had a capacity of less than 10,000 gallons and stored a volatile organic liquid with a vapor pressure of less than 0.02 pounds per square inch absolute ("psia") at standard conditions. This tank was removed from service in 1994 and the Air Permit was canceled at or about that time.

- Combustion turbine Unit No. 9 was replaced in 1990 with a new state-of-the-art combustion turbine unit ("New Unit No. 9"). The Station applied for an Air Permit in 1989 to operate New Unit No. 9 using natural gas. PSE&G conducted ambient air quality studies in connection with the preparation of the application. Mathematical modeling, which relied upon manufacturer's emission data and proposed unit operations, was used to determine whether the proposed Unit 9 would cause or significantly contribute to an exceedance of an ambient air quality standard. In conjunction with the Unit 9 modeling studies, less rigorous modeling studies were conducted for Units 10, 11 and 12, using estimates of exhaust gas characteristics as model inputs. The modeling studies for Units 10-12 was performed to identify issues that might arise if the modeling study for Unit 9 would have predicted the potential to cause an exceedance of a significant impact level.

- NJDEP issued an Air Permit/Certificate in 1990 for New Unit No. 9 which was amended in 1993, based upon PSE&G's supplementary application, to allow New Unit No. 9 to burn natural gas as the primary fuel and distillate oil as a secondary fuel. This Air Permit, in part, requires stack testing every five years for NOx, Carbon monoxide ("CO"), non-methane hydrocarbons, total suspended particulates ("TSP") and PM-10. In addition, it required the installation and operation of a continuous emission monitor ("CEM") to record NO_x, CO and O_2 emission data. Annual emission reports for the emission years 1990 and 1992 through 1995; and data from the CEMs for the years 1990 through 1995 are available upon request.

In early 1990, Congress enacted the Clean Air Act Amendments of 1990 ("CAAA"). New Jersey also adopted major amendments to its air pollution control statute in 1993. Each of these acts and their implementing regulations established supplemental requirements and/or standards relative to the control of air pollution, certain of which were applicable to the Station.

Title V of the CAAA requires states to develop and implement facility-wide operating permit programs. The USEPA and NJDEP promulgated regulations establishing facility-wide operating permit programs ("Operating Permit"). In anticipation that the NJDEP might require applicants for Title V permits to submit ambient air quality analyses (for certain criteria pollutants and TSP) with such applications, PSE&G conducted preliminary, in-house modeling studies for Unit Nos. 10, 11 and 12 between 1992 and 1995. Sensitivity analyses were conducted in 1994 and 1995 to address, among other things, uncertainties in model inputs, (e.g., emission rates, exhaust gas flow and temperature and exhaust gas velocity) the complexity of the arrangement of structures surrounding the stacks, and changes in stack heights.

PSE&G, pursuant to the Operating Permit regulations, submitted an operating permit application for all significant sources at Essex to the NJDEP in August 1995. The final regulations adopted by NJDEP did not require the conduct of ambient air quality studies. NJDEP advised PSE&G in January 1996 that its application was timely filed and administratively complete. The application is currently undergoing technical review by the NJDEP.

In addition to the requirements to apply for an Operating Permit, the CAAA, the 1993 New Jersey Act and their implementing regulations impose other requirements relative to the control of air-borne emissions from Essex. In this regard, PSE&G has, among other things: (1) made submittals to NJDEP relative to applicable NO_x RACT requirements including a system-wide NO_x Emissions Averaging Plan which was approved by NJDEP in November 1995; (2) made submittals to NJDEP relative to applicable volatile organic compounds ("VOC") RACT requirements; and (3) filed requisite data and reports with USEPA and NJDEP.

PSE&G also has conducted a limited number of stack tests at Essex. These include: (1) a series of stack tests on one stack at Unit 10 was performed to determine whether the TSP emission rates were typical of PSE&G's fleet of combustion turbines and the extent of which TSP is present in stack gases due: to the combustion process; background concentrations in the ambient air; or particulates added to the ambient air that passes through the housing surrounding the combustion turbine; and (2) a special study to investigate the reentrainment of exhaust gases through the combustion turbines' air intakes.

Documents, correspondence, data, and written studies are available for inspection.

4.3 DPCC/DCR/SPCC Programs

Beginning in the mid 1970s with the promulgation by the USEPA of regulations pursuant to Section 311 of the Clean Water Act, PSE&G was required to prepare a Spill Prevention Control and Countermeasures ("SPCC") Plan for Essex. Pursuant to these USEPA regulations, PSE&G developed and implemented an SPCC Plan for the Site which set forth specific information with respect to the facilities, equipment and personnel at Essex relating to the storage of oil at the Station as well as preventative measures and spill response plans for any spill of oil into navigable waters.

Subsequently, the NJDEP developed a substantially similar regulatory program pursuant to its authority under the New Jersey Spill Compensation and Control Act. This state regulatory program, which is codified at N.J.A.C. 7:1E-1 et seq., required PSE&G to prepare and to file with the NJDEP a Discharge Prevention, Containment and Countermeasures ("DPCC") Plan and a Discharge Cleanup and Removal ("DCR") Plan. The substance and purpose of the DPCC and DCR Plans required by the NJDEP and the SPCC Plan required by USEPA were essentially similar; however, the DPCC/DCR regulations expanded the scope of the program to include discharges of hazardous substances.

Subsequent to the adoption of these regulations, PSE&G prepared a consolidated SPCC and DPCC/DCR Plan. This consolidated Plan was submitted to the NJDEP in 1977. Subsequent to this submission, the Station prepared revised Plans in response to a series of NJDEP comments. The Plan received final NJDEP approval in 1986. A list of SPCC/DPCC/DCR applicable storage and processing equipment (including underground storage tanks ("USTs")) from circa 1980, through January 1996 are presented on Table 3.37. The list does not include SPCC/DPCC applicable storage and processing equipment associated with the steam electric generating facilities which had been removed from service as of 1978.

PSE&G has periodically updated, revised and supplemented its SPCC/DPCC/DCR Plan for the Station in accordance with the requirements of applicable state and federal regulations. These are on-going regulatory programs and PSE&G continued to have contact with NJDEP and, from time to time, USEPA concerning issues relating to its SPCC/DPCC/DCR Plan for the Station.

Pursuant to the Oil Pollution Act of 1990 ("OPA"), PSE&G was required to submit a

Facility Response Plan ("FRP") for Essex in that the Station was, as of the applicable trigger date, a non-transportation-related onshore facility. PSE&G submitted its FRP to USEPA on February 18, 1993.

Upon completion of its initial review in June 1993, USEPA requested additional information. This information was submitted in July 1993. In July 1994, USEPA advised PSE&G that it had conducted another initial review and requested additional information. This information was submitted in September 1994. As of this date, PSE&G has not received notice of final agency action with respect to the FRP.

Available correspondence by and between PSE&G and relevant regulatory agencies relating to SPCC/DPCC/DCR/OPA issues is available for inspection.

4.3.1 Spill Discharge History

The Station was an industrial operation that involved the handling and storage of materials (primarily coal and oil). Spills and discharges that may have involved releases to the environment occurred. Housekeeping policy and practice was directed at prevention, early detection and expeditious corrective action. While PSE&G's file search is not yet complete, this section presents a summary of discharge and spill incidents for which documentation has been located to date, involving releases to the environment as detailed below:

- In June 1973, solidified No. 6 Fuel Oil (Bunker C Fuel Oil) in a fuel oil heater became heated, liquefied, and drained into a sump tank in the fuel oil room causing the tank to overflow. The oil that overflowed the tank entered the Station's drain system and flowed into the Passaic River. Spill response measures were performed by a contractor. There is no documentation available estimating the quantity of material discharged. The discharge was reported to the United States Coast Guard ("USCG") which responded. Corrective actions were implemented with USCG oversight. There is no record that sampling of any media was performed. The USCG issued a notice of violation ("NOV") which was resolved.

- In July 1973, No. 6 Fuel Oil leaked from a fuel oil heater valve causing oil to enter the Station's drain system and flow into the Passaic River. Spill response measures were performed by a contractor. There is no documentation available estimating the quantity of material discharged. The discharge was reported to the USCG, the USCG responded, and corrective actions were implemented with USCG oversight. There is no record that sampling of any media was performed. The USCG issued a NOV which was resolved.

- In November 1974, No. 6 Fuel Oil leaked from a valve on a fuel oil heater, entered the Station's drain system and flowed into the Passaic River. Available information indicates that approximately 40 gallons of fuel oil were discharged. Spill response measures were performed by Station personnel. The discharge was reported to the USCG. The USCG responded, and corrective actions were implemented with USCG oversight. There is no record that sampling of any media was performed. The USCG issued a NOV which was resolved.

- In October 1975, a thin narrow film of material was observed along the dock front. As the tide receded, it appeared that the material was entering the river from DSN 342. The material was described as a pale, bluish-gray substance; however, there was not enough material present to collect a full sample. The material lacked the characteristic rainbow spectrum sheen that an oil droplet displays over water. Further investigations suggested that the material was a detergent, cleaning agent or non-petroleum type substance which had entered the flow drain system of the low pressure boiler area. The USCG, NJDEP, USEPA, and the PVSC were notified by Station personnel. The estimated quantity of material was one to two quarts. Station personnel cleaned up the substance. One sample was collected; however, due to the limited sample volume, all that could be concluded was that the material was not oil. Available Station records do not indicate any further regulatory actions as a result of the incident.

- In January 1976, during a routine inspection by representatives of the PVSC, a black oily liquid was observed being pumped from a manhole near the Station onto the ground where it then flowed to Lawyers Ditch, a tributary of the Passaic River. The quantity and constituent substances of this discharge are unknown. PSE&G employees complied with the PVSC request to cease the pumping operation immediately. It is unknown whether any remedial actions were taken with respect to this discharge.

- In October 1989, PSE&G notified the NJDEP hotline of a small leak detected at Fuel Oil Tank No. 1 during a tank cleaning associated with the planned retirement of the tank. Several gallons of No. 6 Fuel Oil appeared outside the tank in the six inch area between the tank and its concrete containment. The oil most likely appeared because the steam and high pressure water was used to remove solidified No. 6 Fuel Oil from the tank. The oil was then forced out of some of the small corrosion openings that had developed around rivets which were part of the tank's construction. PSE&G cut holes in the tank floor to inspect the ground under the tank. This inspection verified that oil leakage was limited and that there was no potential hazard to the ground water or surface water.

  When Fuel Oil Tank No. 1 was demolished in September 1990, PSE&G re-examined the ground under the tank and found oil-soaked soil in the containment at the circumference of the tank, which was collected in plastic bags and placed in the Station's hazardous waste dumpster. There was some oil-soaked soil in the area of the tank sump. This area did not have a heavy concentration of oil; however, PSE&G removed several cubic yards of material, excavating as much as two feet below grade. There are no other records related to this spill.

- In June 1990, a kerosene leak from an above ground storage tank was detected. The kerosene that leaked from the tank was contained in the tank's secondary containment system, an earthen dike with a claymax liner. Approximately 3,000 gallons of kerosene entered into the secondary containment system. Response measures were initiated by Station personnel and completed by a contractor. None of the material was discharged to the ground and/or to the waters of the State. The leak was reported and actions to curtail the leak and upgrade the tank to prevent future leaks were implemented with NJDEP oversight. Sampling of environmental media was not performed.

- In July 1990, a discharge of No. 4 Fuel Oil occurred at a relief plug in a pipeline pig-catcher being used in an Amerada Hess fuel oil transfer pipeline located at the Station. As a routine practice, Amerada Hess used No. 4 Fuel Oil to flush its transfer pipeline following delivery of No. 6 Fuel Oil to the Station. Discharge response measures were initiated by Amerada Hess personnel and completed by an Amerada Hess contractor. Approximately 800 gallons of No. 4 fuel oil were discharged to the ground. None of the material migrated to the Passaic River. The discharge was reported to NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In January 1991, a leak of kerosene occurred in a below ground fuel oil delivery line for a kerosene storage tank. Approximately 13,000 gallons of kerosene were discharged into the ground. Seepage from the discharge migrated to the Passaic River. Discharge response measures were initiated by Station personnel and completed by a contractor. The discharge was reported to NJDEP, USCG and USEPA and corrective actions were implemented with NJDEP and USCG oversight. The USCG issued a NOV which was resolved. The NJDEP also issued a NOV requiring PSE&G to implement a remedial action program. PSE&G resolved the NOV by entering into a Memorandum of Agreement ("MOA") pursuant to which a site remediation program was implemented. The site remedial program included limited media characterization, excavation and off site disposal of contaminated soils and a groundwater recovery and monitoring program; the treated groundwater was discharged to the Passaic River. PSE&G completed the site remedial program and the NJDEP issued PSE&G a No Further Action ("NFA") Letter in June 1994.

- In May 1992, a discharge occurred in an aboveground portion of a 26 kV cable dielectric oil pipeline. Approximately 40 gallons of dielectric transil oil were discharged to the ground surface. The discharged material did not migrate to the Passaic River. Response measures were initiated by Station personnel. The discharge was reported to NJDEP and corrective actions were implemented. Sampling of environmental media was not performed. No violation was issued.

- In May 1992, a leak occurred in a drum containing transil oil causing a discharge of approximately one gallon of transil oil to the ground. The discharged material did not migrate to the Passaic River. Discharge response measures were performed by Station personnel. The discharge was reported to NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In July 1992, petroleum hydrocarbon-contaminated soil was encountered in an excavation. The source of the contamination was not identified. The discharge was reported to NJDEP and corrective actions were implemented. Corrective actions involved the excavation of soils in a discrete area visibly contaminated with petroleum hydrocarbons. Sampling of environmental media was not performed.

- In November 1992, a leak occurred in a fuel oil line for a combustion turbine unit. Approximately 50 gallons of kerosene were discharged into the ground. The kerosene did not migrate to the Passaic River. Discharge response measures were initiated by Station personnel and completed by a contractor. The discharge was reported to the NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In November 1992, a vent valve from an overhead section of a fuel oil line to a combustion turbine unit opened causing a discharge of approximately 3,000 gallons of kerosene to the ground. The kerosene did not migrate to the Passaic River. Discharge response measures were initiated by Station personnel and completed by a contractor. The discharge was reported and corrective actions implemented with NJDEP oversight. Sampling of environmental media was performed. PSE&G implemented a site remedial program under an MOA with the NJDEP. The program included post-excavation soil sampling. A Remedial Action Report is currently being prepared.

- In January 1993, a leak occurred in an above ground purge fuel oil line for one of the combustion turbine units. Approximately 15 gallons of kerosene were discharged to the ground surface. The kerosene did not migrate to the Passaic River. The discharge was reported to the NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In September 1993, a transformer cooling radiator failed causing a discharge of approximately 900 gallons of mineral oil to the ground surface. The extent of the discharge was limited by the presence of a firewall under the transformer. The mineral oil did not discharge to the Passaic River. Discharge response measures were initiated by Station personnel and completed by a contractor. The discharge was reported and corrective actions implemented with NJDEP oversight. Sampling of environmental media was performed. PSE&G implemented a site remedial action program under an MOA with the NJDEP. The program included the excavation and off-site disposal of contaminated soils. A Remedial Action Report for this remedial program was submitted to the NJDEP. NJDEP issued a NFA letter in June 1996.

- In October 1993, approximately 30 gallons of transil oil were discharged to the ground during the course of an underground electrical transmission line repair project. The transil oil did not migrate to the Passaic River. Discharge response measures were performed by Station personnel. The discharge was reported to the NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In January 1994, a leak occurred in an above ground fuel pipeline causing the discharge of approximately 5 gallons of kerosene to the ground surface. The kerosene did not migrate to the Passaic River. Discharge response measures were performed by Station personnel. The discharge was reported to the NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In March 1994, a leak occurred in an above ground fuel pipeline causing the discharge of approximately 5 gallons of kerosene to the ground surface. The kerosene discharged did not migrate to the Passaic River. Discharge response measures were performed by Station personnel. The discharge was reported to the NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In June 1994, a discharge of purge oil from an above ground fuel oil line occurred due to the failure of a fuel pump. Approximately four gallons of kerosene were discharged to the ground surface. The kerosene did not migrate to the Passaic River. Discharge response measures were performed by Station personnel. The discharge was reported to the NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In August 1994, a discharge of coolant from a gauge glass on a combustion turbine unit cooling tower occurred as a result of an equipment malfunction. Approximately two gallons of oil were discharged to the ground. The coolant did not migrate to the Passaic

River. Discharge response measures were performed by Station personnel. The discharge was reported to the NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In September 1994, a kerosene residue was observed on the ground surface. The source of the residue was not identified. The quantity of residue was estimated at approximately two gallons. The residue did not migrate to the Passaic River. Discharge response measures were performed by Station personnel. The discharge was reported to the NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In October 1994, a 230 kV above ground oilstatic cable piping failed causing a discharge of mineral oil to the ground surface. Approximately 15 gallons of mineral oil were discharged. The mineral oil did not migrate to the Passaic River. Discharge response measures were performed by Station personnel. The discharge was reported to the NJDEP and corrective actions were implemented. Sampling of environmental media was not performed.

- In May 1995, during the demolition of the old Unit No. 9 combustion turbine, subsurface deposits of lubricating oil and kerosene were encountered. Approximately 2,900 gallons of lubricating oil and water were encountered. No estimate of the quantity of kerosene encountered is available. The discharged materials did not migrate to the Passaic River.

Discharge response measures were performed by Station personnel. The discharge was reported to the NJDEP. No NOV was issued. Sampling of environmental media was performed. PSE&G implemented a site remedial action program under a MOA with the NJDEP. The program included the removal of the free product and excavation and off site disposal of contaminated soils. PSE&G submitted a Remedial Action Report to NJDEP in July 1996.

Available correspondence by and between PSE&G and relevant regulatory agencies concerning these spill incidents is available for inspection. Available reports concerning sampling of environmental media and any reports of corrections are also available for inspection.

4.4 Hazardous Waste Management

The Resource Conservation and Recovery Act ("RCRA") provides the basic framework for regulation of hazardous waste. RCRA was adopted in 1976 as a revision and expansion of the Solid Waste Disposal Act of 1965. It introduced a nationwide program for management of hazardous wastes by controlling the generation, transportation, treatment, storage and/or disposal of hazardous waste through a comprehensive system of hazardous waste management requirements. The RCRA statute, inter alia, directed USEPA to develop standards for handling, tracking and disposing of hazardous wastes. USEPA adopted certain implementing regulations in 1980.

RCRA regulations create an elaborate system for tracking hazardous waste from the time it is generated until its ultimate disposal. RCRA divides the universe of entities that shepherd hazardous waste through its life cycle into categories. Generators are one such category and include "[a]ny person, by site, whose act or process produces hazardous waste." Generators bear responsibility for determining whether their solid waste is hazardous. Upon making such a determination, they must: (1) obtain a hazardous waste identification number from USEPA; (2) carefully package and label wastes; (3) ship them to an authorized treatment, storage and disposal facility; and, (4) prepare a manifest which tracks the waste from the generator's site to its ultimate disposal site. Generators must biennially submit reports on waste generating activities.

RCRA provides that States may establish their own hazardous waste programs so long as they meet or exceed minimum USEPA requirements. Over period from 1978 through 1981, New Jersey adopted regulations implementing a hazardous waste program consistent with federal requirements, (See N.J.A.C. 7:26-1 et seq.). Pursuant to the New Jersey Solid Waste Management Act (N.J.S.A. 13:1E-1 et seq.) These regulations imposed requirements on generators associated with, inter alia, the management for off-site disposal of hazardous wastes. These regulations require, inter alia, that generators: (1) have an USEPA generator I.D. No.; (2) complete a USEPA/NJDEP-approved hazardous waste manifest form in connection with the off-site disposal of hazardous wastes; (3) file with the NJDEP an annual report of such shipments; and, (4) retain manifests and annual reports for a period of three years.

In 1980, the Station obtained a USEPA generator number (No. NJD000574000). The Station submitted Hazardous Waste Generator Annual Reports to the NJDEP thereafter.

The Station's Hazardous Waste Manifests for the years 1989 through 1995 and Hazardous Waste Generator Annual Reports for the years 1984 through 1995 are available for inspection.

4.5 Underground Storage Tanks

New Jersey enacted a statute in 1986 (as amended in 1990) providing for, inter alia, the registration of underground storage tanks ("USTs"). Station USTs were identified in connection with the preparation of the SPCC/DPCC/DCR Plan (see Table 3.37). The Station initiated the registration process for certain of the USTs then at the Station. At that time, there were twenty-five USTs at the Station.[6] These USTs are identified in Table 3.39.

The twenty-five USTs fall into three categories: twenty-one purge oil collection USTs for the combustion turbine generations; three USTs used for vehicle fuel storage; and one UST used for lube oil storage.

With respect to the three vehicle fuel storage USTs, records indicate the following: two

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[6] As discussed in Section 3.6.5 above, a 1,000 gallon steel UST for diesel fuel oil storage had been installed circa 1924. Records are not available with respect to the removal of this tank.

were of steel construction and one was fiberglass; the 3,000 gallon diesel UST was installed in 1951; and there is no indication of an installation date for the other two USTs. Records relating to the regulatory registration and compliance with then-applicable NJDEP regulatory requirements with respect to these three USTs are incomplete. There is an indication that the 3,000 gallon diesel UST was registered pursuant to NJDEP regulations. In April 1988, all three of these vehicle fuel USTs were removed, according to available records.

The lube oil UST was discovered in 1989 under the coal tower. It was cleaned and removed by a contractor in September 1989. There are no records indicating whether it was registered, nor is there any indication of its size or condition.

The twenty-one purge oil USTs were installed for the combustion turbines. These USTs were not initially registered with the NJDEP because, as flow through process tanks, they were exempt from regulation under then-applicable NJDEP rules. Records indicate that circa 1990, five of these USTs were removed. The remaining sixteen USTs were registered with the NJDEP after a regulatory amendment required such registration. In 1992, PSE&G instituted closure and removal of these sixteen USTs pursuant to applicable NJDEP regulations and with NJDEP oversight. Site assessment work related to these UST removals is on-going.

Relevant records relating to Station USTs are available for inspection.

4.6 Floods, Fires and Other Incidents

Based on available inforamtion, several floods, fires and explosions occurred at Essex over the operating life of the Station. These incidents are summarized below.

Explosion and Fire -- A & B Group Selector Oil Switches and Equipment

An explosion and fire occurred on the "A & B Group Selector Oil Switches and Equipment" on May 16, 1927. Damage was extensive, necessitating the replacement of nine barrier walls in the oil circuit breaker compartments and forty-two cell doors. Repairs were made to the A & B Group selector oil switches, disconnecting switches, current transformers, control wiring, cable compartments, and compartment doors in the 4th and 5th floors of the Switch House.

Fire on Fifth Floor Switch House

A fire occurred in the Switch House at Essex on December 28, 1936. Relevant file information describing the maintenance work that was performed to repair the damage to the Switch House is available. Section 3.8 above provides additional information relative to these repairs.

Fire on Sixth Floor Switch House

On August 19, 1938 at 6:38 p.m., a bus short circuited, igniting a fire between Nos. 2 and

3 phases on the new M-group tie bus on the sixth floor of the Switch House. This fire damaged the 13,000 volt bus, bus insulators, disconnecting switches, and compartment structures and doors. Repairs were completed on or before September 21, 1938.

Dock Collapse

On September 14, 1948, the dock collapsed between the coal tower and discharge canal. Although the dock had been recapped in 1937, the support piles had been installed in 1915. As a safety precaution, the small section of the dock which remained after the collapse was removed. Both sections of the dock were completely rebuilt.

Storm Damage

Various ancillary equipment and building structures (e.g., cracked lights and windows, building roofs, screen doors), were damaged during a severe wind storm which took place on November 25, 1950.

Flood

Many areas of the Essex property were flooded during the "NorEaster" (Northeastern) storm of March 6, 1962. During this storm, available records indicated that river elevation in the vicinity of the Harrison Gas Plant upriver of Essex reached 7.78 ft. above mean sea level. Cars parked on Station property were caught in waters which reached the elevation of a standard car's steering wheel.

No. 6 Unit Condenser Explosion

An explosion occurred in the Unit No. 6 condenser circa 1971. No records, other than photographs, have been located relative to this event.

Unit No. 10 Fire, 103 Inlet Filters

A fire occurred on No. 10 Unit, 103 Inlet Filters on June 27, 1994 at 2:39 p.m. The local fire department responded and extinguished the burning filters. No release of materials was reported.

No. 9 Gas Turbine Fire

The old Unit No. 9 combustion turbine was destroyed by fire on January 3, 1989. The fire began at approximately 8:00 p.m. when lube oil ignited. Foam and chemical fire protection systems were activated. Station personnel used a 150 lb cylinder of "K" dry chemical on the fire. The Newark Fire Department was called and the fire was extinguished by approximately 8:45 p.m. The unit was damaged beyond repair and was eventually demolished in 1995. A New Unit No. 9 was constructed in the early 1990s to replace the damaged unit.

Flood

In December 1992, a storm caused excessively high tides. Flood waters inundated the Station. Available information indicates that these flood waters did not rise over the level of any secondary containments. There is no record of a release of a hazardous substance as a result of this flood.

4.7 Environmental Media Studies/Analyses

Analytical data from environmental media sampling at Essex may be summarized as follows:

- In November 1989, approximately 6,000 cu. yd. of soil was excavated in connection with the preparations for New Unit No. 9 foundation construction. Analysis was performed to conduct a waste classification pursuant to NJDEP solid waste regulations. Excavated soils were classified as ID 27 non-hazardous waste and recycled as asphalt aggregate.

- As a result of a kerosene delivery pipe failure discovered on January 28, 1991, approximately 13,000 gallons of kerosene was discharged into the ground. During remediation of the discharge, periodic groundwater monitoring was conducted. Final groundwater sampling results submitted to NJDEP in 1992 reported levels below published standards for groundwater classification Class IIA cleanup standards. NJDEP has issued a NFA letter.

- During demolition of the Steam Station in 1991, PCBs were found to be present in several pieces of electrical switching equipment for No. 1 Unit. The foundation and surrounding soil were sampled. The sampling from the concrete foundation had elevated levels of PCBs which were remediated. Post-remediation sampling indicated that the remaining concrete and surrounding soil levels were below NJDEP cleanup guidance levels for residential areas.

- Post-excavation soil samples taken in an area impacted by a discharge of 3,000 gallons of kerosene in November 24, 1992 indicated non-detects for VOCs. A Remedial Action Report is currently being prepared.

- Following the remediation of the area under a 132-1 transformer phase which had a radiator fail in 1993, post excavation samples were taken. A Remedial Action Report was submitted to NJDEP in May 1996.

- During demolition of old No. 9 Unit in April 1995, approximately 2,900 gallons of oil and water were found under the foundation. Kerosene was also detected during post-excavation sampling and additional soils were excavated. The combustion turbine, including the foundation, was demolished and the soil surrounding the unit was excavated. Post-excavation soil and groundwater indicated that residual levels were below NJDEP residential cleanup guidance levels. A Remedial Action Report was submitted to the NJDEP in July 1996.

Groundwater monitoring wells and post-excavation soil and groundwater samples were collected and analyzed under the NJDEP-approved closure plan associated with the closure of sixteen purge oil collection tanks. Activities relative to the closure plan are continuing under NJDEP guidance.

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CERTIFICATION OF ANSWERS TO REQUEST FOR INFORMATION

State of New Jersey :
: ss.
County of Essex :

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document (response to EPA Request for Information) and all documents submitted herewith, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete, and that all documents submitted herewith are complete and authentic unless otherwise indicated. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. I am also aware that my company is under a continuing obligation to supplement its response to EPA's Request for Information if any additional information relevant to the matters addressed in EPA's Request for Information or the company's response thereto should become known or available to the company.

Horace G. Campbell
NAME (print or type)

Manager, Site Remediation, Project Development - Fossil
TITLE (print or type)

Horace G Campbell
SIGNATURE

Sworn to before me this 13th day
of August, 1996.

Rosann Del Tufo - DiIorio
Notary Public

Rosann DelTufo-DiIorio
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires May 14, 1999

TABLES

Table 3.1

Low Pressure Units - Operating Parameters

Low Pressure Boilers

Year Installed	Manufacturer	HP	Pressure (psi)	No. of Boilers	Fuels[1]
1915	B&W	1373	242	4	Coal, Oil
1917	B&W	1278	242	8	Coal, Oil
1919	B&W	1278	242	4	Coal, Oil
1923	B&W	1859	242	2	Coal, Oil
1924	B&W	1859	242	6	Coal, Oil

Low Pressure Steam Turbine/Generators

Year Installed	Manufacturer	HP	KW	Volts	Maximum Generator Name Plate Rating (KW)
1915	GE	33,500	25,000	13,200	22,500 KW
1915	GE	33,500	25,000	13,200	22,500 KW
1918	GE	53,600	40,000	13,200	40,000 KW
1923	GE	47,300	35,000	13,200	36,000 KW
1923	GE	47,300	35,000	13,200	36,000 KW
1924	GE	56,600	40,000	13,200	36,000 KW

B&W = Babcock & Wilcox
GE = General Electric
HP = Horsepower
psi = Pounds Per Square Inch
KW = Kilowatts

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[1] Essex began using No. 6 Fuel Oil, Circa 1933.

Table 3.2

Raw Materials
Low Pressure Boilers
Essex Generating Station 1915 to 1978

Materials	Use and Description	EPA Letter	CERCLA Listed Substance
Fuels			
Bituminous Coal (WVa & PA Sources)	Boiler Fuel	*	
No. 6 Fuel Oil	Boiler Fuel	*	
Combustion Air	Boilers and Combustion Turbines		
Fuel Additives or Treatments			
Coal Trol (22% Phosphoric Acid)	May have been used for treatment of coal piles to prevent freezing		*
Boiler Water Treatment Chemicals			
Sodium Carbonate (Soda Ash)	Boiler Water Treatment, pH Adjustment		
Sodium Sulfate	Boiler Water Treatment	*	
Phosphoric Acid	Boiler Chemistry Control, Adjustment of Phosphate Concentration		*
Sodium Hydroxide (Caustic)	Boiler Water Treatment and as Neutralizing Agent		*
Disodium Phosphate	Boiler Water Treatment, Phosphate Addition		*
Chemical used for Equipment Cleanings			
Hydrochloric Acid	Condenser Cleanings		*
NEP 22	Condenser Cleanings		
Sodium Cyanide	Condenser Cleaning, Oxide Removal (one cleaning only)	*	*
Oakite (Trisodium Phosphate)	Condenser Cleaning, Oxide Removal (one cleaning only)		*
Caustic Soda	Neutralizer (one cleaning only)		*
Water Sources			
River Water	Cooling and Various In-Plant Uses		
Newark City Water (potable)	Boiler Makeup and Sanitary Uses		
Non-Contact Cooling Water Treatment Chemicals			
Chlorine (circa 1933)	Non-Contact Cooling Water Condenser, Biofouling Control		*

Table 3.3

Typical Low Pressure Boiler Chemistry Limits
Essex Generating Station 1915 to 1978

Constituent	**Limit or Range**
Phosphate	60.0 - 120.0 ppm
Hydroxide	0 - 5 ppm
pH	11.0 - 11.3
Sulfate to Alkalinity Ratio	3.1
Total Solids	1,500 ppm

Ref: ESSEX Operating Data

Table 3.4

Boiler Blowdown
Low Pressure Boilers
Essex Generating Station 1915 to 1978

Substance		Typical Concentration (ppmw)
Total Dissolved Solids		499.0
Suspended Solids		1.0
Calcium Carbonate	$CaCO_3$	2.83
Magnesium Carbonate	$MgCO_3$	4.83
Sodium Carbonate	Na_2CO_3	10.44
Sodium Hydroxide	$NaOH$	34.72
Sodium Chloride	$NaCl$	142.0
Sodium Sulphate	Na_2SO_4	238.0
Trisodium Phosphate	Na_3PO_4	42.8
Silica	SiO_2	19.5
Iron and alumina		0.1
pH		10.5
Organic Matter		18.2

ppmw = parts per million by weight
Ref - Analysis of PSE&G Low Pressure Boiler Blowdown - Cyrus WM. Rice & Company April 1937

Table 3.5

Fuels / Generation Statistics Essex Generating Station

STEAM UNITS						COMBUSTION TURBINES			
YEAR		BITUMINOUS COAL (TON) **	GAS (MCF)	OIL BARRELS	NET GENERATION (Kwh)	GAS (MCF)	OIL BARRELS	NET GENERATION (Kwh)	COMMENTS
1915		1,766	N/A	N/A	823,000	N/A	N/A	N/A	
1916		109,367	N/A	N/A	153,951,500	N/A	N/A	N/A	
1917		160,561	N/A	N/A	232,105,000	N/A	N/A	N/A	
1918		222,397	N/A	N/A	298,584,000	N/A	N/A	N/A	
1919		243,512	N/A	N/A	294,481,100	N/A	N/A	N/A	
1920		319,149	N/A	N/A	380,006,900	N/A	N/A	N/A	
1921		242,887	N/A	N/A	333,280,000	N/A	N/A	N/A	
1922		282,011	N/A	N/A	389,214,000	N/A	N/A	N/A	
1923		372,443	N/A	N/A	513,566,900	N/A	N/A	N/A	
1924		450,140	N/A	N/A	675,979,861	N/A	N/A	N/A	
1925	*	411,291	N/A	N/A	618,000,000	N/A	N/A	N/A	24 Boilers in service
1926	*	411,291	N/A	N/A	618,000,000	N/A	N/A	N/A	
1927	*	411,291	N/A	N/A	618,000,000	N/A	N/A	N/A	
1928	*	411,291	N/A	N/A	618,000,000	N/A	N/A	N/A	
1929	*	411,291	N/A	N/A	618,000,000	N/A	N/A	N/A	
1930	*	411,291	N/A	N/A	618,000,000	N/A	N/A	N/A	
1931	*	411,291	N/A	N/A	618,000,000	N/A	N/A	N/A	
1932	*	411,291	N/A	N/A	618,000,000	N/A	N/A	N/A	
1933	*	411,291	N/A	N/A***	618,000,000	N/A	N/A	N/A	
1934	*	411,291	N/A	N/A***	618,000,000	N/A	N/A	N/A	
1935	*	411,291	N/A	N/A***	618,000,000	N/A	N/A	N/A	
1936	*	411,291	N/A	N/A***	618,000,000	N/A	N/A	N/A	
1937	*	411,291	N/A	N/A***	618,000,000	N/A	N/A	N/A	
1938		229,579	N/A	595,604	591,810,198	N/A	N/A	N/A	16 Low Pressure Boilers, 2 High Pressure Boilers # 25 & #26 in Service
1939		112,691	N/A	1,777,874	1,042,842,220	N/A	N/A	N/A	First Year of Anthracite Use
1940		333,249	N/A	720,942	864,592,660	N/A	N/A	N/A	
1941		510,465	N/A	333,398	1,086,421,170	N/A	N/A	N/A	
1942		559,515	N/A	47,393	1,012,759,010	N/A	N/A	N/A	
1943		583,796	N/A	144,641	1,027,445,600	N/A	N/A	N/A	
1944		610,409	N/A	247,265	1,153,274,140	N/A	N/A	N/A	
1945		523,550	N/A	194,552	1,006,483,080	N/A	N/A	N/A	Final year anthracite coal was used
1946		455,746	N/A	602,295	1,054,944,330	N/A	N/A	N/A	
1947		388,261	N/A	985,203	1,070,027,750	N/A	N/A	N/A	12 Low Pressure Boilers, 3 High Pressure Boilers in Service.
1948		662,305	N/A	823,729	1,664,765,710	N/A	N/A	N/A	
1949		317,356	N/A	1,741,104	1,476,069,000	N/A	N/A	N/A	
1950		279,059	N/A	1,723,954	1,419,719,720	N/A	N/A	N/A	
1951		260,335	250,289	1,743,567	1,379,931,160	N/A	N/A	N/A	Gas Fuel First Used in Steam Unit
1952		158,562	511,930	2,314,507	1,480,213,800	N/A	N/A	N/A	
1953		5,295	3,785,429	2,143,362	1,306,074,500	N/A	N/A	N/A	
1954		0	2,243,660	1,722,895	983,004,300	N/A	N/A	N/A	
1955		50,650	2,555,817	1,814,343	1,171,606,300	N/A	N/A	N/A	8 Low Pressure Boilers, and 3 High Pressure Boilers, Start of Fluid Coke Use
1956		223,816	1,181,894	1,153,467	1,085,784,600	N/A	N/A	N/A	
1957		147,719	4,674,525	1,158,567	1,221,979,500	N/A	N/A	N/A	End of Fluid Coke Use
1958		85,291	4,304,697	1,009,893	994,544,200	N/A	N/A	N/A	
1959		39,091	3,825,851	1,225,915	947,328,200	N/A	N/A	N/A	
1960		0	2,134,031	1,362,063	806,163,900	N/A	N/A	N/A	

Table 3.5

Fuels / Generation Statistics Essex Generating Station

	STEAM UNITS				COMBUSTION TURBINES			
YEAR	BITUMINOUS COAL (TON) **	GAS (MCF)	OIL BARRELS	NET GENERATION (Kwh)	GAS (MCF)	OIL BARRELS	NET GENERATION (Kwh)	COMMENTS
1961	20,516	510,554	1,196,329	639,836,500	N/A	N/A	N/A	
1962	7,152	863,043	997,247	533,466,800	N/A	N/A	N/A	
1963	132,731	377,743	549,553	544,409,300	22,492	N/A	1,154,800	No. 8 Combustion Turbine in service
1964	100,223	1,939,694	805,302	694,543,500	138,423	N/A	6,876,200	
1965	113,017	1,364,302	944,179	729,175,300	220,613	N/A	11,564,100	
1966	107,319	2,039,826	1,295,027	896,382,000	217,909	N/A	9,497,000	
1967	87,519	1,914,571	1,891,091	1,090,573,000	217,355	N/A	10,143,000	
1968	0	540,945	2,418,088	985,104,000	491,471	N/A	27,734,000	
1969	0	548,877	3,039,344	1,271,422,000	543,252	N/A	27,178,000	
1970	12,942	277,788	3,082,642	1,169,196,000	590,347	N/A	31,867,000	Last Year of Recorded Solid Fuel Used
1971	0	543,783	2,714,184	1,061,828,000	851,579	382900	212,131,000	Combustion turbines No. 9,10 & 11 in service
1972	0	0	1,259,773	352,883,000	753,563	1700412	744,055,000	No. 6 Steam Turbine Unit Retired, No. 12 Combustion Turbine in service
1973	0	0	1,915,936	605,961,000	1,066,374	1472793	649,563,000	
1974	0	141,290	960,446	370,218,000	191,573	952438	385,988,000	Steam Units 2,3,4,5&7 Retired
1975	0	175,039	383,914	160,965,000	65,690	88808	31,280,000	
1976	0	119,066	493,268	219,247,000	21,419	241063	92,238,000	
1977	0	417,669	413,466	203,692,000	67,638	499861	195,482,000	
1978	0	0	93,090	45,209,000	27,716	329691	129,029,000	Unit #1 On Inactive Status
1979	0	0	0	0	249,124	223091	101,680,000	
1980	0	0	0	0	3,648,646	243071	338,814,000	
1981	0	0	0	0	3,318,468	77018	247,610,000	
1982	0	0	0	0	1,645,203	58722	125,553,000	
1983	0	0	0	0	2,294,141	97649	187,236,000	
1984	0	0	0	0	1,617,495	63126	130,415,000	Unit # 1 Retired
1985	0	0	0	0	1,131,538	38995	86,868,000	
1986	0	0	0	0	1,506,649	51499	114,109,000	
1987	0	0	0	0	4,609,475	14387	331,197,000	
1988	0	0	0	0	4,066,471	50945	312,066,000	
1989	0	0	0	0	4,311,550	63972	325,467,000	
1990	0	0	0	0	4,048,413	1053	308,343,000	
1991	0	0	0	0	3,613,577	1473	282,856,000	
1992	0	0	0	0	2,001,559	9684	161,270,000	
1993	0	0	0	0	2,889,749	16577	231,353,000	
1994	0	0	0	0	2,268,447	44076	189,536,000	
1995	0	0	0	0	3,462,214	13373	278,898,000	
TOTAL	14,869,175	37,242,313	50,039,312	48,717,888,709	52,170,133	6,736,677	6,319,051,100	

NOTES

1 * These figures were arrived at by averaging the coal fuel use for the years of 1923 and 1924. Generation was arrived by proportioning generation to coal use for 1924.

2 ** A Total of 63,596 tons of Anthracite and 39,407 tons of Fluid Coke were also used. This represents less than 1% of the total coal use at Essex since 1915.

3 *** Although some oil was used on the Low Pressure Boilers in the years 1933 - 1937, the quantity has not been identified or estimated.

Table 3.6

Pennsylvania Bituminous Coal Constituents/Properties

Typical Properties

Parameter	Avg.	Min.	Max.
Ash	10.1 %	3.85 %	19.8 %
Carbon	75.9 %	65.8 %	77.95 %
Hydrogen	5.14 %	4.60 %	5.33 %
Moisture	4.46 %	9.0 %	8.38 %
Nitrogen	1.47 %	1.37 %	1.60 %
Oxygen	6.29 %	4.96 %	7.68 %
Sulfur	2.35 %	0.5 %	8.25 %
HHV Btu/lb	13,266	11,756	14,072

West Virginia Bituminous Coal Constituents/Properties

Typical Properties

Parameter	Avg.	Min.	Max.
Ash	9.89 %	6.05 %	15.50 %
Carbon	75.80 %	71.30 %	77.95 %
Hydrogen	5.10 %	4.64 %	6.09 %
Moisture	5.69 %	1.20 %	8.38 %
Nitrogen	1.52 %	1.40 %	1.60 %
Oxygen	6.93 %	4.78 %	9.30 %
Sulfur	1.32 %	0.82 %	1.92 %
HHV Btu/lb	13,256	11,554	14,072

Ref: EPRI PISCES Database

Table 3.7

Bituminous Coals from West Virginia
Hazardous Substances

Typical Concentration (ppmw)			
Substance	**Avg.**	**Min.**	**Max.**
Antimony	0.91	0.5	1.42
Arsenic *	13.86	1.82	32.3
Barium *	124	28	270
Beryllium	0.68	0.07	0.9
Cadmium *	0.29 **	0.05	0.6
Chloride *	615	66.2	910
Chromium *	19.88	10	34.9
Copper *	27.35	5.2	160
Fluoride	95.7	53.4	128
Lead *	7.39	2.5	17.37
Mercury *	0.16	0.05	0.41
Nickel *	15.52	8	42
Selenium	3.46	0.9	7.8
Silver	0.27 **	0.05	0.57 **
Sulfur *	13,248	8,200	19,200
Thallium			3.1
Vanadium	39	29	61
Zinc *	30.4 **	2.27 **	62

ppmw = parts per million by weight

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

Ref: EPRI PISCES Database

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.8

Bituminous Coals from Pennsylvania
Hazardous Substances

Typical Concentration (ppmw)			
Substance	**Mean**	**Min.**	**Max.**
Antimony	0.76	0.24	1.42
Arsenic *	17.48	1	58.43
Barium *	125.85	24.48	270
Beryllium	0.62	0.07	0.9
Cadmium *	1.03 **	0.03	3.4 **
Chloride *	842.86	740	910
Chromium *	20.77	8.35	34.9
Copper *	52.13 **	30.7 **	160
Fluorine	72.17	56.3	107
Lead *	6.87	1.8	17.11
Mercury *	0.23	0.03	0.85
Nickel *	18.76 **	8	42
Phosphorus *	18.75	4.5	37
Selenium	3.05	1	7.8
Silver	0.44 **	0.01	1.25 **
Sulfur *	23,543	5,000	62,500
Thallium			3.1
Vanadium	32.9	10.9	61
Zinc *	24.22	4.58	46

ppmw = parts per million by weight

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

Ref: EPRI PISCES Database

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.9

Bituminous Coal from Eastern USGS Province
Hazardous Substances

Typical Concentration (ppmw)			
Substance	**Avg.**	**Min.**	**Max.**
Acenaphthene	0.01	0.01	0.01
Acenaphthylene	0.15	0.07	0.23
Antimony	1.26 **	0.24	4
Arsenic *	12.68	0.7	131
Barium *	101.95	13	270
Benzo(a)pyrene *	0.09	0.06	0.12
Benzo(g,h,i)perylene	0.16	0.07	0.21
Beryllium	1.1	0.07	2.4
Bis(2-ethylhexyl)phthalate			0.58
Cadmium *	1.52 **	0.03	10.4
Chloride *	854	66.2	5,500
Chromium *	18.31	2	60
Chrysene *	0.18	0.15	0.23
Copper *	27.08 **	5.36	160
Dibenzo(a,h)anthracene *	0.02	0.02	0.02
Fluoranthene	0.1	0.05	0.13
Fluorene *	0.09	0.06	0.12
Lead *	23.47 **	1.8	590
Mercury *	0.21 **	0	1.25
Naphthalene *	2.02	1.6	2.7
Nickel *	18.11 **	5.15	46
Phenanthrene	0.71	0.45	1
Phosphorus *	75.7 **	0.01	234
Pyrene *	0.13	0.07	0.2
Selenium	3.23 **	0.01	14
Silver	0.39 **	0.01	1.25
Sulfur *	19,868	5,000	62,500
Thallium	2.13 **	0.63 **	4.96 **
Vanadium	35.61	5.5	78.5
Zinc *	34.86	2.27	280

ppmw = parts per million by weight

*** Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G**

Ref: EPRI PISCES Database

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.10

No. 6 Fuel Oil
Typical Properties

Percent by Weight:	
Sulfur	0.7 - 3.5
Hydrogen	(9.5 to 12.0) *
Carbon	(86.5 to 90.2) *
Ash	0.01 - 0.5
Gravity:	
Degree API	7 to 22
Specific Gravity	1.022 to 0.922
Density (pound/gallon)	8.51 to 7.68
Pour Point, F	+ 15 to + 85
Viscosity Values:	
Centistokes at 100° F	260 to 750
SSF at 122° F	45 to 300
Water and sediment, % by vol	0.05 to 2.0
Heating value, Btu/pound gross	17,410 to 18,990
*Estimated	

API = American Petroleum Institute
SSF = Seconds Saybolt Furol

Ref: Steam-Its Generation and Use, Babcock & Wilcox,
40th Edition, 1992, page 8-15, Table 13

Table 3.11

No. 6 Fuel Oil
Hazardous Substances

Substance	Typical Concentration (ppmw)		
	Avg.	Min.	Max.
Antimony	0.23	0.03	0.52
Arsenic *	0.41 **	0.09	2
Barium *	3.87 **	2.53 **	5.87
Beryllium	0.04 **	0.01 **	0.22 **
Cadmium *	0.58 **	0.2 **	3.5 **
Chloride *	145	12	799
Chromium *	0.91 **	0.18	5 **
Copper *	5.55 **	0.01	12.6
Fluoride	7.78	6	12
Lead *	2.71 **	0.1	19.5
Mercury *	0.04 **	0.01	0.1 **
Nickel *	32	11	43.5
Phosphorus *	1.79	0.36	7.73
Selenium	0.28 **	0.05 **	1.1 **
Silver	0.08 **	0.05 **	0.08
Sulfur *	7,854	2,500	57,900
Vanadium	12.5	4	69
Zinc *	0.92	0.03	3.1

ppmw = parts per million by weight

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

Ref: EPRI PISCES Database

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.12

Bituminous Bottom Ash from West Virginia Coal
Hazardous Substances

Typical Concentratin (ppmw)			
Substance	**Avg.**	**Min.**	**Max.**
Antimony	3.99 **	1.6	7
Arsenic *	8.74 **	4	30.9
Barium *	1,086.13	740	1,600
Beryllium	12.57 **	8.48 **	23
Cadmium *			ND - 0.97
Chloride *	16.24	0.55	60
Chromium *	145.07	103	221
Copper *	126.48 **	86.4 **	220 **
Fluoride			ND - 0.19
Lead *	96.58 **	14.8	700
Mercury *	0.01 **	0	0.02
Nickel *	121.68	63.1	252
Phosphorus *			1946
Selenium	64.64 **	0.55	938
Silver	59.43 **	9.7 **	208
Sulfur *	3,521 **	343	16,000
Thallium			ND - 97
Vanadium	211	157	273
Zinc *	127.13 **	23.5	203

ppmw = parts per million by weight

ND - 0.19, 0.97, or 97 = Not Detected by Analytical Method to 0.19, 0.97, or 97 ppm Limit

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

Note: Information not available for typical organic hazardous substances for West Virginia coal

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.13

Bituminous Fly Ash from West Virginia Coal
Hazardous Substances

Typical Concentration (ppmw)			
Substance	**Avg.**	**Min.**	**Max.**
Antimony	6.84 **	1.1	11
Arsenic *	133.8	26.3	308
Barium *	1,060	618	2,200
Beryllium	13.6	8.72	27
Cadmium *	1.05 **	0.1	3.8
Chloride *	104.11	2.5	610
Chromium *	168.34	97.1	259
Copper *	196.47 **	85	532
Fluoride	33.44	1.7	145
Lead *	103.78	8	800
Mercury *	0.25	0	0.88
Nickel *	127.27	6.6	299
Phosphorus *			2551
Selenium	72.05	5.4	1,193
Silver	21.32 **	0.3	187
Sulfur *	10,511 **	1400	66,000
Thallium	91.7 **	25	100 **
Vanadium	280.1	152	560
Zinc *	234.63	16	750

ppmw = parts per million by weight

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

Note: Information not available for typical organic hazardous substances for West Virginia Bituminous coal

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.14

Bituminous Bottom Ash from Pennsylvania Coal
Hazardous Substances

Typical Concentration (ppmw)			
Substance	**Avg.**	**Min.**	**Max.**
1,2,4,5-Tetrachlorobenzene			ND - 1
1,2,4-Trichlorobenzene			ND - 1
1,3-Dichlorobenzene			ND - 1
1,4 - Dichlorobenzene			ND - 1
1 - Naphthylamine			ND - 1
2,3,4,6-Tetrachlorophenol			ND - 2
2,4,5-Trichlorophenol			ND - 1
2,4,6-Trichlorophenol			ND - 1
2,4-Dichlorophenol			ND - 1
2,4-Dimethylphenol			ND - 1
2,4-Dinitrophenol			ND - 5
2,4-Dinitrotoluene			ND - 1
2,6-Dichlorophenol			ND - 1
2,6-Dinitrotoluene			ND - 1
2-Chloronaphthalene			ND - 1
2-Chlorophenol			ND - 1
2-Naphthylamine			ND - 1
2-Nitrophenol			ND - 1
2-Picoline			ND - 1
3,3-Dichlorobenzidine			ND - 2
3-Methylcholanthrene			ND - 1
4-Bromophenyl phenyl ether			ND - 1
4-Chlorophenyl ether			ND - 1
4-Nitrophenol			ND - 5
Acenaphthene			ND - 1
Acenaphthylene			ND - 1
Acetophenone			ND - 1
Aniline			ND - 1
Anthracene *			ND - 1

ppmw = parts per milion by weight

ND - 1, 2 or 5 = Not Detected by Analytical Method to 1, 2 or 5 ppm Limit

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

Ref: EPRI PISCES Database

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.14 (Cont)

Bituminous Bottom Ash from Pennsylvania Coal
Hazardous Substances

Typical Concentration (ppmw)

Substance	Avg.	Min.	Max.
Antimony	22.12	1.6	69
Arsenic *	7.95	2.8	30.9
Barium *	1,008.4	650	1,600
Benz(a)anthracene *			ND - 1
Benzidine			ND - 1
Benzo(a)pyrene *			ND - 1
Benzo(b)fluoranthene *			ND - 1
Benzo(g,h,i)perylene			ND - 1
Benzo(k)fluoranthene *			ND - 1
Benzoic acid			ND -5
Beryllium	5.12	4.8	5.4
Bis(2-chloroethoxy)methane			ND - 1
Bis(2-chloroethyl)ether			ND - 1
Bis(2-ethylhexyl)phthalate			ND - 1
Cadmium *	1.95	0.49	5
Chloride *	31.29	11.6	60
Chromium *	695.5	84	5820
Chrysene *			ND - 1
Copper *	205.4	19	932
Dibenzo(a,h)anthracene *			ND - 1
Dibenzofuran			ND - 1
Dimethylphenethylamine			ND - 1
Ethyl methanesulfonate			ND - 1
Fluoranthene			ND - 1
Fluorene *			ND - 1
Fluoride	14.33	3.87	32.4
Hexachlorobenzene			ND - 1

ppmw = parts per milion by weight

ND - 1, 2 or 5 = Not Detected by Analytical Method to 1, 2 or 5 ppm Limit

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

Ref: EPRI PISCES Database

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.14 (Cont.)

Bituminous Bottom Ash from Pennsylvania Coal
Hazardous Substances

	Typical Concentration (ppmw)		
Substance	**Avg.**	**Min.**	**Max.**
Hexachlorobutadiene			ND - 1
Hexachlorocyclopentadiene			ND - 1
Indeno (1,2,3-c,d) pyrene			ND - 1
Isophorone			ND - 1
Lead *	120.87	6.2	1082
Mercury *	0.04	0.02	0.05
N-Nitrosodimethylamine			ND - 1
N-Nitrosodiphenylamine			ND - 1
N-Nitrosopiperidine			ND - 1
Napththalene *			ND - 1
Nickel *	405.54	58	2,939
Nitrobenzene			ND - 1
Pentachlorobenzene			ND - 1
Pentachloronitrobenzene			ND - 1
Pentachlorophenol			ND -5
Phenacetin			ND - 1
Phenanthrene			ND - 1
Phenol *			ND - 1
Phosphorus *	1,726.67	1,660	1,780
Pronamide			ND - 1
Pyrene *			ND - 1
Pyridine			ND - 1
Selenium	1.9	0.55	2.9
Silver	5.3	4.9	5.9
Sulfur *	2,719	337	16,000
Thallium	58.83	49	85
Vanadium	210.89	83	537
Zinc *	123.05	35	295
p-Dimethylaminoazobenzene			ND - 1

ppmw = parts per million by weight

ND - 1, 2 or 5 = Not Detected by Analytical Method to 1, 2 or 5 ppm Limit

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

Ref: EPRI PISCES Database

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.15

Bituminous Collected Fly Ash from Pennsylvania
Hazardous Substances

Typical Concentration (ppmw)			
Substance	**Avg.**	**Min.**	**Max.**
Antimony	28.08 **	4	240
Arsenic *	209.34 **	12	1180
Barium *	1,204.21	0.2	2,200
Beryllium	4.8	0.2	7.91
Cadmium *	1.47 **	0.1	6.9
Chloride *	37.96	6.58	67
Chromium *	214.64	130	500
Copper *	145.7 **	57	327
Fluoride	12.12	1.98	34.9
Lead *	145.73	4.8	1154
Mercury *	0.16 **	0.02	0.7
Nickel *	153.26	66	259
Phosphorus *	2,010	500	2,630
Selenium	22	0.5	70
Silver	12.2 **	4.9 **	24 **
Sulfur *	93,77.5	2000	66,000
Thallium	120.83 **	25	240 **
Vanadium	305.63	60	723
Zinc *	198.1	16	357

ppmw = parts per million by weight

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

Ref: EPRI PISCES Database

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.16

Bottom Ash Sluice Water from Western Pennsylvania
Bituminous Coals
Hazardous Substances - Metals
(Concentrations in mg/L)

Chemical	Concentration Range	Mean
Antimony		<0.1
Arsenic*	0.01 - 0.029	0.023
Barium*	0.25 - 0.54	0.40
Beryllium	0.002 - 0.0032	0.0025
Cadmium*		<0.001
Chromium*	0.01 - 0.033	0.024
Copper *		<0.020
Lead*	0.0048 - 0.0092	0.0073
Manganese	0.04 - 0.16	0.12
Mercury*		<0.0002
Molybdenum	0.066 - 0.077	0.072
Nickel*	0.027 - 0.042	0.035
Selenium		<0.005
Silver		<0.01
Vanadium	0.036 - 0.09	0.068
Zinc	0.02	0.037

*Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G.

mg/L = milligrams per liter

Note: Metals listed as hazardous substances under CERCLA or in EPA's letter of April 30, 1996 to PSE&G that were detected in bottom ash sluice.

Table 3.17

Ash Pond Effluent from Western Pennsylvania Coal
Hazardous Substances
(Concentrations in mg/L)

Chemical	Filtered Samples	Unfiltered Samples
Barium*	0.91	0.1
Beryllium	<0.0001	<0.0001
Cadium*	<0.0001	<0.00015
Chromium*	0.0015	0.0025
Copper*	0.0015	0.0015
Nickel*	0.007	0.008
Zinc	0.007	0.015

mg/L = milligrams per liter

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G.

NOTE: Metals listed as hazardous substances under CERCLA or in EPA's letter of April 30, 1996 to PSE&G that were detected in ash pond effluent from Western Pennsylvania Coal.

Table 3.18

Available Information
Condenser Chemical Cleanings
(Unit Nos. 1-6)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
1938 or 1939	No. 4 Condenser	Water Side	The water side of the condenser was cleaned using sodium cyanide and oakite at 180°F for eight to ten hours, with limited circulation.	Spent cleaning solution was discharged to the river via the discharge canal.
6/23/45	No. 1 Condenser	Water Side	The cleaning solution contained approximately 1,296 gallons (gals.) of hydrochloric acid (20°BE) + 110 quarts (qts.) of NEP-22 inhibitor, resulting in a 6% HCl solution.	The solution was drained to the discharge canal.
7/21/45	No. 2 Condenser	Water Side	The cleaning solution contained approximately 980 gallons (gals.) of hydrochloric acid (20°BE) + 100 quarts (qts.) of NEP-22 inhibitor, resulting in a 4.5% HCl solution.	The solution was drained to the discharge canal.
6/28/52	No. 2 Condenser	Water Side	The cleaning solution contained approximately 800 gallons (gals.) of hydrochloric acid (20°BE) + 68 quarts (qts.) of NEP-22 inhibitor, resulting in a 3.7% HCl solution.	The solution was drained to the discharge canal.
2/4/58	No. 2 Condenser	Water Side	The cleaning solution contained 1,376 gallons hydrochloric acid with NEP-22 inhibitor. The solution was drained to the discharge canal and flushed using the circulators, resulting in a 6.4% HCl solution.	The solution was drained to the discharge canal.
6/9/45	No. 3 Condenser	Water Side	The cleaning solution contained approximately 1,200 gallons (gals.) of hydrochloric acid (20°BE) + 120 quarts (qts.) of NEP-22 inhibitor, resulting in a 3.8% HCl solution.	The solution was drained to the discharge canal.
6/3/49	No. 3 Condenser	Water Side	The cleaning solution contained approximately 1,950 gallons (gals.) of hydrochloric acid (20°BE) + 144 quarts (qts.) of NEP-22 inhibitor. Condenser was flushed for 2 hours with circulators, resulting in a 4.6% HCl solution.	The solution was drained to the discharge canal.
5/13/54	No. 3 Condenser	Water Side	The cleaning solution contained approximately 2,000 gallons (gals.) of hydrochloric acid (20°BE) + 152 quarts (qts.) of NEP-22 inhibitor, resulting in a 4.6% HCl solution.	The solution was drained to the discharge canal.

Table 3.18 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
5/13/54	No. 3 Condenser	Steam Side	The cleaning solution contained approximately 2,000 gals. of hydrochloric acid (20°BE) + 152 qts. of NEP-22 inhibitor. A caustic soda solution was used for a neutralizing flush and rinse.	The solution was drained to the discharge canal.
5/13-14/54*	No. 3 Condenser	Water Side	The cleaning solution contained approximately 1,100 gallons (gals.) of hydrochloric acid (20°BE) + 110 quarts (qts.) of NEP-22 inhibitor, resulting in a 2.5% HCl solution.	The solution was drained to the discharge canal..
7/7/45	No. 4 Condenser	Water Side	The cleaning solution contained approximately 1,768 gallons (gals.) of hydrochloric acid (20°BE) + about 120 quarts (qts.) of NEP-22 inhibitor, resulting in a 4.7% HCl solution.	The solution was drained to the discharge canal.
3/25/49	No. 4 Condenser	Water Side	The cleaning solution contained approximately 1,350 gallons (gals.) of hydrochloric acid (20°BE) + 100 quarts (qts.) of NEP-22 inhibitor. Condenser was flushed for 3/4 of an hour with circulators, resulting in a 3.6% HCl solution.	The solution was drained to the discharge canal.
3/16/50	No. 4 Condenser	Water Side	The cleaning solution contained approximately 1,000 gallons (gals.) of hydrochloric acid (20°BE) + 100 quarts (qts.) of NEP-22 inhibitor, resulting in a 2.7% HCl solution.	The solution was drained to the discharge canal.
4/25/52	No. 4 Condenser	Water Side	The cleaning solution contained approximately 868 gallons (gals.) of hydrochloric acid (20°BE) + 64 quarts (qts.) of NEP-22 inhibitor, resulting in a 2.3% HCl solution.	The solution was drained to the discharge canal.
5/21/55	No. 4 Condenser	Water Side	The cleaning solution contained 1,150 gallons (gals.) of hydrochloric acid (20°BE) + 120 quarts (qts.) of NEP-22 inhibitor, resulting in a 3.0% HCl solution.	The solution was drained to the discharge canal.
3/31/45	No. 5 Condenser	Water Side	The cleaning solution contained approximately 880 gallons (gals.) of hydrochloric acid (20°BE) + 90 quarts (qts.) of NEP-22 inhibitor, resulting in a 2.3% HCl solution.	The solution was drained to the discharge canal.

Table 3.18 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
7/20/46	No. 5 Condenser	Water Side	The cleaning solution contained approximately 1,336 gallons (gals.) of hydrochloric acid (20°BE) + 99 quarts (qts.) of NEP-22 inhibitor. Condenser was flushed for ½ hour with circulators, resulting in a 3.5% HCl solution.	The solution was drained to the discharge canal.
4/30/55	No. 5 Condenser	Water Side	The cleaning solution contained approximately 1,357 gallons (gals.) of hydrochloric acid (20°BE) + 150 quarts (qts.) of NEP-22 inhibitor, resulting in a 3.5% HCl solution.	The solution was drained to the discharge canal.
03-19-58	No. 5 Condenser	Water Side	The cleaning solution was approximately 5% hydrochloric acid with 132 quarts (qts.) of NEP-22 inhibitor. The solution was drained to the discharge canal and flushed using the circulators.	The solution was drained to the discharge canal.
5/12/45	Condenser No. 6	Water Side	The cleaning solution contained approximately 1,415 gallons (gals.) of hydrochloric acid (20°BE) + 130 quarts (qts.) of NEP-22 inhibitor, resulting in a 3.6% HCl solution.	The solution was drained to the discharge canal.
4/8/49	Condenser No. 6	Water Side	The cleaning solution contained approximately 1,620 gallons (gals.) of hydrochloric acid (20°BE) + 126 quarts (qts.) of NEP-22 inhibitor, resulting in a 4.1% HCl solution.	The solution was drained to the discharge canal.
4/13/50	Condenser No. 6	Water Side	The cleaning solution contained approximately 1,145 gallons (gals.) of hydrochloric acid (20°BE) + 88 quarts (qts.) of NEP-22 inhibitor, resulting in a 2.9% HCl solution.	The solution was drained to the discharge canal.
9/13/51	Condenser No. 6	Water Side	The cleaning solution contained approximately 1,000 gallons (gals.) of hydrochloric acid (20°BE) + 100 quarts (qts.) of NEP-22 inhibitor, resulting in a 2.5% HCl solution.	The solution was drained to the discharge canal.
7/5/52	Condenser No. 6	Water Side	The cleaning solution contained approximately 800 gallons (gals.) of hydrochloric acid (20°BE) + 54 quarts (qts.) of NEP-22 inhibitor, resulting in a 2% HCl solution.	The solution was drained to the discharge canal.

*Area cleaned was "steam space" (steam side of condenser tubes).

Table 3.19

High Pressure Units - Operating Parameters

<table>
<tr><th colspan="6">High Pressure Boilers (Nos. 25 & 26)</th></tr>
<tr><th>Year Installed</th><th>Manufacturer</th><th>Pressure (psi)</th><th>No. of Boilers</th><th colspan="2">Fuels</th></tr>
<tr><td>1938</td><td>B&W</td><td>1,350</td><td>2</td><td colspan="2">Coal, Oil</td></tr>
<tr><td>1947</td><td>B&W</td><td>1,350</td><td>1</td><td colspan="2">Coal, Oil, Gas</td></tr>
<tr><th colspan="6">High Pressure Steam Turbine/Generators (Unit No. 7)</th></tr>
<tr><th>Year Installed</th><th>Manufacturer</th><th>KW</th><th>Type</th><th>Volts</th><th>Maximum Generator Name Plate Rating (KW)</th></tr>
<tr><td>1938</td><td>GE</td><td>50,000</td><td>Topping</td><td>13,200</td><td>50,000 KW</td></tr>
<tr><td>1947</td><td>GE</td><td>105,400</td><td>Condensing</td><td>13,800</td><td>116,300 KW</td></tr>
</table>

B&W = Babcock & Wilcox
GE = General Electric
psi = Pounds Per Square Inch
KW = Kilowatts

Table 3.20

Raw Materials
Unit No. 7, Boilers 25 & 26
1937 - 1974

Materials	**Use and Description**	**EPA Letter**	**CERCLA Listed Substance**
Fuels			
Bituminous Coal (WVa Primary Source & PA Alternate Source)	Boiler Fuel	*	
No. 6 Fuel Oil	Boiler Fuel	*	
Combustion Air	Boilers and Combustion Turbines		
Fuel Additives or Treatments			
Coal Trol (22% phosphoric acid)	May Have Been Used for Treatment of Coal Piles to Prevent Freezing		*
Boiler Water Treatment Chemicals			
Sodium Sulfite	Boiler Water Treatment Oxygen Scanvenger, Used in ppm Dosages		*
Sodium Hydroxide	Boiler Water Treatment and as Neutralizing Agent		*
Anhydrous Disodium Phosphate	Boiler Water Treatment, Phosphate Addition Used in ppm Dosages		*
Anhydrous TriSodium Phosphate	Boiler Water Treatment, Phosphate Addition Used in ppm Dosages		*
Chemicals Used For Equipment Cleanings			
Hydrochloric Acid (a.k.a. Aquakleen)	Boiler Heater Chemical Cleaning, Iron Oxide Removal		*
Dow A-124 Inhibitor	Boiler Chemical Cleaning, Iron Oxide Removal		
CitroSolv Formulation (Ammoniated Citric Acid)	Boiler Chemical Cleaning (one cleaning)		
NEP - 22 Inhibitor	Boiler Chemical Cleanings, Iron Removal		
Vertan 675 (tetra ammonium EDTA)	Boiler Chemical Cleanings, Copper Removal		*
Ammonium Hydroxide (Anhydrous/Aqua Ammonia)	Boiler Chemical, pH Adjustment (Vertan or Citrosolve) Cleanings	*	*
Oakite (Trisodium phosphate)	Feedwater Heaters Cleanings, Oxide Removal		*
Sodium Cyanide	Feedwater Heaters Cleanings, Oxide Removal	*	*
Sodium Nitrite	Boiler Chemical Cleaning		*
Rodine 31A Inhibitor	Boiler Chemical Cleaning		
Sodium Hydroxide (Caustic)	Boiler/Feedwater Heater Chemical Cleaning (neutralization)		*
Water Sources			
Not Applicable - This Unit did not have a condenser			
Newark City Water (potable)	Sanitary Uses, Boiler Makeup Provided From Low Pressure Boiler (s) Condensate		
Non-Contact Cooling Water Treatment Chemicals			
Not Applicable - This Unit did not have a condenser			

Table 3.21

Typical Boiler Units 25 & 26
High Pressure Boiler Chemistry Limits

Constituent	**Limit or Range**
pH	10.5 - 11.0
Silica	2 to 5 ppm maximum
PO_4	25 to 50 ppm
Total Solids	100 - 150 ppm maximum
Specific Conductivity	350 - 550 umhos/cm

Table 3.22
Available Information - Boiler Chemical Cleanings
(Boiler Nos. 25 and 26)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
1939 or 1940	Boiler No. 25	Economizer Only	This cleaning was performed on only the economizer section of the boiler and was performed only once for each boiler. The economizer of each boiler was chemically cleaned using a solution of 400-600 grains/gallon of hydrochloric acid along with NEP-22 inhibitor. There were approximately 55 economizer tubes in each boiler. Economizer cleaning was labor intensive and time consuming. Four economizer tubes were cleaned at a time. Hoses were connected to the inlet and outlet end of each tube. Cleaning chemicals (HC1 and NEP-22) were placed in a mix tank. Circulation of the cleaning solution through the economizer tubes was from the mixing tank, via pump, through the four inlet hoses, through the economizer tubes, and via four outlet hoses to the mixing tank. It took approximately eight hours to clean each set of four economizer tubes. The water capacity for each economizer was approximately 4,280 gallons. (NOTE: For all subsequent acid cleanings of this boiler, the economizer tubes were left full of condensate, which served as a buffer against backflow of acid into the economizer section. At the conclusion of each chemical cleaning, the economizer section would be flushed out.)	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
2/40	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for 1/2 hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
8/40	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
4/41	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
7/41	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
10/41	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
1/42	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
2/42	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
9/42	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
8/43	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
4/44	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
11/44	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
12/45	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
10/46	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
3/48	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
4/49	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
5/50	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
9/51	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
6/53	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
2/55	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
12/57	Boiler No. 25	Water Side of Boiler Tubes	No. 25 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
3/15/72	Boiler No. 25	Water Side of Boiler Tubes	The boiler was cleaned using Vertan 675 (tetra-ammonium ethylenediamine tetra acetic acid), an alkaline copper removal process patented by the Dow Chemical Co. The boiler was filled with the A-124 inhibitor, fired and cooled at a frequency to cause the boiler pressure to oscillate between 50 and 150 psi, thus causing the cleaning solution to naturally circulate in the boiler. Additional chemical was injected when necessary to maintain the required parameters. When iron and Vertan concentrations leveled out, indicating completion of the iron removal phase, the firing ceased and the boiler was cooled to approximately 170°F. Air was then injected into various connections in the lower headers to effect copper removal and passivate the newly cleaned metal surfaces. When copper values leveled out the air injection stopped and the boiler drained to the discharge canal, and then given a rinse with hot (180°F) condensate. Chemical Used: 78,400 lbs of Vertan 675 Metals removed: Iron - 3,664 lbs, Copper - 325 lbs	Spent solution trucked off site.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
10/28/72	Boiler No. 25	Water Side of Boiler Tubes	The boiler was cleaned by Halliburton Industrial Cleaning Service using the CitroSolv process. The boiler was heated, then filled with a 3% solution of ammoniated citric acid at approximately 200°F, with an average pH of 4.0. When iron concentration and acid concentration leveled out, indicating completion of the iron removal phase, the boiler was allowed to cool to 150°F, for the copper removal and metal passivation stage. Anhydrous ammonia was then added to the recirculating pump suction to raise the pH to 9.0. A sodium nitrite solution was pumped to the boiler. Additional anhydrous ammonia was pumped to the system to raise the pH to 10.0. When the copper concentrations leveled out, the boiler was drained. Chemicals used were: 10,300 lbs citric acid, 300 gals. ammonium hydroxide, 9 gals Rodine 31A inhibitor and 800 lbs sodium nitrite. The solvent averaged 205°F, 3.3 pH and 3.2% citric acid for the iron phase. The copper removal phase averaged a 9.1 pH and 135°F. Approximately 1,130 lbs Fe and 30 lbs Cu were removed.	Spent solution was evaporated in No. 26 Boiler.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
1939 or 1940	Boiler No. 26	Economizer Only	This cleaning was performed on only the economizer section of the boiler and was performed only once for each boiler. The economizer of each boiler was chemically cleaned using a solution of 400-600 grains/gallon of hydrochloric acid along with NEP-22 inhibitor. There were approximately 55 economizer tubes in each boiler. Economizer cleaning was labor intensive and time consuming. Four economizer tubes were cleaned at a time. Hoses were connected to the inlet and outlet end of each tube. Cleaning chemicals (HCl and NEP-22) were placed in a mix tank. Circulation of the cleaning solution through the economizer tubes was from the mixing tank, via pump, through the four inlet hoses, through the economizer tubes, and via four outlet hoses to the mixing tank. It took approximately eight hours to clean each set of four economizer tubes. The water capacity for each economizer was approximately 4,280 gallons. (NOTE: For all subsequent acid cleanings of this boiler, the economizer tubes were left full of condensate, which served as a buffer against backflow of acid into the economizer section. At the conclusion of each chemical cleaning, the economizer section would be flushed out.)	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
3/40	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
9/40	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
3/41	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
6/41	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
8/41	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
3/42	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for 1/2 hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
10/42	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
2/43	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
11/43	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
7/44	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
2/45	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
9/45	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
2/47	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
4/48	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
4/50	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
8/52	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
3/54	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
4/56	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
3/4/58	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for 1/2 hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.
11/8/61	Boiler No. 26	Water Side of Boiler Tubes	No. 26 boiler was cleaned using hydrochloric acid in a range of 1% - 5%, inhibited with NEP-22. Caustic was used as a neutralizing rinse. The boiler sections are filled with hot water and recirculated though the acid cleaning tanks to obtain a temperature of 180°F, to preheat the tube metal to 140°F. Acid and inhibitor were then added to the recirculating water to obtain the planned concentration after 1-2 hours of circulation, the boiler was drained to the discharge canal to the Passaic River. The boiler was then flushed for ½ hour with condensate. The boiler was then drained and filled again with hot condensate containing caustic soda. After soaking, or recirculating for approximately 1 hour, the caustic solution was drained to the discharge canal to the Passaic River. The boiler was refilled and drained as many times as needed until it reached a neutral condition (pH of ≈7.0).	Spent solution drained to the discharge canal to the Passaic River.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
2/9/72	Boiler No. 26	Water Side of Boiler Tubes	The boiler was cleaned using Vertan 675 (tetra-ammonium ethylenediamine tetra acetic acid), an alkaline copper removal process patented by the Dow Chemical Co. The boiler was filled with the A-124 inhibitor, fired and cooled at a frequency to cause the boiler pressure to oscillate between 50 and 150 psi, thus causing the cleaning solution to naturally circulate in the boiler. Additional chemical was injected when necessary to maintain the required parameters. When iron and Vertan concentrations leveled out, indicating completion of the iron removal phase, the firing ceased and the boiler was cooled to approximately 170°F. Air was then injected into various connections in the lower headers to effect copper removal and passivate the newly cleaned metal surfaces. When copper values leveled out the air injection stopped and the boiler drained to the discharge canal, and then given a rinse with hot (180°F) condensate. Chemical Used: 75,264 lbs of Vertan 675 Metals removed: Iron - 4,602 lbs, Copper - 434 lbs	Spent solution was evaporated in No. 25 Boiler.

Table 3.22 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
12/9/72	Boiler No. 26	Water Side of Boiler Tubes	The boiler was cleaned by Haliburton Industrial Cleaning Service using the Citrosolv process. The boiler was heated, then filled with a 6% solution of ammoniated citric acid at approximately 200°F, with an average pH of 4.0. When iron concentration and acid concentration leveled out, indicating completion of the iron removal phase, the boiler was allowed to cool to 150°F, for the copper removal and metal passivation stage. Anhydrous ammonia was then added to the recirculating pump section to raise the pH to 9.0. A sodium nitrite solution was pumped to the boiler. Additional anhydrous ammonia was pumped to the system to raise the pH to 10.0. When the copper concentrations leveled out, the boiler was drained. Chemicals used were 7,500 lbs citric acid, 300 gals ammonium hydroxide, 9 gals Rodine 31A inhibitor, and 800 lbs sodium nitrite. The solvent averaged 202°F, 3.9 pH and 6% citric acid for the iron removal phase. The copper removal phase averaged a 9.9 pH and 134°F. Approximately 852 lbs Fe and 3 lbs Cu were removed.	Spent solution was evaporated in No. 25 Boiler.
				Rinse water drained to the discharge canal.

Table 3.23
Summary of Feedwater Heater Chemical Cleanings
(Boiler Nos. 25 And 26)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
07-02-39	No. 7 Turbine High Pressure Drain Cooler	Water Side	Cleaned heater with inhibited hydrochloric acid neutralized with caustic. Acid (5 gal.), Inhibitor (1 pint), Caustic (3 lbs.)	No records.
12-23-39	No. 7 Turbine Low Pressure Drain Cooler	Water Side	Cleaned drain cooler with Oakite (99 lbs.), Cyanide (21.5 lbs.) and Acid (4.75 gals.) with Inhibitor (1.675 pts.). Volume of system was 300 gallons.	No records.
12-27-39	No. 7 Turbine Low Pressure Heater	Water Side	Cleaned heater with Oakite (60 lbs.), Cyanide (15 lbs.), and Acid (28 gals.) with Inhibitor. Acid neutralized with 5 lbs Caustic. Volume of system was 400 gallons.	No records.
12-30-39	No. 7 Turbine Low Pressure Drain Cooler	Steam Side	Cleaned heater with Oakite (200 lbs.), Cyanide (37.5 lbs.) and Acid (56 gals.) -- initial application. Second application was Oakite (125 lbs.) and Cyanide (75 lbs.). No record of Inhibitor usage. Volume of system was 790 gallons.	No records.
12-31-39	No. 7 Turbine Low Pressure Drain Cooler	Water Side	Cleaned heater with solution from previous cleaning (the second application of oakite-cyanide) and added 12 lbs. Oakite and 7 lbs. Cyanide. Volume of system was 300 gallons.	No records.
01-02-40	No. 7 Turbine Low Pressure Heater	Steam Side	Cleaned heater with Oakite (480 lbs.), Cyanide (95 lbs.) and Acid (135 gals.) with Inhibitor (37 pts.). Second treatment used 443 lbs. Oakite and 265 lbs. Cyanide. Volume of system was 2000 gallons.	No records.
01-17-40	No. 7 Turbine High Pressure Drain Cooler	Water Side	Cleaned heater with Oakite (38 lbs.), Cyanide (8 lbs.) and Acid (13 gals.) with Inhibitor (3.5 pts.). Second application used 33 lbs. Oakite and 19 lbs. Cyanide. Volume was 175 gallons.	No records.
01-18-40	No. 7 Turbine High Pressure Drain Cooler	Steam Side	Cleaned heater with Oakite (87.5 lbs.) and Cyanide (18.75 lbs.) Second application contained acid (28 gallons) and Inhibitor (7 pts.) Acid was neutralized with caustic (3 lbs.) Third application contained Oakite (62.5 lbs.) and Cyanide (37.5 lbs.). Volume of system was 400 gallons.	No records.

Table 3.23 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
01-20-40	No. 7 Turbine High Pressure Heater	Water Side	Cleaned heater with Oakite (100 lbs.) and Cyanide (37.5 lbs.). No acid was used for this cleaning and no second Oakite treatment.	No records.
01-21-40	No. 7 Turbine High Pressure Heater	Steam Side	Oakite (750 lbs.) and Cyanide (300 lbs.). No acid used for this cleaning. Volume of system was 2400 gallons.	No records.
02-07-44	No. 7 Turbine High Pressure Heater	Water Side	Cleaned heater with Oakite (112 lbs.) and Cyanide (42 lbs.).	No records.
02-10-44	No. 7 Turbine High Pressure Heater	Steam Side	Cleaned heater with Oakite (720 lbs.) and Cyanide (270 lbs.).	No records.
02-25-53	No. 7 Turbine Low Pressure Heater	Water Side	Cleaned heater with Aquakleen (hydrochloric) Acid (108 gallons) and Inhibitor (8 pts.), recirculating for approximately 3.5 hours at an average temperature of 142°F. System was drained overboard and refilled, adding caustic (3 gallons). System was again drained overboard. Repairs were made. System refilled with the addition of flake caustic (400 lbs.) and recirculated for approximately 2.5 hours at an average temperature of 140°F. Caustic concentration average 3.0%. Heater was drained and flushed. System was refilled and heater was cleaned again with the Aquakleen Acid (67.5 gallons) and Inhibitor (5 pts.), recirculating for about 2 hours at an average temperature of 143°F. Acid concentration average 1.9%. System was drained overboard and flushed with service water.	All chemicals, solutions, etc. were discharged overboard.

Table 3.23 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
06-03-53	No. 7 Turbine High Pressure Heater	Water Side	Cleaned heater with a caustic solution (5%) for approximately 2 hours at approximately 158°F. The caustic solution was drained overboard and the heater was refilled, flushed and drained overboard. The next cleaning was done with hydrochloric acid (67.5 gallons) and an Inhibitor (2 ½ pts.), recirculated for 2.5 hours at an average temperature of 133°F. Acid concentration was a little less than 2.0%. Heater and system were drained overboard. System refilled, caustic added, system recirculated and drained. System flushed with clear water.	All chemicals, solutions, rinses were discharged overboard.

Table 3.24

Typical HCl Boiler Chemical Cleaning Drain Water Characteristics

Analyte	Spent Cleaning Drain	First Rinse Drain
pH	1.5	
Major Metals		
Iron	5900 ppm	0.14 ppm
Copper	320 ppm	0.31 ppm
Nickel	210 ppm	0.03 ppm
Zinc	30 ppm	0.01 ppm
RCRA Metals		
Arsenic	0 ppm	0 ppm
Barium	1 ppm	0.01 ppm
Cadmium	0.18 ppm	0.01 ppm
Chromium	3.5 ppm	0.01 ppm
Lead	1.6 ppm	< 0.002 ppm
Mercury		
Selenium	< 0.002 ppm	< 0.002 ppm
Silver	0.17 ppm	0.01 ppm
Other Components		
Acidity		
Alkalinity		
Aluminum	< 5 ppm	< 0.05 ppm
Ammonia		
Antimony	5.6 ppm	0.08 ppm
Beryllium	< 0.1 ppm	< 0.001 ppm
Boron	6.2 ppm	0.23 ppm
Calcium	74 ppm	18 ppm
Chloride		
Chromium VI	0.24 ppm	
Cobalt	1.6 ppm	< 0.006 ppm
COD		
Fluoride		
Magnesium	42 ppm	6.2 ppm
Manganese	31 ppm	0 ppm
Molybdenum	0.72 ppm	0.03 ppm
Nitrate		
Nitrite		
Phosphorous		
Potassium	< 5 ppm	3.2 ppm
Silicon	22 ppm	6.7 ppm
Sodium	160 ppm	35 ppm
Sulfate		
Thallium	< 9 ppm	< 0.09 ppm
TOC		
Vanadium	< 0.3 ppm	0.01 ppm

Ref: EPRI PISCES Database

Table 3.25

Raw Materials
Unit No. 1 (1947 - 1978)

Materials	Use and Description	EPA Letter	CERCLA Listed Substance
Fuels			
Bituminous Coal (WVa Primary Source & PA Alternate Source)	Boiler Fuel	*	
No. 6 Fuel Oil	Boiler Fuel	*	
Natural Gas	Boiler and Combustion Turbine Fuel		
Combustion Air	Boilers and Combustion Turbines		
Fuel Additives or Treatments			
Coal Trol (22% Phosphoric Acid)	May Have Been Used for Treatment of Coal Piles to Prevent Freezing		*
Boiler Water Treatment Chemicals			
Sodium Sulfite	Boiler Water Treatment Oxygen Scanvenger		*
Sodium Hydroxide	Neutralizing Agent		*
Anhydrous Disodium Phosphate	Boiler Water Treatment, Phosphate Addition		*
Anhydrous Trisodium Phosphate	Boiler Water Treatment, Phosphate Addition		*
Chemicals Used For Equipment Cleanings			
Sodium Meta-Silicate	Initial Pre-Operational Boiler Chemical Cleaning		
Dow A - 120 Inhibitor	Pre-Operational Boiler Chemical Cleaning, Iron Oxide Removal		
Thiourea	Boiler Chemical Cleanings, Copper Removal		*
Citric Acid	Boiler Chemical Cleanings, Copper Removal		
Hydrochloric Acid	Boiler/Condenser/Heater Chemical Cleanings, Iron Removal		*
NEP - 22 Inhibitor	Inhibitor Used With Hydrochloric Acid		
CausticSodium Hydroxide/Caustic (NaOH)	Neutralize Acidic High Chemical Cleanings for Boiler/Condenser/Heaters		*
Ammonium Hydroxide (Aqua Ammonia)	Boiler Chemical Cleaning Bromate Cleanings	*	*
Hydrazine at 100 ppm water solution	Hydrazine Was Used As A Passavating Agent In Some Boiler Chemical Cleaning Procedures		*
Anhydrous Trisodium Phosphate	Pre-Operational Boiler Chemical Cleaning/Heater Cleaning		*
Phosphoric Acid	Boiler Chemical Cleaning		*
Ammonium Carbonate	Boiler Chemical Cleaning		*
Sodium Bromate	Boiler Chemical Cleaning		
Potassium Permanganate	Feedwater Heater Chemical Cleaning		*
Oxalic Acid	Feedwater Heater Chemical Cleaning		
Sodium Carbonate (Soda Ash)	Neutralize Acidic Chemical Cleanings for Boiler/Condenser/Headers		
Water Sources			
River Water	Cooling and Various In-Plant Uses		
Newark City Water (potable)	Sanitary Uses, Boiler Makeup Provided From Low Pressure Boiler (s) Condensate		
Non-Contact Cooling Water Treatment Chemicals			
Chlorine (circa 1933)	Non-Contact Cooling Water Condenser, Biofouling Control		*

Table 3.26

Natural Gas
Typical Chemical Composition

Component	Mole Percentage
Nitrogen	0.67 %
Carbon Dioxide	0.71 %
Methane	95.61 %
Ethane	2.37 %
Propane	0.36 %
Iso-Butane	0.08 %
Normal-Butane	0.08 %
Iso-Pentane	0.02 %
Normal Pentane	0.02 %
Hexanes	0.06 %
Specific Gravity	0.5848
Saturated Btu Per Cubic Foot @ 14.73 psi	1,014
Dry Btu Per Cubic Foot @ 14.73 psi	1,032

Table 3.27

Typical Unit No. 1
High Pressure Boiler Chemistry Limits

Constituent	Limit or Range
pH	10.5 - 10.8
Silica	2 - 5 ppm maximum
PO_4	25 - 50 ppm
Total Solids	100 - 150 ppm maximum
Specific Conductivity	350 - 550 umhos/cm

Table 3.28
Summary of Boiler Chemical Cleanings
(New Unit No. 1)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
11-15-47	No. 1 Boiler	Water Side of Boiler Tubes (Pre-Operational Cleaning)	The boiler was given an alkaline boil out using the following chemical combination: 2600 ppm trisodium phosphate, 125 ppm caustic soda and 800 ppm sodium meta-silicate. Boiler was fired for approximately 18 hours while blowing down through the various blowdown valves. Drum pressure varied from 21 to 225 psi.	The boiler was cooled and drained via the discharge canal to the Passaic River.
			The boiler was refilled with hot condensate, including the economizer and superheater, and then drained, leaving the superheater and economizer full.	
			The boiler was acid cleaned with a 3.8% hydrochloric acid solution at 160°F. After soaking for approximately 4 hours, the boiler was then drained to the acid cleaning tanks, where the spent solution was neutralized with caustic soda, before draining.	The neutralized solution was drained via the discharge canal to the Passaic River.
			The boiler was then filled with city water and condensate at 150°F, and drained immediately (estimated concentration of 0.15% HCl in the rinse water).	The city water rinse was drained via the discharge canal to the Passaic River.
			A neutralizing solution of city water and condensate with 0.25% NaOH and 0.5% Na_3PO_4 at 180°F was pumped to the boiler. After a 1 hour soak, the boiler was drained.	The neutralizing solution was drained via the discharge canal to the Passaic River.
			The boiler was next filled with 190°F condensate and drained to the acid cleaning tanks.	No record.
			Chemicals Used: 910 lbs. trisodium phosphate 280 lbs. sodium metasilicate 44 lbs. flake caustic soda 5,000 gals. inhibited hydrochloric acid 8 1/2 drums liquid caustic soda 4 carboys phosphoric acid*	

Table 3.28 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
02-01-49	Boiler No. 1	Water Side	Chemicals Used: 55 1/2 carboys of hydrochloric acid* 55 1/2 quarts of NEP-22 inhibitor 9 drums of liquid caustic No other information available.	No record.
06-07-51	Boiler No. 1	Water Side	Chemicals used: 60 carboys of hydrochloric acid* 60 quarts of NEP-22 inhibitor 51 gals. (approx.) of liquid caustic No other information available.	No record.
10-02-52	Boiler No. 1	Water Side	Chemicals used: 1,000 gals. (approx.) of hydrochloric acid (via tank truck) 23 gals. of NEP-22 inhibitor 26 gals. of liquid caustic No other information available.	No record.
11-07-53	Boiler No. 1	Water Side	Chemicals used: 1,400 gals. of hydrochloric acid (via tank truck) 27 gals. (approx.) of NEP-22 inhibitor 27 gals. (approx.) of liquid caustic No other information available.	No record.

Table 3.28 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
07-09-56	Boiler No. 1	Water Side	Chemicals used: 5,011 gals. of hydrochloric acid 100 gals. of NEP-22 inhibitor 108 gals. of liquid caustic Boiler was cleaned with a 5% solution of hydrochloric acid at 140°F, containing 100 gals. of NEP-22 inhibitor. The solution was in the boiler for 3 hrs. 15 mins. before being drained. A condensate rinse followed the draining of the spent solution. A neutralizing rinse, containing 108 gals. of liquid caustic followed the condensate rinse. Following the draining of the neutralizing rinse, the boiler was given a final condensate rinse. Rinses were heated to 180°F before being pumped to the boiler.	The acid solution, rinse waters, neutralizing solution and any excess chemical solutions were all drained to the discharge canal to the Passaic River..
05-58	Boiler No. 1	Water Side	Boiler was cleaned with a 5% solution of inhibited hydrochloric acid. Inhibitor used was NEP-22. Temperature of solution was in the range of 140-150°F. Neutralization done with caustic soda solution. No other information available.	No record.

Table 3.28 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
10-03-65	Boiler No. 1	Water Side	The boiler was cleaned in two stages. First Stage: Copper removal using ammonium bromate at 180°F. Solution contact time was 6 hrs. Two rinses with city water at 180°F completed this phase. Second Stage: Iron and copper removal using 7.5% hydrochloric acid, 3.0% thiourea and 0.3% A120 inhibitor at 150°F. The solution contact time was 6 hrs. The solution was drained under a nitrogen blanket. The boiler was filled with condensate at 150°F for the first rinse, and was drained under nitrogen. The boiler was filled again with condensate containing 0.5% citric acid and 100 ppm hydrazine for the second rinse, and drained under nitrogen. The boiler was filled again with 150°F condensate containing 100 ppm hydrazine, and 0.5% citric acid for the third rinse, and drained under nitrogen. The boiler was then filled with a neutralizing solution containing 0.5% trisodium phosphate and 100 ppm hydrazine at 150°F. The boiler was fired to 75 psig pressure for 6 hrs. The boiler was blown down and finally drained when chemistry requirements were met.	All drains from the boiler went to the south ash lake. Uninhibited hydrochloric acid was injected into the bromate drain to reduce the bromate to bromide.

Table 3.28 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
10-03-65 (cont'd)	Boiler No. 1	Water Side	Chemicals used in First Stage: 3,250 gals. aqua ammonia 4,900 lbs. ammonium carbonate 2,700 lbs. sodium bromate 6,000 gals. 28% hydrochloric acid (used for neutralizing bromate). Chemicals used in Second Stage: 9,850 gals. 28% hydrochloric acid 120 gals. A120 inhibitor 10,100 lbs. thiourea 450 lbs. hydrazine 1,800 lbs. trisodium phosphate 700 lbs. citric acid 3,750 gals. sodium hydroxide 7 gals. antifoam agent Metal removed: 7,874 lbs. iron (as Fe) 2,693 lbs. copper (as Cu)	

Table 3.28 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
12-08-73	Boiler No. 1	Water Side	The boiler was cleaned with a 6% solution of hydrochloric acid, containing 2.0% thiourea (for copper removal), and 0.3% inhibitor. The boiler water side volume was 40,000 gallons. The solution temperature was 140-150°F, and contact time was approximately 6.5 hrs. The boiler was drained under nitrogen to trucks for off site disposal. The boiler was filled with hot condensate and drained under nitrogen, to the chemical waste basin. The boiler was refilled again with hot condensate containing 0.1% citric acid and drained under nitrogen, to the chemical waste basin. The boiler was refilled again with hot (180-190°F) condensate containing 0.5% caustic for neutralization. After soaking for approximately 2 hrs., the boiler was drained to the chemical waste basin. The boiler was filled again with hot (180°F) condensate and drained to the chemical waste basin. Metals removed (approx.): 3,000 lbs. iron (as Fe) 500 lbs. copper (as Cu).	The spent solution was drained to trucks for off site disposal. All other boiler condensate solution were drained to the chemical waste basin.

* A carboy contains 13 1/2 gallons.

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Table 3.29
Summary of Condenser Chemical Cleanings
(New Unit No. 1)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
7/25/53	No. 1 Condenser	Water Side	Cleaned with a solution containing approximately 1,680 gallons of hydrochloric acid and 132 quarts of NEP-22, resulting in a 3.5% HCl solution. Spent solution drained. Condenser flushed with fresh water.	Spent solution drained to the discharge canal to the Passaic River.
11/10/53	No. 1 Condenser	Water Side	Cleaned with approximately a 2.5% hydrochloric acid inhibited with 128 quarts of NEP 22. Liquid caustic used for neutralization. Temperature was 110°F-115°F. Circulation method used. No other data available.	Spent solution drained to the discharge canal to the Passaic River.
4//16/55	No. 1 Condenser	Water Side	Cleaned with 2.0% hydrochloric acid inhibited with NEP 22. Liquid caustic used for neutralization. Temperature was 120°F. Circulation method used. No other data available.	Spent solution drained to the discharge canal to the Passaic River.
7/11/56	No. 1 Condenser	Water Side	Cleaning solution contained approximately 1,200 gallons of 20° Baume hydrochloric acid and 124 quarts of NEP-22, resulting in a 2.5% HCl solution. Liquid caustic was used for neutralization. Temperature was 122°F-125°F. Circulation method was used.	Spent solution drained to the discharge canal to the Passaic River.
5/14/58	No. 1 Condenser	Water Side	Cleaning solution contained approximately 1,524 gallons of 20° Baume hydrochloric acid, inhibited with 55 gallons of NEP-22, resulting in a 3.2% HCl solution. Liquid caustic was used for neutralization. Temperature was 104°F-124°F. Circulation method was used. No other data available	Spent solution drained to the discharge canal to the Passaic River.

Table 3.29 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
12/21/58	No. 1 Condenser	Water Side	Cleaning solution contained approximately 2,000 gallons of 20° Baume hydrochloric acid inhibited with 40 gallons of NEP-22, resulting in a 4.2% HCl solution. Liquid caustic was used for neutralization. Temperature was 128°F-136°F. Circulation method used. No other data available.	Spent solution drained to the discharge canal to the Passaic River.
1/1/60	No. 1 Condenser	Water Side	Cleaned with 3% inhibited hydrochloric acid. Soak method used. No other data available.	No records.
6/21/68	No. 1 Condenser	Water Side	Condenser and two condensate coolers foam cleaned with 4,400 gallons of 28% hydrochloric acid containing 32 gallons of A-120 inhibitor. Anti-foam (12 gallons) was used to collapse the foam when it reached the outlet water boxes. No other data available.	Solution drained to the north ash lake.
12/1/73	No. 1 Condenser	Water Side	Foam cleaned with hydrochloric acid (10%). No other information available.	No records.

Table 3.30

Summary of Feedwater Heater Chemical Cleanings
(New Unit No. 1)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
01-01-60	No. 1 Unit Heaters 15 through 18	Steam and Water Sides	Cleaned both steam and water sides with 3% hydrochloric acid and NEP-22. Neutralized with caustic. Rinsed with condensate. Did three acid stages with same acid mix on feedwater side only. Used a total of 100 gal. caustic and 1,580 gal. acid.	All solutions went to discharge canal to the Passaic River.
07-26-69	No. 1 Unit Heaters 15 and 16	Steam and Water Sides	Cleaned with 8% solution of trisodium phosphate and 0.03% wetting agent, at 240°F.	No records.
01-03-70	No. 1 Unit Heaters 15 through 18	Water Side	Cleaned with 5% caustic +2% potassium permanganate at 200°F, followed by a city water rinse. Second stage was 7 1/2% hydrochloric acid +.2% A120 inhibitor plus .25% oxalic acid, followed by a city water rinse, followed by a flush until effluent was same pH and conductivity as city water. Third stage was 3% soda ash, which was drained hot to ash pit. Approximately 105 lbs of iron, 7 lbs of manganese, and .4 lbs of copper were removed.	All solutions went to discharge canal to the Passaic River.
08-23-73	No. 1 Unit Heaters 15 through 18	Steam and Water Sides	First stage: Cleaned with 3% caustic +2% potassium permanganate for 6 hours at 180°F. Solution recirculated.	None. Drained to truck for off site disposal.
			Flushed with hot water. Initial portion went to disposal truck, remainder to waste basin.	Remainder of flush water to chemical waste basin for settling and subsequent discharge from standpipe.
			Flushed again with city water.	Flush water to chemical waste basin.
			Second stage: Cleaned with 15% hydrochloric acid +.3% A120 inhibitor for 6 hours at 165°F. Solution recirculated.	None. Pumped to truck for off site disposal.
			Flushed with city water.	Flush water to chemical waste basin.
			Third stage: A repeat of first stage.	None. Drained to truck for off site disposal.
			Flushes after third stage.	Flush water to chemical waste basin.

Table 3.30 (Continued)

Date	Equipment Name	Area Cleaned	Materials Used and Procedure Notes	Discharges
08-23-73 (Continued)	No. 1 Unit Heaters 15 through 18	Steam and Water Sides	Fourth stage: A repeat of second stage plus acid fill and soak of steam side of heaters with same formulation.	None. Pumped to truck for off site disposal.
			Heaters flushed on water and steam sides.	Flush water to chemical waste basin.
			Fifth stage: Neutralization with 3% soda ash on water and steam sides. Water side recirculated. Steam side just soaked.	Neutralization solution drained and flushed to chemical waste basin.
			Metals removed: 120 lbs iron (Fe); 160 lbs copper (Cu).	
			Water side volume = 1,500 gallons Steam side volume = 6,000 gallons	

Table 3.31

Combustion Turbine Units - Operating Parameters

Combustion Turbine ID	Year Installed	Fuel Used	Voltage	Phase	Frequency	Name Plate KW Rating	No. Of Units In Plant	Plant Capacity Maximum Generator Name Plate Rating
No. 8 Gas Turbine*	1963	Natural Gas	13,800	3	60	30,000	1	30,000
No. 9 Gas Turbine**	1971	Natural Gas and Distilled Fuel	13,800	3	60	53,133	1	53,133
No. 10 Gas Turbine	1971	Natural Gas and Distilled Fuel	13,800	3	60	167,400	1	167,400
No. 11 Gas Turbine	1971	Natural Gas and Distilled Fuel	13,800	3	60	167,400	1	167,400
No. 12 Gas Turbine	1972	Natural Gas and Distilled Fuel	13,800	3	60	167,400	1	167,400
New No. 9 Gas Turbine	1990	Natural Gas and Distilled Fuel	13,800	3	60	90,000	1	90,000

* Retired
** Replaced

Table 3.32

Low Sulfur Distillate Fuel Oil Typical Characteristics

Percents by Weight:	
Sulfur	0.05 to 1.0
Hydrogen	11.8 to 13.9
Carbon	86.1 to 88.2
Nitrogen	nil to 0.1
Gravity Values:	
Degrees API	28 to 40
Specific Gravity	0.887 to 0.825
Density (pound/gallon)	7.39 to 6.87
Pour Point, deg. F	0 to - 40
Viscosity Values:	
Centistokes at 100°F	1.9 to 3.0
SSF at 122°F	---
Water and sediment, % by vol	0 to 0.1
Heating value, Btu/pound gross	19,170 to 19,750

API = American Petroleum Institute
SSF = Seconds Saybolt Furol

Ref: Steam-Its Generation and Use, Babcock & Wilcox, 40th Edition, 1992, page 8-15, Table 13

Table 3.33

Kerosene
Typical Characteristics

Percentages by Weight:	
Sulfur	0.01 to 0.5
Hydrogen	13.3 to 14.1
Carbon	85.9 to 86.7
Nitrogen	nil to 0.1
Gravity Values:	
Degrees API	40 to 44
Specific Gravity	0.825 to 0.806
Density (pounds/gallon)	6.87 to 6.71
Pour Point, deg. F	0 to -50
Viscosity Values:	
Centistokes at 100°F	1.4 to 2.2
SSF at 122°F	----
Water and sediment, % by vol.	----
Heating value, Btu/pound gross	19,670 to 19,860

API = American Petroleum Institute
SSF = Seconds Saybolt Furol

Ref: Steam-Its Generation and Use, Babcock & Wilcox, 40th Editions, 1992, page 8-15, Table 13

Table 3.34

Low Sulfur Distillate Fuel Oil
Metallic Hazardous Substances

Typical Concentration (ppmw)			
Substance	**Avg.**	**Min.**	**Max.**
Arsenic *			ND - 0.25
Beryllium			ND - 0.05
Cadmium *			ND - 0.05
Chloride *			ND - 30
Chromium *	0.05 **	0.05 **	0.06
Copper *	0.2 **	0.1 **	0.5
Lead *	0.34 **	0.25 **	0.5
Mercury *			ND - 0.1
Nickel *	0.06 **	0.05 **	0.08
Selenium			ND - 0.25
Sulfur *	550	500	600
Zinc	0.15	0.06	0.26

ppmw = parts per million by weight

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G

ND - 0.25, 0.1, or 30 = Not Detected by Analytical Method to 0.25, 0.1 or 30 ppm Limit

Ref: EPRI PISCES Database

Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are, or in the case of Average include, Non-Detect data reported at the detection level of the analytical method(s) used.

Table 3.35

Kerosene
Hazardous Substances

Typical Concentration		
Substance	**Ref 1 (mg/L)**	**Ref 2 (mg/kg)**
3-Methylcholanthrene	< 0.1 , <0.08	
7,12 - Dimethylbenz(a)anthracene	--, 17.0	
Acenaphthene	40, 51	
Acenaphthylene	25, 38 **	
Anthracene *	< 2.0 , 7.3	0.04
Benz(a)anthracene *	< 0.75 , < 0.09	< 0.01
Benzo(a)pyrene *	< 0.50 , < 0.30	< 0.01
Benzo(b)fluoranthene *	< 0.75 , < 0.20	
Benzo(ghi)perylene	< 2.0 , <0.30	
Benzo(k)fluoranthene *	< 0.50 , < 0.04	
Chrysene *	< 2.0 , <0.11	U
Dibenz(a,h)anthracene *	< 0.75 , <0.50	
Fluoranthene	< 4.0 , 1.0	0.09
Fluorene *	< 2.0 , 36	
Indeno(1,2,3-c,d)pyrene	< 2.0 , <0.30	
Naphthalene *	1,286 , 2,000	
Phenanthrene	1.9 , 493	U
Pyrene *	< 2.0 , 2.0	0.16

mg = milligrams
kg = kilograms
L = Liter
Ref 1 - Goodman & Harbison 1980
Ref 2 - Guerin, 1978

* Chemicals cited in USEPA's letter of April 30, 1996 to PSE&G
**Range and mean values reported
U = Undetected

Table 3.36

Raw Materials
Combustion Turbines
1963 - Present

Material	Use and Description	EPA Letter	CERCLA Listed Substamce
Fuels			
Natural Gas	Combustion Turbine Fuel		
No. 2 Distillate Oil	Combustion Turbine Fuel	*	
Kerosene	Combustion Turbine Fuel	*	
Combustion Air	Combustion Turbines		
Fuel Additives or Treatments			
DGT - 2 Smoke Suppresant (Barium & Manganese based)	Comustion Turbine Fuel Additives		*
GTA - 19 Smoke Suppresant (Cerium based)	Comustion Turbine Fuel Additives		
Boiler Water Treatment Chemicals			
Penetone 19(1)			
Chemicals Used For Equipment Cleanings			
Not Applicable			
Water Sources			
Newark City Water (potable)	Makeup to Closed Loop Cooling		
Chemicals Used for Cooling System (Unit No. 8 and New Unit No. 9 Only			
Ethylene Glycol	Closed Loop Cooling Water System	*	*
Corrosion Inhibitor (unspecified)	Closed Loop Cooling Water System		
Non-Contact Cooling Water Treatment Chemicals			
Not Applicable			

(1) Contains hexylene glycol (13.0%), which is not on the CERCLA hazardous substances list. Other constituents of Penetone-19 are not identified.

TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
No. 1 Tank	Steel Tank (ES)	S.E. Corner Yard	No. 6 Fuel Oil	20,000 bbls	Earthen Dike	Removed From Service
No. 2 Tank	Steel Tank (ES)	S.E. Corner Yard	No. 6 Fuel Oil	100,000 bbls	Steel Dike	Use Changed - 1990
No. 2 Tank	Steel Tank (ES)	S. E. Corner Yard	DM Water	100.000 bbls	Steel Dike	
No. 11 Station Power Transf.	Steel Housing (P)	N. Boiler House	Transil Oil	1,675 gal	Concrete Dike	Removed From Service
No. 5 Station Power Transf.	Steel Housing (P)	E. Boiler House	Transil Oil	1,955 gal	Concrete Dike	Removed From Service
No. 6 Station Power Transf.	Steel Housing (P)	E. Boiler House	Transil Oil	1,955 gal	Concrete Dike	Removed From Service
House Heating Boiler Tank	Steel Tank (ES)	W. Side Switch House	No. 2 Fuel Oil	8,000 gal	Concrete Dike	Removed From Service
Gasoline Tank	Fiberglass Tank (UST)	S.E. No. 1 Drive House	Gasoline	1,000 gal	None	Removed From Service
Diesel Tank (2)	Steel Tank (UST)	S.E. No. 1 Drive House	Diesel Oil	3,000 gal 1,000 gal	None	Removed From Service
Hazardous Waste Drum Storage Area	Steel Drums (ES)	S. Unit No. 12	Waste Oil	55 gal Drums = 15 Drums	Concrete Dike With Roof	
C-1355 Reactor	Steel Housing (P)	138KV Yard	Dielectric Fluid (Transil Oil)	5,725 gal	Housekeeping (Crushed Stone)	
H-1308 Reactor	Steel Housing (P)	138KV Yard	Dielectric Fluid	5,725 gal	Housekeeping	
W-1323 Reactor	Steel Housing (P)	138KV Yard	Transil Oil	5,725 gal	Housekeeping	Removed From Service
No. 132-1 Phase 1	Steel Housing (P)	138KV Yard	Transil Oil	13,700 gal	Housekeeping	Replaced
No. 132-1 Phase 2	Steel Housing (P)	138KV Yard	Transil Oil	13,700 gal	Housekeeping	Replaced
No. 132-1 Phase 3	Steel Housing (P)	138KV Yard	Transil Oil	13,700 gal	Housekeeping	Replaced
No. 132-1 Phase 1	Steel Housing (P)	138KV Yard	Dielectric Fluid	4,595 gal	Housekeeping	

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[1] Tank Codes: P = Process; ES = Exterior Storage; IS = Interior Storage; UST - Underground Storage Tank

TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
No. 132-1 Phase 2	Steel Housing (P)	138KV Yard	Dielectric Fluid	4,595 gal	Housekeeping	
No. 132-1 Phase 3	Steel Housing (P)	138KV Yard	Dielectric Fluid	4,595 gal	Housekeeping	
Oilostatic Tank	Steel Tank (P)	Oil Pump House	Dielectric Fluid	20,000 gal	Deversion/Concrete Dike	
Pump House	Steel Housing (P)	Pump House	Dielectric Fluid	N/A	Deversion/Concrete Dike	
Oilostatic Tank (P)	Steel Tank (P)	Next to Pump House	Dielectric Fluid	10,000 gal	Covered Concrete	
Oilostatic Tanks (2)	Steel Tank (P)	Oil Pump House	Dielectric Fluid	12,000 gal (6,000 gal/ea)	Deversion/Concrete Dike	
No. 8 Main Transf.	Steel Housing (P)	S. No. 8 Unit	Transil Oil	3,800 gal	Concrete Dike	Removed From Service
Old No. 9 Main Transf.	Steel Housing (P)	N. No. 9 Unit	Transil Oil	3,560 gal	Concrete Dike	Removed From Service
Old No. 9 Unit Gen. Lube Oil Reservoir	Steel Tank (P)	No. 9 Unit Generator	Lube Oil	3,300 gal		
Old No. 9 Unit Chemical Additive Tank	Steel Tank (ES)	N. No. 9 Unit	DGT-2M	1,000 gal	Concrete Dike	Removed From Service
Old No. 9 Unit Fuel Oil Drain Tank	Steel Tank (UST)	N.W. Corner No. 9 Unit	No. 2 Fuel Oil	275 gal		Removed From Service
Old Unit No. 9 OCB (3)	Steel Tank (P)	N. Side of Unit No. 9	Oil	183 gal (91 gal/ea)	Housekeeping	Removed From Service
Drum Storage Area	Steel Drums (ES)	W. Unit No. 10	Various Drums	55 gal Drums (47)	Concrete Dike	
Unit No. 10 Fuel Oil Reclaim Sumps (2)	Steel Tank (P)	S. Unit No. 10	Kerosene	100 gal (55gal/ea)	Concrete Vault	
No. 10 Unit Fuel Oil Drain Tank (4)	Steel Tank (UST)	N. & S. Corner No. 10 Unit	No. 2 Fuel Oil	250 gal/ea 1,000 gal		Removed From Service
Tank No. 3	Steel Tank Installed With Leak Detection (ES)	S.E. Corner Yard	Kerosene	5,040,000 gal	Earthen Dike and Claymax Liner	
No. 220-1 Transformer	Steel Housing (P)	230KV Yard	Dielectric Fluid (Transil Oil)	22,000 gal	Housekeeping	

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[1] Tank Codes: P = Process; ES = Exterior Storage; IS = Interior Storage; UST - Underground Storage Tank

TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
No. 220-2 Transformer	Steel Housing (P)	230KV Yard	Dielectric Fluid (Transil Oil)	18,000 gal (17,010 gal?)	Housekeeping	
No. 26-2A Transformer	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	7,380 gal	Housekeeping	
No. 26-2B Transformer	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	7,380 gal	Housekeeping	
No. 26-1A Phase 3	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	2,145 gal	Housekeeping	
No. 26-1A Phase 2	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	2,145 gal	Housekeeping	
No. 26-1A Phase 1	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	2,145 gal	Housekeeping	
No. 26-1B Phase 3	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	2,145 gal	Housekeeping	
No. 26-1B Phase 2	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	2,145 gal	Housekeeping	
No. 26-1B Phase 1	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	2,145 gal	Housekeeping	
Transil Oil Tanks (5)	Steel Tank (ES)	13KV Yard	Transil Oil	30,675 gal	Housekeeping	Removed From Service
No. 132-3 Tap Changer	Steel Housing (P)	13KV Yard	Transil Oil	4,350 gal	Housekeeping	Removed From Service
No. 132-3 Phase 3	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	7,430 gal	Housekeeping	
No. 132-3 Phase 2	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	7,430 gal	Housekeeping	
No. 132-3 Phase 1	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	7,430 gal	Housekeeping	
No. 132-2 Trap Changer	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	3,960 gal	Housekeeping	
No. 132-2 Phase 2	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	7,430 gal	Housekeeping	

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[1] Tank Codes: P = Process; ES = Exterior Storage; IS = Interior Storage; UST - Underground Storage Tank

TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
No. 132-2 Phase 3	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	7,430 gal	Housekeeping	
No. 132-2 Phase 1	Steel Housing (P)	13KV Yard	Dielectric Fluid (Transil Oil)	7,430 gal	Housekeeping	
No. 132-4 Transformer	Steel Housing (P)	N. Unit No. 10	Dielectric Fluid	9,500 gal	Housekeeping	
Unit No. 10 Generator Lube Oil Reservoir (4)	Steel Tank (P)	Unit No. 10 Generator	Lube Oil	400 gal (100 gal/ea)	Building	
No. 11 Main Transformer	Steel Housing (P)	N. No. 11 Unit	Transil Oil	11,440 gal	Housekeeping	
No. 11 Unit Fuel Oil Drain Tank (8)	Steel Tank (UST)	N. & S. Corner No. 11 Unit	No. 2 Fuel Oil	275 gal/ea (2,200 gal)		Removed From Service
No. 11 Main Transformer	Steel Housing (P)	N. Unit No. 11	Dielectric Fluid	3,900 gal	Housekeeping	
Unit No. 11 Fuel Oil Reclaim Tank (2)	Steel Tank (P)	Unit No. 11	Kerosene	950 gal (475 gal/ea)	Concrete Vault	Removed From Service
Unit No. 11 Generator Lube Reservoir (4)	Steel Tank (P)	Unit No. 11 Generator	Lube Oil	1,000 gal (250 gal/ea)	Building	
Chemical Additive Tank	Steel Tank (ES)	S. Unit Nos. 10 & 11	DGT-2M	2,500 gal	Concrete Pad & Dike	
No. 12 Main Transformer	Steel Housing (P)	N. No. 12 Unit	Transil Oil	14,130 gal	Housekeeping	Removed From Service
No. 12 Unit Fuel Oil Drain Tank (8)	Steel Tank	N. & S. Corner No. 12 Unit	No. 2 Fuel Oil	275 gal/ea (2,200 gal)		
Lube Oil Storage	Steel Drums	W. No. 12 Unit	Multigear B, Gulfcrest 44, Turbo Oil, 2380, Fryquel 220, Harmony 43AW, Aturbrio 71	55 gal drums		
No. 12 Main Transformer	Steel Housing (P)	N. Unit No. 12	Dielectric Fluid	8,900 gal	Housekeeping	
Unit No. 12 Fuel Oil Reclaim Tank (2)	Steel Tank (P)	S. Unit No. 12	Kerosene	950 gal (475 gal/ea)	Concrete Vault	Removed From Service
Unit No. 12 Generator Lube Oil Reservoir (4)	Steel Tank (P)	Unit No. 12 Generator	Lube Oil	1,000 gal (250 gal/ea)	Building	

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TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
Chemical Additive Tank	Steel Tank (ES)	S. Unit No. 12	DGT-2M	1,000 gal	Concrete Pad & Dike	
No. 9 Main Transformer	Steel Housing (P)	Unit No. 9	Dielectric Fluid	11,007 gal	Concrete Pad clay pit with Sump	
Unit No. 9 Generator Lube Oil Reservoir	Steel Tank (P)	Unit No. 9 Generator	Lube Oil	3,300 gal	Diversionory Collection System	
26KV Tie Bus O-U Reactors (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	1,100 gal	Housekeeping	
Group "U" OCB (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	315 gal (105 gal/ea)	Housekeeping	
C-289, N-248 OCB (2)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	530 gal (265 gal/ea)	Housekeeping	
Plank Rd Reactors Phase's 1-3(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	1,071 gal (357 gal/ea)	Housekeeping	
V-48 Plank Rd OCB(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	375 gal (125 gal/ea)	Housekeeping	
No. 9 Generator Transformer OCB(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	330 gal (110 gal/ea)	Housekeeping	
L-12 Ironbound Reactor Phase 1-3 (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	1,071 gal (357 gal/ea)	Housekeeping	
L-12 Ironbound OCB (3) Transformer	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	375 gal (125 gal/ea)	Housekeeping	
26-2 Trans. Group "U" OCB (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	315 gal (105 gal/ea)	Housekeeping	
Group "U" Secondary PT (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	15 gal (5 gal/ea)	Housekeeping	
No. 8 Station Power (Now No. 13)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	240 gal	Housekeeping	
26KV Transformer Bus OCB (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	318 gal (106 gal/ea)	Housekeeping	

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TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
Group O-U Trans Bus Reactors (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	1,071 gal (357 gal/ea)	Housekeeping	
26KV 132-4 Primary PT (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	12 gal (4 gal/ea)	Housekeeping	
26KV Group "0" OCB	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	105 gal/ea	Housekeeping	
0327 Reactor & J556	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	265 gal/ea	Housekeeping	
H-86 Plank Rd Reactor (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	720 gal (240 gal/ea)	Housekeeping	
H-86 OCB's (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	375 gal (125 gal/ea)	Housekeeping	
G-163 Reactor	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	265 gal	Housekeeping	
D-368 Ironbound Reactors (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	971 gal (357 gal/ea)	Housekeeping	
D-368 OCB's (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	375 gal (125 gal/ea)	Housekeeping	
I-87 Plank Rd Reactor (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	1,071 gal (357 gal/ea)	Housekeeping	
I-87 OCB (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	375 gal (125 gal/ea)	Housekeeping	
132-4 26KV Group "0" OCB (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	315 gal (105 gal/ea)	Housekeeping	
No. 12 Station Power	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	240 gal	Housekeeping	
I-85 Harrison OCB (3) (Now 4-25)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	375 gal (125 gal/ea)	Housekeeping	
X-102 A&B OCB(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	411 gal (137 gal/ea)	Housekeeping	
T-358 Clay Street OCB (3) (Now M-21)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	318 gal (106 gal/ea)	Housekeeping	

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TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container*[1] *Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
Z-52 Harrison OCB(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	411 gal (137 gal/ea)	Housekeeping	
26KV Group M OCB(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	390 gal (130 gal/ea)	Housekeeping	
132-1 Transformer Group M OCB (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	390 gal (130 gal/ea)	Housekeeping	
132-1 Transformer 26KV PTS (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	45 gal (15 gal/ea)	Housekeeping	
26KV Transformer Bus I-M OCB	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	125 gal/ea	Housekeeping	
Transformer Bus I-M Synch Transformer	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	5 gal	Housekeeping	
P-94 Harrison OCB (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	375 gal (125 gal/ea)	Housekeeping	
J-556 Path OCB (3) (Now G-163)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	318 gal (106 gal/ea)	Housekeeping	
S-357 A&B Reactor	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	265 gal	Housekeeping	
H-346 Clay St OCB(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	318 gal (106 gal/ea)	Housekeeping	
26KV Tie Bus Group "I" OCB(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	390 gal (130 gal/ea)	Housekeeping	
132-1 Transformer 26KV Group I OCB(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	390 gal (130 gal/ea)	Housekeeping	
26KV Neutral Resistor Shunt OCB	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	100 gal (approx)	Housekeeping	
26-1 Transformer 26KV OCB(3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	315 gal (105 gal/ea)	Housekeeping	
26KV Tie Bus Group I-M Reactors (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	3,300 gal (1,100 gal/ea)	Housekeeping	
26-1 Pot Transformer (3)	Steel Housing (P)	26KV Switchyard	Dielectric Fluid	45 gal (15 gal/ea)	Housekeeping	Removed From Service

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TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
Potential Transformer	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	15 gal (approx)	Housekeeping	
C-1355 & 132-4 B&R OCB (3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	3,510 gal (1,170 gal/ea)	Housekeeping	
220-1.138KV Breaker (3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	2,550 gal (850 gal/ea)	Housekeeping	
132-1 Transformer 132KV OCB(3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	3,510 gal (1,170 gal/ea)	Housekeeping	
132KV Main Bus Sec 3-4 (3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	2,550 gal (850 gal/ea)	Housekeeping	
H-1308 & No 11 Main Transformer 138KV Breaker (3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	2,475 gal (825 gal/ea)	Housekeeping	
132-2 Transformer 132KV OCB (3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	2,550 gal (850 gal/ea)	Housekeeping	
132KV Sec 2, Bus Tie OCB (3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	2,550 gal (850 gal/ea)	Housekeeping	
220-2, 138 KV OCB (3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	3,510 gal (1,170 gal/ea)	Housekeeping	
132-3, 132KV OCB(3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	3,420 gal (1,140 gal/ea)	Housekeeping	
132KV Main Bus Sec 1-30 OCB (3)	Steel Housing (P)	132KV Switchyard	Dielectric Fluid	2,550 gal (850 gal/ea)	Housekeeping	
No. 8 Lighting Transformer	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	20 gal (approx)	Housekeeping	
No. 7 Lighting Transformer	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	20 gal (approx)	Housekeeping	
OCB's (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
G319 City Dock 13KV OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
V337 City Dock 13KV OCB (3) (Now Y-337)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	

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TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
H320 OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
L324 13KV OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
132-3 Transformer 13KV Group "O" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	390 gal (130 gal/ea)	Housekeeping	
26-1 Transformer 13KV Group "O" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	390 gal (130 gal/ea)	Housekeeping	
13KV Neutral Ground Transformer 13KV Group "O" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	390 gal (130 gal/ea)	Housekeeping	
13KV Tie Bus Group "O" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	345 gal (115 gal/ea)	Housekeeping	
13KV Tie Bus Group "U" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	345 gal (115 gal/ea)	Housekeeping	
13KV Bus Group "U" PT (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	45 gal (15 gal/ea)	Housekeeping	
13KV Neutral Ground Trans 13KV Group "U" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	345 gal (115 gal/ea)	Housekeeping	
13KV Neutral Ground Transformer	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	1,013 gal	Housekeeping	
26-1 Transformer PTS (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	57 gal (19 gal/ea)	Housekeeping	
Group O-U PT's (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	30 gal (10 gal/ea)	Housekeeping	
26-1 Transformer 13KV Group "U" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	390 gal 130 gal/ea)	Housekeeping	
132-3 Transformer 13KV Group "U" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	342 gal (114 gal/ea)	Housekeeping	
No. 5 Stat Power Transformer OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	

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TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
V-256 OCB(3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
D-82 OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	177 gal (59 gal/ea)	Housekeeping	
D-316 OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
X-388 OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	156 gal (52 gal/ea)	Housekeeping	
No. 5 & 6 Lighting Transformer (2)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	42 gal (21 gal/ea)	Housekeeping	
13KV Groups "O" and "6" Shunt (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	459 gal (153 gal/ea)	Housekeeping	
No. 11 Station Power Transformer OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
H-164 OCB(3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
L-376 Penna 13KV OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
S-461 13KV OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
No. 1 Station Power Transformer OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
132-3 Transformer Group "R" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	342 gal (114 gal/ea)	Housekeeping	
No. 5 Generator Group "R" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	345 gal (115 gal/ea)	Housekeeping	Not In Service
No. 2 Generator Group "R" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	345 gal (115 gal/ea)	Housekeeping	Not In Service
13KV Tie Bus Group "R" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	345 gal (115 gal/ea)	Housekeeping	

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TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
13KV Tie Bus Group "X" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	345 gal (115 gal/ea)	Housekeeping	
No. 2 Generator 13KV Group "X" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	342 gal (114 gal/ea)	Housekeeping	Not In Service
No. 5 Generator 13KV Group "X" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	345 gal (115 gal/ea)	Housekeeping	Not In Service
132-3 Transformer 13KV Group "X" OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	342 gal (114 gal/ea)	Housekeeping	
L-38 Miller St OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
T-332 OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
E-473 OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
Z-442 OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	174 gal (58 gal/ea)	Housekeeping	
S-487 OCB (3)	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	243 gal (81 gal/ea)	Housekeeping	
No 26-1 Spare Transformer	Steel Housing (P)	13KV Substation	Dielectric Fluid	2,145 gal	Housekeeping	
No 26-1 Transformer A&B Blower Motor	Steel Housing (P)	13KV Substation	Dielectric Fluid	35 gal (5 gal/ea)	Housekeeping	
Allis-Chalmers 45KVA Unit	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	7,000 gal	Housekeeping	
No 132-3 Spare Transformer	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	7,430 gal	Housekeeping	
No. 7 Pole Transformer	Steel Housing (P)	13KV Switchyard	Dielectric Fluid	80 gal (20 gal/ea)	Housekeeping	
Oilostatic 26 2A&2B Tank	Steel Tank (P)	Transformer Repair Building	Dielectric Fluid	470 gal	Building	
No. 12 Station Power Transformer	Steel Housing (P)	West of Switchgear Building	Dielectric Fluid	155 gal	Housekeeping	

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TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
Battery Station 60 Cells	Glass Containers (P)	26 Control House	Sulfuric Acid	150 gal (2.5 gal/ea)	Building	
Kerosene Piping	Steel Pipe (P)	Above & Below Ground	Kerosene	N/A	Below Ground Steel Pipe	
Unit No. 10 Nelson Winslow Filters (2)	Steel Housing (P)	S. Unit No. 10	Fuel Oil	400 gal (approx)	Concrete Dike	
Unit No. 10 Lube Oil Reservoirs (16)	Steel Housing (P)	Inside Unit No. 10	Lube Oil	480 gal 30 gal/ea	Building	
Drum Storage Area	55 gal Drum (IS)	Unit No. 10 Maintenance Area	Lube Oil Waste Oil	55 gal (approx)	Building	
Unit No. 11 Nelson Winslow Filter (6)	Steel Housing (P)	S. Unit No. 11	Kerosene	2,400 gal (400 gal/ea)	Concrete Dike	
Unit No. 11 Lube Oil Reservoirs (24)	Steel Housing (P)	Inside Unit No. 11	Lube Oil	720 gal (30 gal/ea)	Building	
Unit No. 12 Lube Oil Reservoirs	Steel Housing (P)	Inside Unit No. 12	Lube Oil	30 gal/ea	Building	
Unit No. 12 Nelson Winslow Filters (4)	Steel Housing (P)	S. Unit No. 12	Kerosene	1,600 gal (400 gal/ea)	Concrete Dike	
Unit No. 12 Natural Gas Distillate	Steel Housing (P)	S. Unit No. 12	Water & Oil	10 gal (approx)	Concrete Dike	
Fuel Oil Forwarding Pumps & Valves	Steel Valves (P)	W. Side Tank No. 3 Dike	Kerosene	N/A	Concrete Dike	
Unit No. 9 4KV Cranking Transformer	Steel Housing (P)	S.W. Corner Unit No. 9	Dielectric Fluid	250 gal (approx)	Housekeeping	
Unit No. 9 480V Aux Transformer	Steel Housing (P)	S.W. Corner Unit No. 9	Dielectric Fluid	250 gal (approx)	Housekeeping	
Unit No. 9 Lube Oil Surge Tank	Steel Housing (P)	Unit No. 9	Lube Oil	100 gal (approx)	Building	
Unit No. 9 Vacuum Demister Pot	Steel Housing (P)	N. Unit No. 9	Waste Oil	40 gal (approx)	Building	
Unit No. 15 Station Power Transformer	Steel Housing (P)	230KV Switchyard	Dielectric Fluid	70 gal (approx)	Housekeeping	
Unit No. 14 Station Power Transformer	Steel Housing (P)	230KV Switchyard	Dielectric Fluid	70 gal (approx)	Housekeeping	Removed From Service

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Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
Nelson Winslow Filters (2)	Steel Housing (P)	Tank No. 3 Unloading Area	Kerosene	800 gal (400 gal/ea)	Concrete Dike	
Battery Station (60 Batteries)	Glass Containers (P)	230KV Yard Central Building	Sulfuric Acid	300 gal (5 gal/ea)	Building	
Battery Station (100 Batteries)	Glass Containers (P)	Unit No. 10 Control Room	Sulfuric Acid	500 gal (5 gal/ea)	None	
Drum Storage Area	55 gal Drums (IS)	Maintenance Shop	Lube Oil	600 gal	Building	
Lube Oil Storage Sheds (5)	55 gal Drums (P)	Near Each Generator Unit	Lube Oil	8 Drums	Hazmat Storage Shed	
Group "A" Tie Bus OCB (3)	Steel Housing (P)	Switch House, 6th Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
Group "M" Tie Bus OCB (3)	Steel Housing (P)	Switch House, 6th Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
Group "I" Tie Bus OCB (3)	Steel Housing (P)	Switch House, 6th Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
Group "B" Tie Bus OCB (3)	Steel Housing (P)	Switch House, 6th Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
Group "B" Tie No. 7 Generator OCB (3)	Steel Housing (P)	Switch House, 2nd Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
Group "A" Tie No. 7 Generator OCB (3)	Steel Housing (P)	Switch House, 2nd Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
132-2 Trans. Group "B" OCB (3)	Steel Housing (P)	Switch House, 2nd Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
132-2 Trans.Group "A" OCB (3)	Steel Housing (P)	Switch House, 2nd Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
No. 4 Generator Group "I" OCB (3)	Steel Housing (P)	Switch House, 2nd Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
No. 4 Generator Group "M" OCB (3)	Steel Housing (P)	Switch House, 2nd Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service

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TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
26-2 Trans. 13KV Group "I" OCB (3)	Steel Housing (P)	Switch House, 2nd Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
26-2 Trans. 13KV Group "M" OCB (3)	Steel Housing (P)	Switch House, 2nd Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
8001-Sec 1 13KV Network OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
LP-324 Essex Transmission OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
X-492 Substation OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
No. 1 Station Power 13KV OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
Q-69 Long-Naien OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
8003-Sec 1 13KV Network Group "A" OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
8001-Sec 1 13KV Network OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
J-88 P.V.J.C. FPEG Y-103 Naval Shipyard OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
M-325 Essex Yard Transmission OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
No. 2 Station Power Trans. 13KV OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
P-562 BKR OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
8003- Sec 1 13 KV Group "B" OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
13 KV Group "A" & "B" Reactor Shunt Group "B" OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service

---

[1] Tank Codes: P = Process; ES = Exterior Storage; IS = Interior Storage; UST - Underground Storage Tank

TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container[1] Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
13 KV Group "A" & "B" Reactor Shunt Group "A" OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
No. 3 Generator Group "I" OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
No. 3 Generator Group "M" OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	600 gal (200 gal/ea)	Building	Not In Service
LP-432- Sec 1 Group "I" OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
No.6 Station Power Trans. 13 KV OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
LP-432- Sec 1 Group "m" OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
O-41 Washington Ave OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
E-473 Western Ave OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
No. 3 Station Power Trans. 13KV OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
R-96 Washington Ave OCB (3)	Steel Housing (P)	Switch House, 4th Floor	Dielectric Fluid	300 gal (100 gal/ea)	Building	Not In Service
Battery Station (240 Batteries)	Glass Containers (P)	Switch Building	Sulfuric Acid	3,600 gal (15 gal/ea)	Building	
Drum Storage Area	55 gal Drum (IS)	Transformer Building	Lube Oil	55 gal	Overpack Drum	
Air Compressor	Steel Housing (P)	Transformer Building	Lube Oil	20 gal	Building	
Unit No. 11 (4) Battery Station (60 Cells)	Glass Containers (P)	Unit No. 11	Sulfuric Acid	1,500 gal (25 gal/ea)	None	
Unit No. 12 (4) Battery Station (60 Cells)	Glass Containers (P)	Unit No. 12	Sulfuric Acid	1,500 gal (25 gal/ea)	None	
Unit No. 10 OCB's (3)	Steel Housing (P)	N. Unit No. 10	Dielectric Fluid	336 gal (112 gal/ea)	Housekeeping	

---

[1] Tank Codes: P = Process; ES = Exterior Storage; IS = Interior Storage; UST - Underground Storage Tank

TABLE 3.37
ESSEX GENERATING STATION STORAGE & PROCESS EQUIPMENT

Designation	*Container¹ Type*	*Location*	*Product Type*	*Product Quantity*	*Containment/Diversion Type*	*Current Status*
Paint Storage	Steel Containers (P)	Trailer West of Maintenance	Paint	100 gal (Approx.) (5 gal/ea)	Building	
Battery Station Old Unit No. 9 (60 Batteries)	Glass Containers (P)	Old Unit No. 9	Sulfuric Acid	360 gal (6 gal/ea)	None	Removed From Service
Battery Station Unit No. 9 (56 cells)	Glass Containers (P)	Unit No. 9	Sulfuric Acid	168 gal (3 gal/ea)	Building	
Nos. 3 and 4 Transformers	Steel (P)	N. Side of Transformer Repair House	Dielectric Fluid	128 gal/ea	Operator in Attendance	
10-12 Reclaim Oil Tank	Steel Tank	West of No. 13 Fuel Oil	Fuel Oil	8,000 gal	Earthen Dike & Claymax Liner	
Diesel Storage Tank	Steel Tank	N. Of Heliport	Diesel Fuel	500 gal	Concrete Dike & Curbing	
Unit No. 11 Fuel Oil Reclaim Tank (2)	Steel Tank (P)	Unit No. 11	Kerosene	(2) 55 gal Temporary Holding Tanks	Concrete Vault	
Unit No. 12 Fuel Oil Reclaim Tank (2)	Steel Tank (P)	S. Unit No. 12	Kerosene	(2) 55 gal Temporary Holding Tanks	Concrete Vault	
Unit No. 10 Natural Gas Distillate	Steel Housing (P)	S. Unit No. 10	Distillate	10 gal (approx.)	Drip Pan	
Unit No. 11 Natural Gas Distillate	Steel Housing (P)	S. Unit No. 11	Water & Oil	10 gal (approx.)	Drip Pan	
Unit No. 9 Suction Strainers (2)	Steel Housing (P)	E. of Unit No. 9	Kerosene	N/A	Concrete Dike & Roof	
Unit No. 9 Fuel Oil Forwarding Pumps (2) and Heater (1)	Steel Housing (P)	E. of Unit No. 9	Kerosene	N/A	Small Building within Containment	
Unit No. 9 Fuel Oil Filters (2)	Steel Housing (P)	E. of Unit No. 9 in Small Building	Kerosene	N/A.	Concrete Dike & Roof	
Maintenance Shop Satellite Accumulation Area	55 gal Drums (IS)	N. of Maintenance Shop	Waste Oil Spent Solvents	110 gal (55 gal/ea)	Storage Shed	
Stormwater Frack Tank (Portable)	Steel (ES)	W. of No. 3 Fuel Oil Tank	Stormwater Residual Oil	20,000 gal	Operator in Attendance	

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[1] Tank Codes: P = Process; ES = Exterior Storage; IS = Interior Storage; UST - Underground Storage Tank

Table 3.38

Lubricating Oils
Hazardous Substances

TYPICAL CONCENTRATION (ppmw)		
Substance	**Ref 1**	**Ref 2**
Anthracene*	9.9	0.13
Benzo(a)anthracene*	0.68	0.34
Benzo(a)pyrene*	0.23	0.03
Benzo(ghi)perylene	0.85	0.07
Benzofluoroanthene*	0.62	0.41
Chrysene*	3.2	1.26
Fluoranthene	2.0	0.70
Fluorene*	11.7	
Phenanthrene	46.5	7.09
Pyrene*	2.5	1.83

ppmw = parts per million by weight
Ref 1 - Neff et al., 1994
Ref 2 - Grimmer al., 1981

*Chemicals cited in USEPA's letter of April 1996 to PSE&G

Table 3.39

Essex Generating Station
Underground Storage Tanks
(All Have Been Removed)

Designation & No. of Tanks	Container Type	Location	Type	Size	Date of Installation
No. 9 Unit Fuel Oil Drain Tank	Steel Tank	N.W. Corner No. 9 Unit	No. 2 Fuel Oil	275 gal	1971
No. 10 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 10 Unit	No. 2 Fuel Oil	250 gal	1971
No. 10 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 10 Unit	No. 2 Fuel Oil	250 gal	1971
No. 10 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 10 Unit	No. 2 Fuel Oil	250 gal	1971
No. 10 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 10 Unit	No. 2 Fuel Oil	250 gal	1971
No. 11 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. No. 11 Unit	No. 2 Fuel Oil	275 gal	1971
No. 11 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. No. 11 Unit	No. 2 Fuel Oil	275 gal	1971
No. 11 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. No. 11 Unit	No. 2 Fuel Oil	275 gal	1971
No. 11 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. No. 11 Unit	No. 2 Fuel Oil	275 gal	1971
No. 11 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. No. 11 Unit	No. 2 Fuel Oil	275 gal	1971
No. 11 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. No. 11 Unit	No. 2 Fuel Oil	275 gal	1971
No. 11 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. No. 11 Unit	No. 2 Fuel Oil	275 gal	1971
No. 11 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. No. 11 Unit	No. 2 Fuel Oil	275 gal	1971
No. 12 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 12 Unit	No. 2 Fuel Oil	275 gal	1972
No. 12 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 12 Unit	No. 2 Fuel Oil	275 gal	1972
No. 12 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 12 Unit	No. 2 Fuel Oil	275 gal	1972
No. 12 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 12 Unit	No. 2 Fuel Oil	275 gal	1972
No. 12 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 12 Unit	No. 2 Fuel Oil	275 gal	1972
No. 12 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 12 Unit	No. 2 Fuel Oil	275 gal	1972
No. 12 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 12 Unit	No. 2 Fuel Oil	275 gal	1972

Table 3.39 (Continued)

Designation & No. of Tanks	Container Type	Location	Type	Size	Date of Installation
No. 12 Unit Fuel Oil Drain Tank	Steel Tank	N. & S. Corner No. 12 Unit	No. 2 Fuel Oil	275 gal	1972
Gasoline Tank	Fiberglass Tank	S.E. No. 1 Drive House	Gasoline	1,000 gal	Unknown
Diesel Tank	Steel Tank	S.E. No. 1 Drive House	Diesel Oil	3,000 gal	1952
Diesel Tank	Steel Tank	S.E. No. 1 Drive House	Diesel Oil	1,000 gal	Unknown
Coal Equipment Lube Oil Tank	Steel Tank	Coal Unloading Tower	Lube Oil	Unknown	Unknown

Table 3.40
Summary of ACOE Dredging Along Passaic River

DREDGING DATES	DEPTH (FEET)	AREA/REACH	QUANTITY (CUBIC YARDS)
4/17 - 5/19	16	Jackson St. to Clay Street	185,178
5/21 - 6/21	20	Bay to Jackson Street	102,732
2/21 - 7/22	20	From 7,600' to 8,500' above Penn RR Bridge	62,805
6/21/22 - 6/22/22	20	From 1,000' above Lincoln Hwy Bridge 7,600' above Penn RR Bridge	515,500
10/22 - 2/23	20	From 8,500' above Penn RR Bridge to Jackson St. Upper 800' was new work	159,176
9/26	10	At Belleville (6-foot depth)	2,666
7/28	10	At Belleville (6-foot depth)	3,908
4/30 - 6/30	10	At Belleville	36,658
6/30 - 10/30	10	At Belleville	55,597
7/30 - 8/30	10	Above Rutherford Avenue Bridge	35,042
8/30 - 6/31	10	Belleville Bar to 8th St. Bridge	567,357
1/31 - 6/31	10	Above Rutherford Avenue Bridge	39,382
7/31 - 11/31	10	Above Rutherford Avenue Bridge	65,856
7/31 - 12/31	30	Entire Stretch	1,430,706
7/31 - 2/32	10	Belleville Bar to 8th Street Bridge Upper Level	589,110

Table 3.40 (Continued)

DREDGING DATES	DEPTH (FEET)	AREA/REACH	QUANTITY (CUBIC YARDS)
7/31 - 10/32	10	Scattered rock shoals	30,550
3/32 - 4/32	10	Passaic River	8,735
6/32	10	Scattered rock shoals	3,202
9/32 - 11/32	16	Vicinity Congoleum Mfg. Co. to Erie R.R. Bridge (Montclair & Greenwood Lake Div)	228,344
10/32 - 6/33	30	Junction to 3,000' above Lincoln Hwy Bridge	607,212
12/32	10	At DL & W R.R. Bridge	Not Documented
8/33	16	At Erie RR Bridge (Montclair & Greenwood Lake Div)	Not Documented
9/33 - 11/33	10	Belleville Bar	30,051
6/36 - 10/36	20	Lower end of Jackson St. Bridge	800,860
10/6/37 - 10/28/37	10	Vic. Montclair & Greenwood Lake RR Bridge	32,553
5/39 - 6/39	10	Passaic R. Mouth of Second River, Belleville, NJ & bet. Union Avenue Bridge Rutherford & 2nd St. Br. Passaic, NJ	3,173
7/39 - 10/39	10	Passaic R. Mouth of Second River, Belleville, NJ & bet. Union Avenue Bridge Rutherford & 2nd St. Br. Passaic, NJ	51,815
7/40 - 4/41	30	Junction to 3,000' above Lincoln Hwy Bridge (Part of Contract with Newark Bay - Main Channel & Hackensack River)	1,202,000

Table 3.40 (Continued)

DREDGING DATES	DEPTH (FEET)	AREA/REACH	QUANTITY (CUBIC YARDS)
11/44 - 5/45	10	Opposite Second River	25,632
2/46 - 6/46	30	Junction to 3,000' above Lincoln Hwy Bridge (Part of Contract with Newark Bay - Main Channel & Hackensack River)	934,507
12/46	--	Obstruction Passaic R.	--
5/49 - 6/49	16	Penn RR Freight Bridge & Center St. Bridge	272,753
7/49 - 8/49	16	Penn RR Freight Bridge & Center St. Bridge	97,074
9/49 - 4/50	16	Center St. Bridge to Nairn Linoleum Works	344,739
1/50 - 4/50	10	Gregory at 8th St. Bridge	153,501
5/50 - 6/50	--	Miscellaneous Shoals	--
1/51 - 3/51	30	Junction to CRR of NJ Bridge	329,225
4/53 - 6/53	30	Junction to 500' north of Junction (Part of Contract with Newark Bay Main Channel & Hackensack River)	10,000
10/56 - 12/56	10	Vic 2nd River	37,234
1/57 - 4/57	30	CRR of NJ Bridge to 2,000' upstream	130,657
1/57 - 6/57	30	Junction to CRR of NJ Bridge	283,284
11/61 - 4/62	30	Junction to CRR of NJ Bridge (Part of contract with Hackensack River)	245,000
2/65 - 6/65	30	Junction to Lincoln Hwy Bridge	505,535

Table 3.40 (Continued)

DREDGING DATES	DEPTH (FEET)	AREA/REACH	QUANTITY (CUBIC YARDS)
5/20/71 - 7/2/71	30	Junction to 1,000' South of CRR of NJ Bridge	155,556
12/71 - 3/72	30	From Newark Bay to Lincoln Highway Bridge	74,551
1/74 - 2/74	10	Vic 2nd River	64,970
3/76 - 7/76	20	(Location Not Specified)	191,621
5/77 - 7/77	30	From Jct. to Kearny Pt. Reach (CNJ Br.)	477,988
5/77 - 9/88	30	From Jct. to Kearny Pt. Reach (CNJ Br.)	477,988
9/2/81 - 10/7/81	--	(Removal of Wrecks and Associated Debris from Passaic River)	N/A
7/14/83 - 9/23/83	30	Junction to Lincoln Bridge	540,000
1983	30	From Newark Bay to Lincoln Highway Bridge	540,000

TABLE 3.41

CHARACTERISTICS OF TRANSIL OILS SUPPLIED BY VARIOUS EQUIPMENT MANUFACTURERS(a) (FROM PUBLISHED DATA)

Characteristic	Pennsylvania Transformer Division	Westinghouse (Wemco C)	Allis-Chalmers (No. 3)	Genl. Electric (10C)	Pacific Elec. Mfg. Co.
Flash Point (Cleveland Open Cup Method)	270F (132C) Minimum	135C Min.	132C Min.	130C Min.	135C Min.
Fire Point (Cleveland Open Cup Method)	155C at 300F Minimum	152C Min. at 350F	149C at 300F (Min.)	145C Min.	150C Min.
Viscosity (Standard Saybolt Test at 37.8C) OC	60 Seconds	60 Sec. Max. 280 Sec. Max.	63 Sec. Max.	58 Sec. Max.	60 Sec. Max.
Specific Gravity (at 15.5C)	.90 to .910	.898	.91 at 15.6C	.865-.900	.884
Pour Point	-40F (-40C)	-45.6C Max.	-40C Max.	-40C Max.	-40C Max.
Snyder Life Test for Sludge	18 to 22 days		---		
Dielectric Strength (1" circular discs 0.1" apart)	26,000V Min.	26,000V Min. (on shipment)	26,000V Min. (on shipment)	26,000V Min. (on shipment)	26,000V Min
Neutralization No. (Mg.koh per gram of oil)	.05 Maximum	.03 Maximum	.03 Maximum	.02 Maximum	.03 Maximum
Steam Emulsion No. (sec.)	25	25 Maximum	25 Maximum		9 Maximum
Color:(A) N.P.A. Designation Cream White (B) Tag Robinson	No. 1-1/2 No. 17-1/2	2.0 Maximum		ASTM-1 Max.	
Coefficient of Expansion per deg.C	.0007	.000725			
Free and Corrosive Sulphur Mineral Acids (Chloride & Sul.)	Nil Nil	Nil	Nil	Nil	Nil
Weight/gal.		7.5 lbs.			7.5 lbs.
Dielectric Constant		2.2			
Interfacial tension (dynes/sq. cm)		40 Min.			
Specific heat		.488 Approx.			
Precipitation No.		0			

(a) Source: Insulating Oil Report-
Report on Insulating Oil Purchase, Storage, Handling, Testing, Treatment
August 12, 1996and Transportation (12/62) - PSE&G

TABLE 3.42

SWITCHING AND GENERATING STATION STORAGE TANKS-OIL ANALYSIS[(a)]

	Gallons in Tank	NN	IFT	PPM	KV	PF (40°C)	Date Tested
#1 Dirty OCB	2,560	.10	24.0	54	18.0	.37	08/25/61
#3 Dirty OCB	3,470	.12	23.3	57	23.6	.20	08/25/61
#4 Clean Transformer	---	.26	22.0	48	33.6	.72	08/25/61
#5 Dirty Transformer	6,200	.16	23.9	75	16.5	.63	08/25/61

(a) Source: Insulating Oil Report -
Report on Insulating Oil Purchase, Storage, Handling, Testing, Treatment
And Transportation (December 1962)

Notes: NN = neutralization number (mg.koh/gram oil)
IFT = interfacial tension (dynes/sq. cm.)
PPM = parts per million of water
KV = kilovolts of dielectric strength
PF = power factor

FIGURES

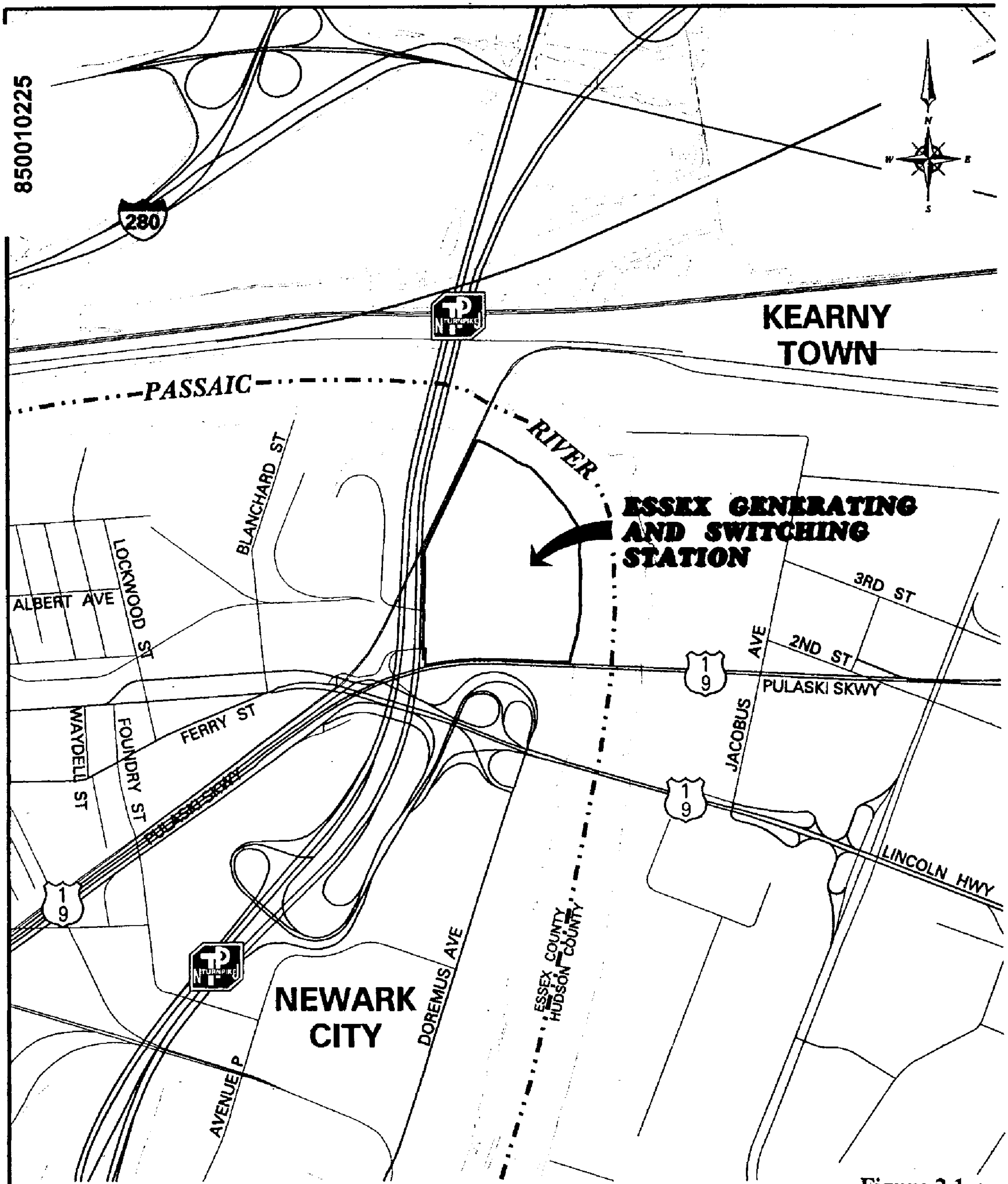

Figure 2.1

FROM U.S.C.&G.S. JERSEY CITY QUADRANGLE

DATA MEETS NMAS FOR 1" = 200' MAPPING *NOT-TO-SCALE* NAD-27

ESSEX GENERATING AND SWITCHING STATION

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OWNERSHIP TRANSACTION
MAP

"ESSEX GENERATING & SWITCHING STATION"
MAP OF PROPERTY
SITUATED IN THE
CITY OF NEWARK ESSEX COUNTY, N.J.
SCALE 1"= 160' AUG. 8, 1969

850010226

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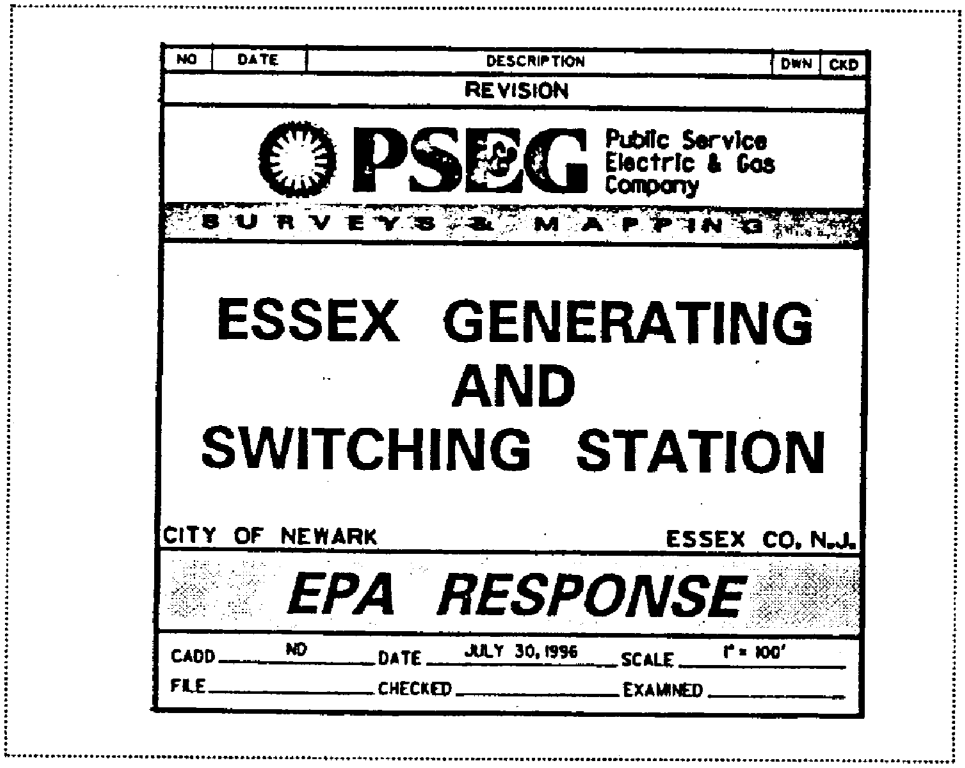

NO	DATE	DESCRIPTION	DWN	CKD

REVISION

PSEG Public Service Electric & Gas Company

SURVEYS & MAPPING

ESSEX GENERATING AND SWITCHING STATION

CITY OF NEWARK ESSEX CO. N.J.

EPA RESPONSE

CADD NO DATE JULY 30, 1996 SCALE 1" = 100'

FILE CHECKED EXAMINED

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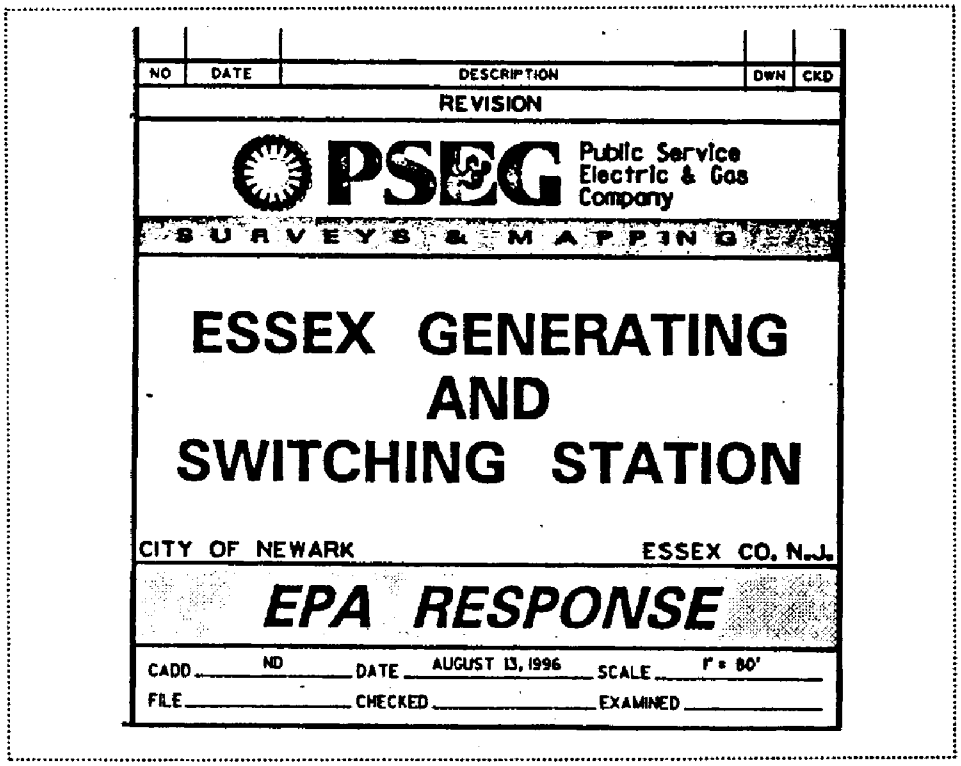

NO	DATE	DESCRIPTION	DWN	CKD

REVISION

PSEG Public Service Electric & Gas Company

SURVEYS & MAPPING

ESSEX GENERATING AND SWITCHING STATION

CITY OF NEWARK ESSEX CO. N.J.

EPA RESPONSE

CADD ND DATE AUGUST 13, 1996 SCALE 1" = 80'

FILE CHECKED EXAMINED

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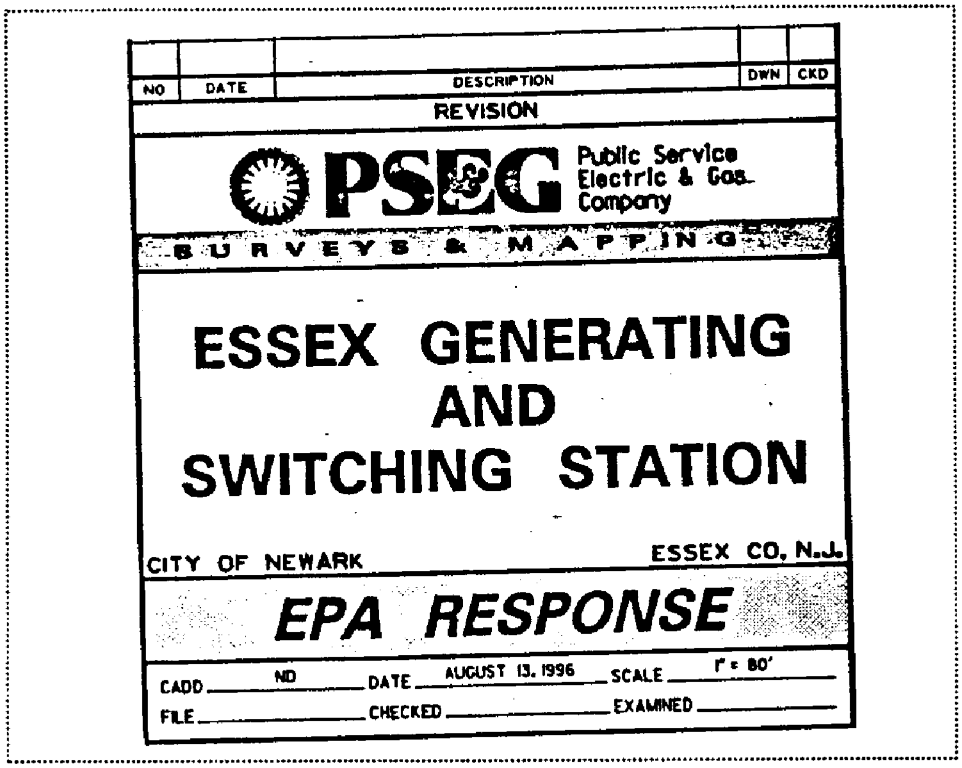

NO	DATE	DESCRIPTION	DWN	CKD

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SURVEYS & MAPPING

ESSEX GENERATING AND SWITCHING STATION

CITY OF NEWARK ESSEX CO, N.J.

EPA RESPONSE

CADD ND DATE AUGUST 13, 1996 SCALE 1" = 80'

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NO	DATE	DESCRIPTION	DWN	CKD

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ESSEX GENERATING AND SWITCHING STATION

CITY OF NEWARK ESSEX CO, N.J.

EPA RESPONSE

CADD ND DATE AUGUST 13, 1996 SCALE 1" = 80'
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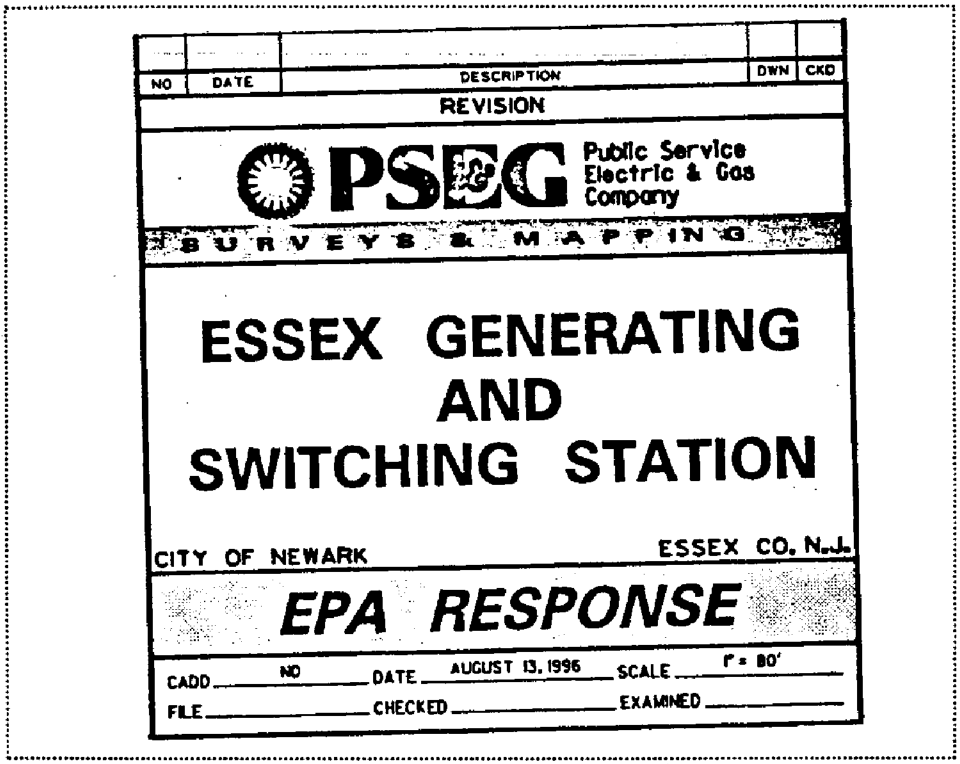

NO	DATE	DESCRIPTION	DWN	CKD

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SURVEYS & MAPPING

ESSEX GENERATING AND SWITCHING STATION

CITY OF NEWARK ESSEX CO. N.J.

EPA RESPONSE

CADD NO DATE AUGUST 13, 1996 SCALE 1" = 80'

FILE CHECKED EXAMINED

Figure 3.1 Process Flow Diagram

Low Pressure Turbine/Generators and Boilers

1915 - 1978

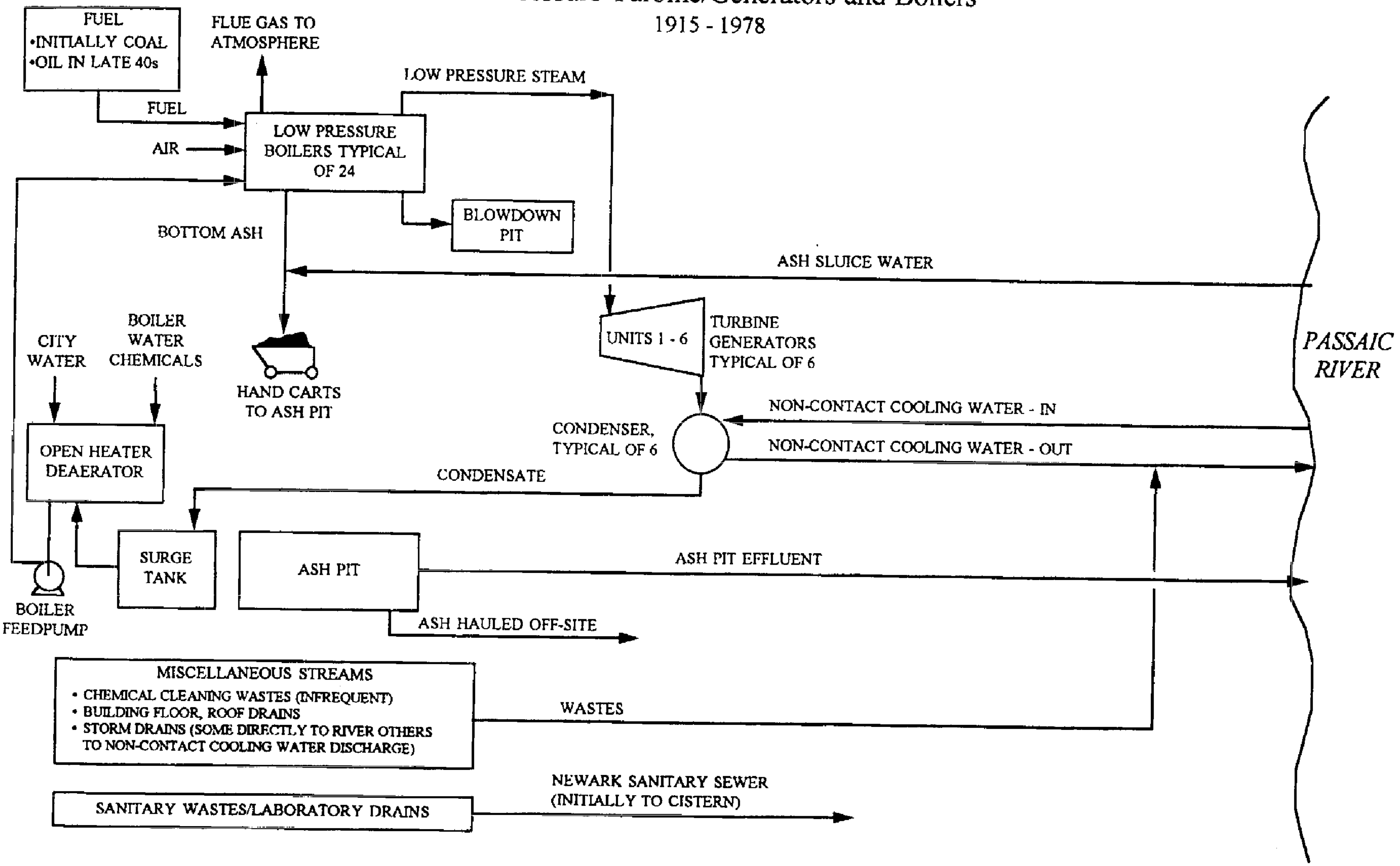
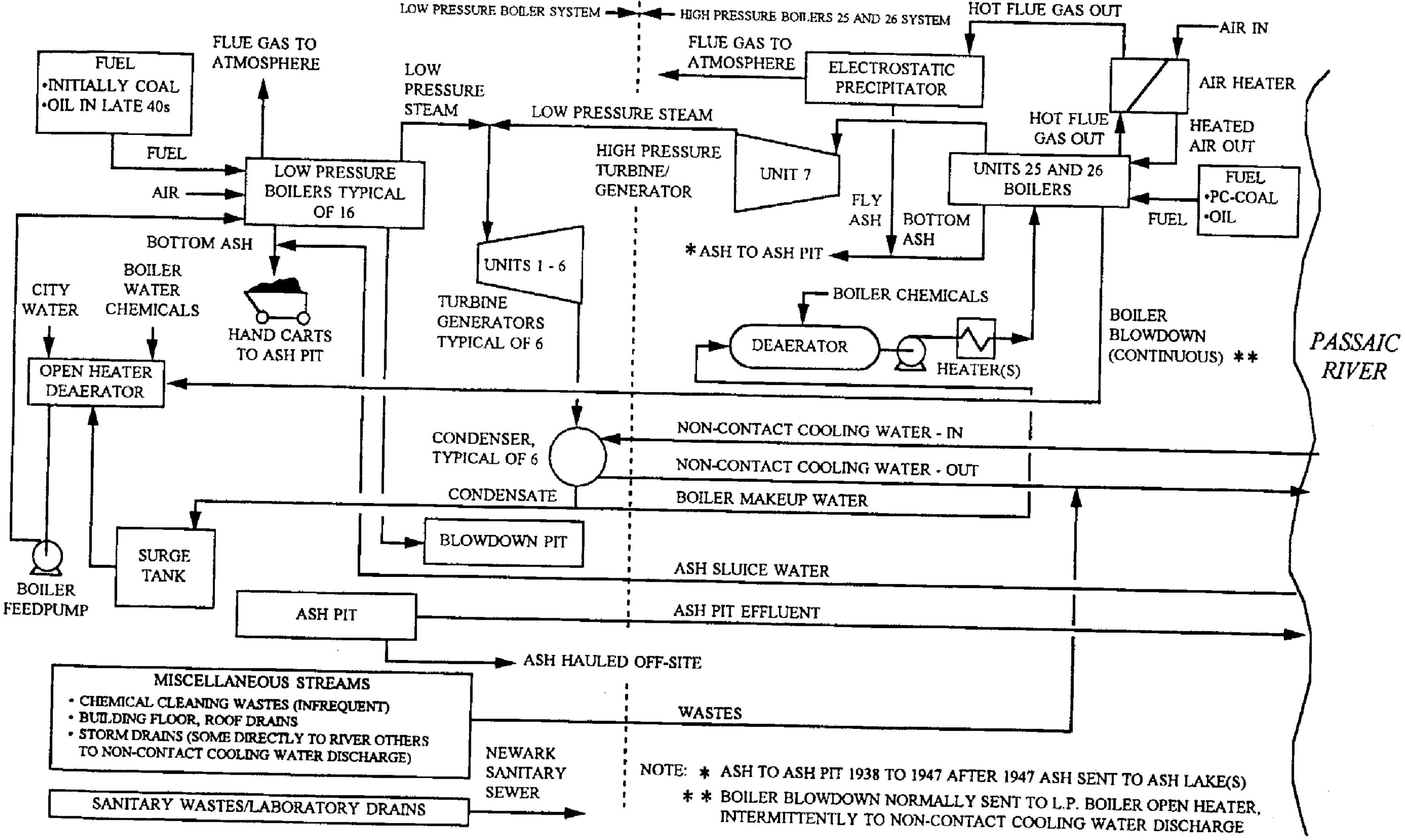


Figure 3.2 Process Flow Diagram

Addition of Unit No. 7 High Pressure Turbine/Generator & Nos. 25 and 26 Boilers

1937 - 1974



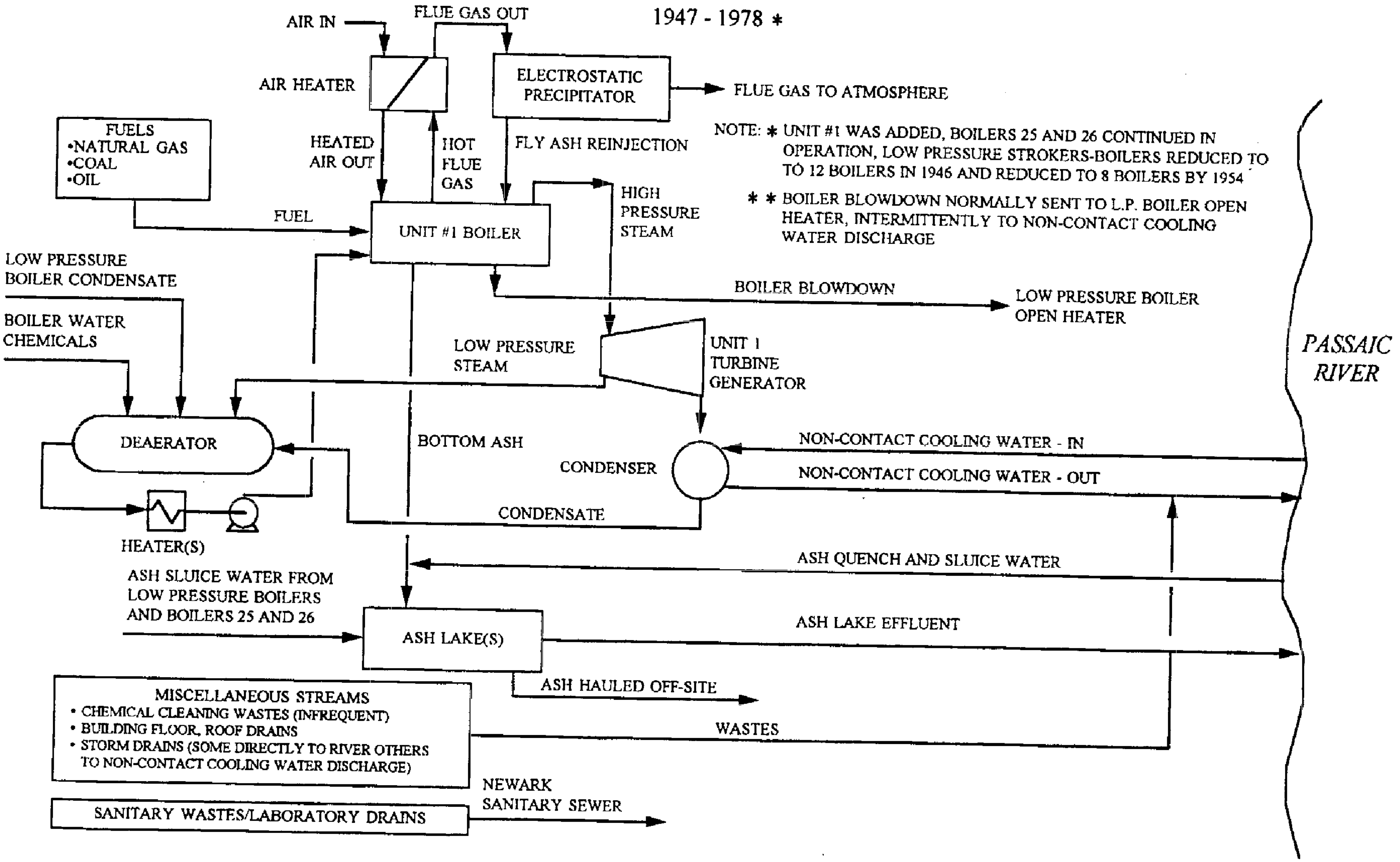
NOTE: * ASH TO ASH PIT 1938 TO 1947 AFTER 1947 ASH SENT TO ASH LAKE(S)

** BOILER BLOWDOWN NORMALLY SENT TO L.P. BOILER OPEN HEATER, INTERMITTENTLY TO NON-CONTACT COOLING WATER DISCHARGE

Figure 3.3 Process Flow Diagram

Addition of New Unit #1 and Ash Lake

1947 - 1978 *



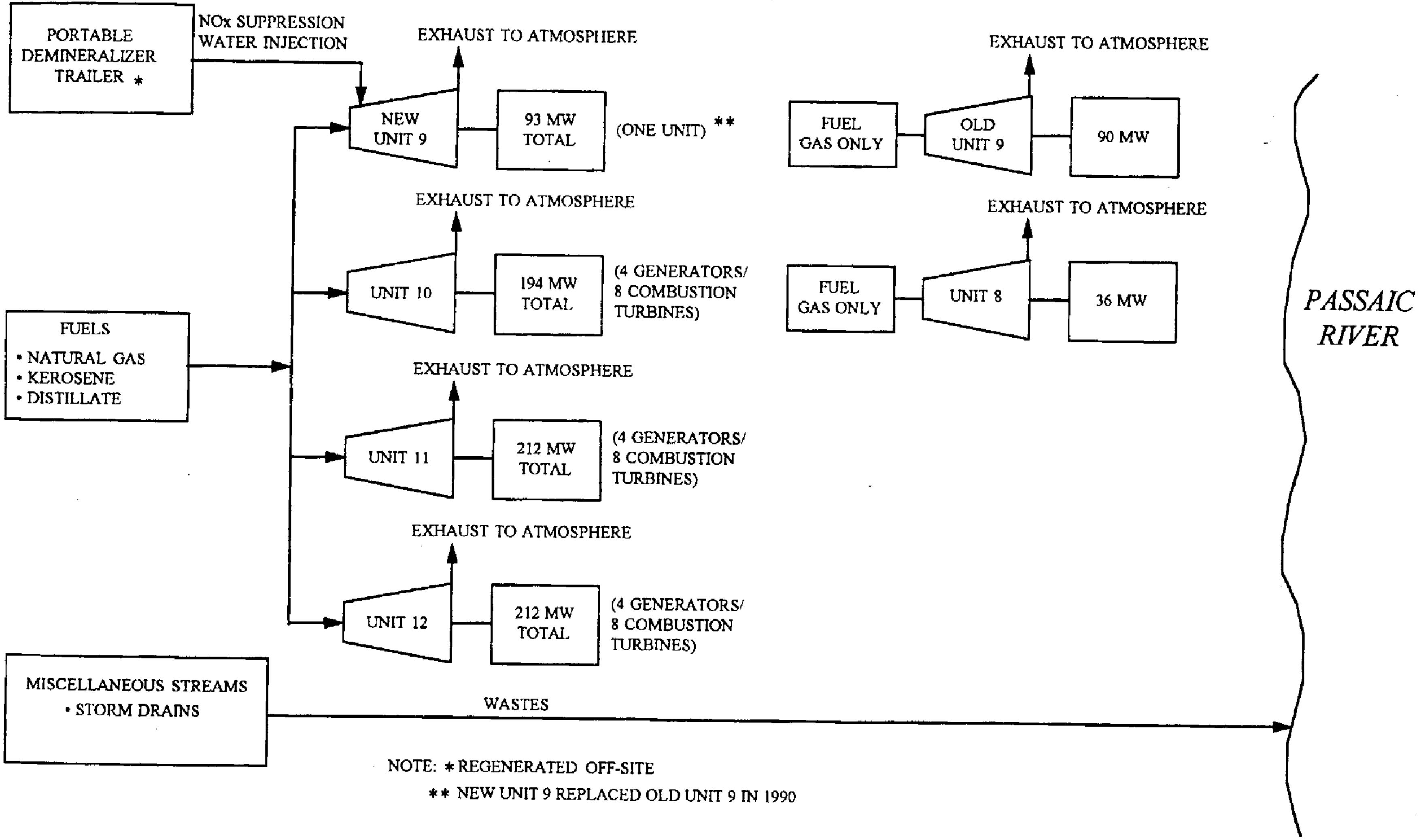
NOTE: * UNIT #1 WAS ADDED, BOILERS 25 AND 26 CONTINUED IN OPERATION, LOW PRESSURE STROKERS-BOILERS REDUCED TO TO 12 BOILERS IN 1946 AND REDUCED TO 8 BOILERS BY 1954

* * BOILER BLOWDOWN NORMALLY SENT TO L.P. BOILER OPEN HEATER, INTERMITTENTLY TO NON-CONTACT COOLING WATER DISCHARGE

Figure 3.4 Process Flow Diagram

Simple Cylce Combustion Turbines

1963 - Present



NOTE: * REGENERATED OFF-SITE

** NEW UNIT 9 REPLACED OLD UNIT 9 IN 1990

ATTACHMENT I

ATTACHMENT I

HAZARDOUS AIR POLLUTANTS
ESSEX GENERATING STATION

The two major types of electric generation processes used at the Essex Generating Station were Steam Electric and Combustion Turbine. The two major emission sources associated with these processes were boilers fired by either coal, oil or gas in the case of Steam Electric and combustion turbines fired by gas or oil.

Station specific data for Hazardous Air Pollutants (HAPs) are not available. To provide an estimate of the potential HAPs generated at Essex the following (coal-, gas-, and oil-fired boiler and gas-fired combustion turbine) emission factors and combustion turbine distillate emissions analyses are provided from both the EPRI PISCES Database (ref 1), and relevant literature (ref 2).

Fuel Fired Boilers

Tables I-1 through I-5 list emission factors for hazardous air pollutants for coal-, oil-, and gas-fired steam-electric power plants that were prepared for the Electric Power Research Institute "EPRI" by Radian Corporation.

The emission factors for coal-fired units are divided into three groups:

1. particulate-phase emissions (Table I-1),
2. vapor-phase inorganics such as Hydrochloric Acid (HCl), and Hydrofluoric Acid (HF) mercury, and, in some cases, selenium (Table I-2),
3. organic substances (Table I-3)

Uncontrolled oil-fired boiler emission factors are presented in Table I-4 for particulate-phase emissions, vapor-phase inorganics, and organic substances. A limited data set was developed for oil-fired boilers with normally operating electrostatic precipitators (ESPs). Based on this data, EPRI recommends 60% of the values in Table I-4 for the metals Arsenic (As), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Lead (Pb), Manganese (Mn), and Nickel (Ni) for oil-fired boilers with ESPs. For organic substances and volatile elements Mercury (Hg), Selenium (Se), Hydrochloric Acid (HCl), and Hydrofluoric Acid (HF), the values in Table I-4 are appropriate for oil-fired boilers with or without an ESP.

There is limited data available from the EPRI Field Chemical Emissions Monitoring (FCEM) Project on HAPs emissions from gas-fired boilers. The corresponding emission factors for gas-fired boilers are presented in Table I-5.

The HAPs emission factors were derived from recent test data produced by EPRI and the U.S. Department of Energy "DOE" that focused on HAPs. The emissions estimating methodology was presented in reference 1,by Radian with the following caveats:

- Actual measurements of HAPs emissions can vary from estimated levels by several orders of magnitude. This variability is primarily external to sampling and analytical variability (i.e., it is caused by site-specific differences in plant design and operation and in daily process variability). Emission estimates developed from such data distributions may differ significantly from measured values.
- As more data become available and are used in the regressions and averages, the predicted factors may change.
- Much of the data fit log-normal distributions. The resulting correlations and geometric mean values provide an appropriate median emission factor for a single unit.
- Site-specific factors at any given plant may be so different from the sample population used to produce these equations that the predictive value may be compromised. For example, co-firing waste tires with oil was not examined at any test site. The oil emission factors would not be good estimators for emissions from such a plant.

It should also be noted that the field data used to develop emission factors for coal-fired boilers were obtained from wall-fired, tangential- fired, and cyclone boilers/furnaces equipped with particulate and/or flue gas desulfurization (FGD) systems. The low pressure, stoker-fired boilers (Nos. 1 through 24) at Essex utilized a different boiler type than the FCEM test units and were not equipped with air pollution control systems.

Combustion Turbines

Measurements of HAPs for utility combustion turbines were performed by Carnot for the Electric Power Research Institute's (EPRI) Gas PISCES (Power Plant Integrated Chemical Emissions Study) field measurement project. The program was jointly sponsored by EPRI and the Gas Research Institute (GRI). The two utility combustion turbines tested by Carnot included the Westinghouse 501AA combustion turbine, without NO_x controls , and the General Electric Frame 7 combustion turbine equipped with water injection for NO_x reduction. The HAPs testing for the two utility combustion turbines included measurements of trace metals, semi-volatile organics, and volatile organics.

The results of the metal tests on the two utility turbines are presented in Table I-6. The test results are reported in three discreet groups on each unit: those detected at more than twice the field blank levels, those detected at less than twice or below the field blank levels, and those that were not detected. The measured levels were all low compared to emissions from coal- and oil-fired boilers.

The semi-volatile organic emission results are presented in Table I-7. No polychlorinated biphenyls (PCBs) were measured to detection levels of 2-10 ng/Nm^3. The levels of polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) that were detected were orders of magnitude lower than those on municipal solid waste incinerators and other units typically associated with PCDD/PCDF emissions.

Table I-8 present emission factors for the VOCs formaldehyde, benzene, and toluene that are valid at full load operation for the two combustion turbines tested. Testing indicates that VOC emissions generally increase sharply with decreasing load. The trend for CO emissions, not shown here, and Volatile Organic Carbons (VOCs) are similar, indicating that combustion conditions favorable for the destruction of CO will also reduce VOC levels.

The combustion turbines used at Essex generally operate at full load during peak electric demand of the winter and summer months. These combustion turbines are fired primarily on gas with oil firing used as the alternate fuel. Table I-9 provides emission data for HAPs for combustion turbines firing oil. This data provides typical stack concentrations for a variety of HAPs measured for combustion turbines operating in a simple cycle mode. Minimum and maximum concentrations shown may reflect, as noted, Non-Detect analytical results which have been conservatively reported in the EPRI PISCES Database at the sensitivity limit of the analytical method.

References

1. Field Chemical Emissions Monitoring Project: Guidelines for Estimating Trace Substance Emissions from Fossil Fuel Steam Electric Plants, EPRI - DCN 95-213-152-64, August 1995

2. A Summary of Air Toxic Emissions From Natural Gas-Fired Combustion Turbines", Bruce A. Fangmeier et al, Carnot, AFRC/JFRC Pacific Rim International Conference on Environmental Control of Combustion Process, October 16-20, 1994, Electric Power Research Institute's (EPRI) Gas PISCES Study.

Table I-1 **

EPRI - Coal Fired Boiler Emission Factors and Correlation Results for Particulate-Phase Emissions (lb/trillion Btu)

Analyte	Predicted Emissions	r^2	N	Root MSE	t - Value	$\bar{x}_{log}$	SS_{logx}
Antimony	$(0.92)\ x^{0.63}$	0.65	8	0.37	2.45	-0.30	3.8
Arsenic	$(3.1)\ x^{0.85}$	0.72	34	0.44	2.04	-0.006	27
Beryllium	$(1.2)\ x^{1.1}$	0.83	17	0.29	2.13	-0.26	4.8
Cadmium	$(3.3)\ x^{0.5}$	0.78	9	0.24	2.37	-0.55	7.8
Chromium	$(3.7)\ x^{0.58}$	0.57	38	0.40	2.03	0.31	23
Cobalt	$(1.7)\ x^{0.69}$	0.57	20	0.42	2.10	0.016	8.3
Lead	$(3.4)\ x^{0.80}$	0.62	33	0.48	2.04	0.061	18
Manganese	$(3.8)\ x^{0.60}$	0.57	37	0.39	2.03	0.70	18
Nickel	$(4.4)\ x^{0.48}$	0.51	25	0.49	2.07	0.28	25

** Ref; Field Chemical Emissions Monitoring Project: Guidelines for Estimating Trace Substance Emissions from Fossil Fuel Steam Electric Plants, EPRI - DCN 95-213-152-64, August 1995

x = Coal ppm/ash fraction * Particulate Emission (lb/million Btu)
r^2 = Correlation coefficient for the regulation
N = Number of data points included in the regression
Root MSE = Square root of the mean squared error (MSE) of the regression
t = Two-tail t value ($t_{0.025}$) for N-2 degrees of freedom
$\bar{x}_{log}$ = Mean of the log of the x terms
SS_{logx} = Sum of Squared Deviations of the log of the x terms

EXAMPLE CALCULATION

Coal arsenic concentration	**= 20 ppm**
Ash Fraction	**= 10%**
Particulate emission	**= 0.06 lb/million Btu**

Mean emission $E = 3.1(x)^{0.85}$
$E = 3.1\ (20 \times 0.06/0.1)^{0.85}$
$E = 25.6$ **lb/trillion Btu**

The 95% Upper Confidence Interval $= E * 10\hat{}\{t * RMSE * \text{Square Root}\{1/N + ((\log x - \bar{x}_{log})\hat{}2)/SS_{logx}\}\}$

Table I-2 **

EPRI - Recommended Emission Factor as Percent of Coal Input Bituminous Coals

Emission	Control Device	Number of Sites	Average Reduction	95% Confidence Interval	Recommended Emission Factor as Percent of Coal Input
Mercury	ESP	17	26%	±14%	70%
Mercury	None	---	---	---	100%
Selenium	None	15	45%	± 13%	55%
Hydrochloric Acid	None	15	-1%	± 13%	100%
Hydrofluoric Acid	None	12	11%	± 19%	90%

** Ref; Field Chemical Emissions Monitoring Project: Guidelines for Estimating Trace Substance Emissions from Fossil Fuel Steam ElectricPlants, EPRI - DCN 95-213-152-64, August 1995

Table I-3 **

EPRI - Coal-Fired Boiler
Organic Substance Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
1-Chloronaphthalene	9	0	0	E		<0.18	<7.8
1-Naphthylamine	8	1	1	D	0.011		
1,1-Dichloroethane	12	1	12	D	0.89	0.40	2.0
1,1-Dichloroethane	12	0	0	E		<0.4	<12
1,1,2-Trichloroethane	12	0	0	E		<0.4	<12
1,1,2,2-Tetrachloroethane	12	0	0	E		<0.4	<10
1,2-Dibromomethane	2	1	2	D	2.6	0.0	1.3e+0.6
1,2-Dichlorobenzene	11	0	0	E		<0.2	<3.5
1,2-Dichloroethane	9	0	0	E		<0.4	<5.2
1,2-Dichloropropane	12	0	0	E		<0.4	<6
1,2-Diphenylhydrazine	8	0	0	E		<2.4	<33
1,2,4-Trichlorobenzene	9	1	9	D	1.5	0.3	8.6
1,2,4,5-Tetrachlorobenzene	8	0	0	E		<0.15	<5
1,3-Dichlorobenzene	11	1	11	D	1.0	0.24	4.4
1,4-Dichlorobenzene	11	1	11	D	1.1	0.25	4.8
2-Butanone	11	2	11	D	3.1	1.8	5.4
2-Chloronaphthalene	8	2	2	C	0.0005	0.0	0.017
2-Chlorophenol	6	0	0	E		<0.2	<5
2-Hexanone	10	3	10	C	3.2	1.8	5.7
2-Methylnaphthalene	19	8	11	A	0.036	0.017	0.077
2-Methylphenol	8	0	0	E		<1.8	<7.8
2-Naphthylamine	7	0	0	E		<0.54	<5
2-Nitroaniline	7	0	0	E		<0.15	<24
2-Nitrophenol	7	0	0	E		<2.4	<7.8
2-Picoline	9	0	0	E		<0.3	<7.8
2,3,4,6-Tetrachlorophenol	9	0	0	E		<0.14	<16
2,3,7,8-TCDD equivalents	10	10	10	A	0.000002	4.40e-07	0.000012
2,4-Dichlorophenol	9	0	0	E		<0.14	<7.8
2,4-Dimethylphenol	9	0	0	E		<0.35	<7.8
2,4-Dinitrophenol	9	0	0	E		<1.8	<39
2,4-Dinitrotoluene	13	4	10	C	0.20	0.038	0.94

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Table I -3 (Continued)

EPRI - Coal-Fired Boiler
Organic Substance Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
2,4,5-Trichlorophenol	9	0	0	E		<0.12	7.8
2,4,6-Trichlorophenol	9	0	0	E		<0.12	<7.8
2,5-Dimethylbenzaldehyde	2	2	2	C	14	9.1	23
2,6-Dichlorophenol	9	0	0	E		<0.19	<7.8
2,6-Dinitrotoluene	13	2	8	D	0.11	0.0095	1.3
3-Chloropropylene	2	2	2	C	9.1	5.5	15
3-Methylcholanthrene	10	0	0	E		<0.005	<7.8
3-Nitroeniline	9	0	0	E		<0.14	<39
3,3-Dichlorobenzidine	9	0	0	E		<0.13	<16
3,4-Methylphenol	2	2	2	C	0.71	0.21	2.4
4-Aminobiphenyl	10	0	0	E		<0.27	<7.8
4-Bromophenyl phenyl ether	9	0	0	E		<0.14	<7.8
4-Chloro-3-methylphenol	9	0	0	E		<0.19	<7.8
4-Chlorophenyl phenyl ether	9	0	0	E		<0.14	<7.8
4-Ethyl toluene	2	2	2	C	2.8	0.0001	1.3e+05
4-Methyl-2-pentanone	7	2	6	D	2.3	1.1	4.7
4-Methylphenol	9	2	6	D	1.3	1.1	1.5
4-Nitroaniline	9	0	0	E		<3.5	<39
4-Nitrophenol	9	0	0	E		<0.23	<39
4,6-Dinitro-o-cresol	9	0	0	E		<0.2	<39
5-Methylchrysene	3	1	3	D	0.0006	0.0001	0.0054
7H-Dibenzo(c,g)carbazole	3	0	0	E		<0.001	<0.016
7,12-Dimethylbenzo(a)anthracene	10	0	0	E		<0.005	<19
Acenaphthene	24	11	15	A	0.024	0.011	0.050
Acenaphthylene	24	12	13	A	0.0078	0.0044	0.014
Acetaldehyde	19	11	19	A	3.2	1.1	8.9
Acetone	11	3	11	C	1.1	0.37	3.2
Acetophenone	15	8	14	A	1.2	0.74	1.9
Acrolein	12	5	12	B	1.9	0.51	7.2
Aniline	9	0	0	E		<0.24	<7.8
Anthracene	24	11	15	A	0.013	0.0054	0.030

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Table I -3 (Continued)

EPRI - Coal-Fired Boiler
Organic Substance Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
Benzaldehyde	7	2	7	D	4.2	0.83	21
Benzene	25	23	25	A	3.9	1.9	8.0
Benzidine	10	0	0	E		<2.4	<7.8
Benzoic acid	11	5	11	B	22	9.5	53
Benzo(a)anthracene	27	11	15	A	0.0075	0.0032	0.017
Benzo(a)pyrene	27	7	13	B	0.0019	0.0008	0.0045
Benzo(a)pyrene equivalents	11	11	11	A	0.0048	0.0019	0.012
Benzo(b,j&k)fluoranthene	26	10	14	A	0.0096	0.0040	0.023
Benzo(e)pyrene	7	4	7	C	0.0036	0.0013	0.010
Benzo(g,h,i)perylene	26	6	12	B	0.0015	0.0007	0.0031
Benzyl alcohol	9	2	9	D	2.0	1.4	2.9
Benzylchloride	6	4	6	C	0.28	0.0042	19
Biphenyl	9	6	9	B	0.16	0.022	1.2
bis(2-Chloroethoxy)methane	8	0	0	E		<0.17	<7.8
bis(2-Chloroethyl)ether	9	0	0	E		<0.18	<7.8
bis(2-Chloroisopropyl)ether	10	0	0	E		<0.22	<7.8
bis(2-Ethylhexyl)phthalate	11	7	11	A	3.6	2.0	6.2
Bromodichloromethane	10	0	0	E		<0.49	<6
Bromoform	10	0	0	E		<0.42	<10
Bromomethane	13	4	13	C	0.89	0.38	2.1
Butylbenzylphthalate	9	2	2	C	0.30	0.24	0.38
Carbon disulfide	14	7	13	B	1.1	0.40	2.9
Carbon tetrachloride	14	0	0	E		<0.42	<6
Chlorobenzene	15	1	1	D	0.16		
Chloroethane	13	1	11	D	0.53	0.26	1.1
Chloroform	12	1	11	D	0.55	0.26	1.2
Chloromethane	10	3	10	C	1.1	0.23	5.1
Chrysene	26	9	12	A	0.0055	0.0028	0.011
cis-1,2-Dichloroethene	6	0	0	E		<0.42	<3.1
cis-1,3-Dichloropropene	14	1	14	D	0.72	0.37	1.4
Crotonaldehyde	4	0	0	E		<0.1	<7.1

Table I -3 (Continued)

EPRI - Coal-Fired Boiler
Organic Substance Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
Dibenzofuran	14	4	14	C	0.58	0.21	1.6
Dibenzo(a,e) pyrene	3	0	0	E		<0.0003	<0.003
Dibenzo(a,h)acridine	3	0	0	E		<0.001	<0.002
Dibenzo(a,h)anthracene	26	3	12	C	0.0009	0.0003	0.0024
Dibenzo(a,i)acridine	3	1	1	D	0.0010		
Dibenzo(a,i)pyrene	3	0	0	E		<0.001	<0.004
Dibenzo(a,j)acridine	9	0	0	E		<0.2	<7.8
Dibromochloromethane	12	0	0	E		<0.42	<6
Dibutylphthalate	9	1	2	D	0.11	0.0005	28
Dichlorobromomethane	2	0	0	E		<0.42	<0.45
Dichloromethane	2	0	0	E		<1.6	<2
Diethylphthalate	10	2	2	C	0.20	0.020	2.0
Dimethylphenethylamine	9	0	0	E		<2.4	<40
Dimethylphthalate	9	1	2	D	0.090	0.0	1.0e+03
Di-n-butylphthalate	3	0	0	E		<1.9	<3
Di-n-octylphthalate	9	0	0	E		<0.21	<7.8
Diphenylamine	9	0	0	E		<0.13	<7.8
Ethyl methanesulfonate	9	0	0	E		<0.17	<7.8
Ethylbenzene	16	4	16	C	0.80	0.35	1.8
Fluoranthene	24	13	22	A	0.15	0.059	0.39
Fluorene	24	11	23	B	0.14	0.049	0.40
Formaldehyde	26	10	26	B	2.6	1.4	4.8
Hexachlorobenzene	14	0	0	E		<0.001	<7.8
Hexachlorobutadiene	15	0	0	E		<0.001	<7.8
Hexachlorocyclopentadiene	13	0	0	E		<0.001	<7.8
Hexachloroethane	13	0	0	E		<0.001	<7.8
Hexaldehyde	2	1	2	D	5.7	0.0036	9.2e+03
Indeno(1,2,3-c,d)pyrene	25	7	12	B	0.0017	0.0008	0.0039
Iodomethane	2	2	2	C	2.0	0.0	2.3e+09
Isophorone	10	1	10	D	1.2	0.32	4.3
Methyl chloroform	8	3	7	C	0.61	0.24	1.5

Table I -3 (Continued)

EPRI - Coal-Fired Boiler
Organic Substance Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
Methyl methacrylate	2	1	1	D	1.1		
Methyl methanesulfonate	9	0	0	E		<1.2	<17
Methylene chloride	7	4	7	C	3.6	0.63	21
m/p-Tolualdehyde	2	2	2	C	3.2	0.0012	8.4e+03
m/p-Xylene	13	8	13	A	0.82	0.28	2.4
Naphthalene	23	12	20	A	0.62	0.36	1.1
n-Butyraldehyde	2	1	2	D	8.3	0.0001	5.9e+05
n-Hexane	2	2	2	C	0.49	0.0	1.7e+06
Nitrobenzene	9	0	0	E		<0.19	<7.8
N-Nitrosodibutylamine	6	0	0	E		<2.4	<7.8
N-Nitrosodimethylamine	10	0	0	E		<0.34	<7.8
N-Nitroso-di-n-butylamine	3	0	0	E		<0.32	<5
N-Nitrosodiphenylamine	9	0	0	E		<0.14	<7.8
N-Nitrosodipropylamine	9	0	0	E		<0.21	<7.8
N-Nitrosopiperidine	9	0	0	E		<0.24	<7.8
o-Tolualdehyde	2	1	2	D	2.9	0.0	6.0e+06
o-Xylene	12	3	12	C	0.44	0.25	0.78
p-Chloroaniline	9	0	0	E		<0.18	<7.8
p-Dimethylaminoazobenzene	9	0	0	E		<0.17	<7.8
Pentachlorobenzene	9	0	0	E		<0.12	<7.8
Pentachloronitrobenzene	9	0	0	E		<0.54	<7.8
Pentachlorophenol	13	0	0	E		<0.001	<39
Perylene	2	1	2	D	0.0035	0.0	7.2e+15
Phenacetin	9	0	0	E		<0.014	<7.8
Phenanthrene	24	13	24	A	0.42	0.19	0.91
Phenol	13	7	13	B	3.3	1.5	7.1
Pronamide	9	0	0	E		<0.17	<7.8
Propanal	2	1	3	D	2.3	0.0	1.1e+06
Propionaldehyde	6	4	6	C	1.8	0.11	30
Pyrene	24	10	21	B	0.066	0.022	0.19
Pyridine	9	0	0	E		<0.28	<7.8

Table I -3 (Continued)

EPRI - Coal-Fired Boiler
Organic Substance Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
Quinoline	3	0	0	E		<0.009	<5.6
Styrene	16	4	12	C	0.70	0.34	1.4
Tetrachloroethylene	15	3	10	C	0.42	0.24	0.75
Toluene	23	16	23	A	1.7	0.90	3.1
trans-1,2-Dichloroethene	12	0	0	E		<0.42	<6
trans-1,3-Dichloropropene	14	0	0	E		<0.42	<6.9
Trichloroethylene	14	0	0	E		<0.42	<6
Trichlorofluoromethane	12	5	12	B	0.87	0.33	2.3
Trichloromethane	2	1	2	D	3.3	0.0	4.7e+05
Valeraldehyde	2	2	2	C	7.6	0.049	1.2e+03
Vinyl acetate	13	1	3	D	0.31	0.14	0.69
Vinyl chloride	12	1	12	D	0.73	0.30	1.8

**** Ref; Field Chemical Emissions Monitoring Project: Guidelines for Estimating Trace Substance Emissions from Fossil Fuel Steam ElectricPlants, EPRI - DCN 95-213-152-64, August 1995**

***Data quality:**

A = Five or more detected values, no more than 50% nondetects in statistics.
B = Four or more detected values, no more than 67% nondetects in statistics.
C = Two or more detected values, no more than 75% nondetects in statistics.
D = One or more detected values, no limit on nondetects in statistics.
E = Substance has not been detected.

LCI = Lower Confidence Interval
UCI = Upper Confidence Interval

Table I-4 **

EPRI - Uncontrolled Oil-Fired Boiler Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
Arsenic	13	12	13	A	5.1	2.5	11
Beryllium	13	5	13	B	0.15	0.05	0.46
Cadmium	13	12	13	A	1.2	0.42	3.1
Chloride (as HCl)	12	12	12	A	2370	1870	3000
Chromium	13	12	13	A	5.2	3.1	8.7
Cobalt	7	7	7	A	32	14	76
Fluoride as (HF)	10	10	10	A	110	48	270
Lead	13	11	13	A	8.0	3.7	17
Manganese	13	13	13	A	14	8.3	23
Mercury	17	9	12	A	0.48	0.23	1.0
Nickel	14	14	14	A	710	470	1080
Selenium	17	11	17	A	2.1	0.81	5.6
1-Chloronaphthalene	2	0	0	E		<5.9	<6.5
1-Naphthylamine	2	0	0	E		<5.9	<6.5
1,1-Dichlorethane	2	0	0	E		<0.49	<1.9
1,1-Cichloroethene	2	0	0	E		<0.49	<1.9
1,1,1-Trichloroethane	2	2	2	C	1.1	0.0074	160
1,1,2-Trichloroethane	2	0	0	E		<0.48	<0.49
1,1,2,2-Tetrachloroethane	2	0	0	E		<0.48	<0.49
1,2-Dibromomethane	2	0	0	E		<1.7	<2.9
1,2-Dichlorethane	2	0	0	E		<1.2	<2.1
1,2-Dichlorobenzene	2	0	0	E		<0.49	<6.5
1,2-Dichloroethane	2	0	0	E		<0.49	<1.9
1,2-Dichloropropane	2	0	0	E		<0.49	<5.9
1,2-Diphenylhydrazine	2	0	0	E		<5.9	<6.5
1,2,4-Trichlorobenzene	2	0	0	E		<5.9	<6.5
1,2,4,5-Tetrachlorobenzene	2	0	0	E		<5.9	<6.5
1,3-Butadiene	2	0	0	E		<0.14	
1,3-Dichlorobenzene	2	0	0	E		<0.49	<6.5
1,4-Dichlorobenzene	2	0	0	E		<0.49	<6.5
2-Butanone	2	0	0	E		<4.9	<19
2-Chloronaphthalene	2	0	0	E		<5.9	<6.5
2-Chlorophenol	2	0	0	E		<5.9	<6.5
2-Hexanone	4	0	0	E		<4.8	<19

ATTACHMENT I

Table I-4 (Continued)

EPRI - Uncontrolled Oil-Fired Boiler Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
2-Methylnaphthalene	11	9	9	A	0.029	0.018	0.047
2-Methylphenol	2	0	0	E		<5.9	<6.5
2-Naphthylamine	2	0	0	E		<5.9	<6.5
2-Nitroaniline	2	0	0	E		<30	<32
2-Nitrophenol	2	0	0	E		<5.9	<6.5
2-Picoline	2	0	0	E		<5.9	<6.5
2,3,4,6-Tetrachlorophenol	2	0	0	E		<12	<13
2,3,7,8-TCDD equivalents	4	3	3	C	0.000008	0.000001	0.00012
2,4-Dichlorophenol	2	0	0	E		<5.9	<6.5
2,4-Dimethylphenol	2	0	0	E		<5.9	<6.5
2,4-Dinitrophenol	2	0	0	E		<30	<32
2,4-Dinitrotoluene	2	0	0	E		<5.9	<6.5
2,4,5-Trichlorophenol	2	0	0	E		<5.9	<6.5
2,4,6-Trichlorophenol	2	0	0	E		<5.9	<6.5
2,6-Dichlorophenol	2	0	0	E		<5.9	<6.5
2,6-Dinitrotoluene	2	0	0	E		<5.9	<6.5
3-Methylcholanthrene	11	0	0	E		0.006	<330
3-Nitroaniline	2	0	0	E		<30	<32
3,3-Dichlorobenzidine	2	0	0	E		<12	<13
4-Aminobiphenyl	2	0	0	E		<5.9	<6.5
4-Bromophenyl phenyl ether	2	0	0	E		<5.9	<6.5
4-Chloro-3-methylphenol	2	0	0	E		<5.9	<6.5
4-Chlorophenyl phenyl ether	2	0	0	E		<5.9	<6.5
4-Methylphenol	2	0	0	E		<5.9	<6.5
4-Nitroaniline	2	0	0	E		<30	<32
4-Nitrophenol	2	0	0	E		<30	<32
4,6-Dinitro-o-cresol	2	0	0	E		<30	<32
6-Nitrobenzo(a)pyrene	2	0	0	E		<0.01	
7,12-Dimethylbenzo(a)anthracene	11	0	0	E		<0.002	<16
Acenaphthene	18	4	16	C	0.012	0.0052	0.029
Acenaphthylene	18	1	1	D	0.0020		
Acetaldehyde	2	1	2	D	6.6	0.16	270
Acetone	2	0	0	E		<4.9	<19
Acetophenone	2	0	0	E		<5.9	<6.5

Table I-4 (Continued)

EPRI - Uncontrolled Oil-Fired Boiler Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal Mean	LCI	UCI
Acrolein	2	0	0	E		<10	<12
Aniline	2	0	0	E		<5.9	<6.5
Anthracene	18	2	14	D	0.0044	0.0030	0.0066
Benzaldehyde	2	0	0	E		<16	<20
Benzene	18	11	16	A	1.10	0.80	1.5
Benzoic acid	2	2	2	C	73	2.1	2500
Benzo(a)anthracene	18	3	15	C	0.0094	0.0047	0.019
Benzo(a)pyrene	18	0	0	E		<0.004	<6.5
Benzo(a)pyrene equivalents	18	4	4	B	0.012	0.0005	0.026
Benzo(bj&k)fluoranthene	17	2	14	D	0.0056	0.0037	0.0086
Benzo(g,h,i)perylene	18	2	15	D	0.0068	0.0044	<0.010
Benzyl alcohol	2	0	0	E		<5.9	<6.5
bis(2-Chloroethoxy)methane	2	0	0	E		<5.9	<6.5
bis(2-Chloroethyl)ether	2	0	0	E		<5.9	<6.5
bis(2-Chloroisopropyl)ether	2	0	0	E		<5.9	<6.5
bis(2)-Ethylhexyl)phthalate	2	0	0	E		<5.9	<6.5
Bromodechloromethane	2	0	0	E		<0.49	<1.9
Bromoform	2	0	0	E		<0.48	<0.49
Bromomethane	2	0	0	E		<0.49	<1.9
Butylbenzylphthalate	2	0	0	E		<5.9	<6.5
Carbon disulfide	2	0	0	E		<0.49	<1.9
Carbon tetrachloride	4	0	0	E		<0.48	<1.9
Chlorobenzene	4	0	0	E		<0.34	<0.69
Chloroethane	2	0	0	E		<0.48	<1.9
Chloroform	4	0	0	E		<0.48	<1.9
Chloromethane	2	0	0	E		<0.48	<1.9
Chrysene	18	3	16	C	0.0098	0.0051	0.019
cis-1,2-Dischloroethene	2	0	0	E		<0.49	<1.9
Dibenzofuran	2	0	0	E		<5.9	<6.5
Dibenzo(a,h)anthracene	18	1	12	D	0.0046	0.0031	0.0069
Dibenzo(a,j)acridine	2	0	0	E		<5.9	<6.5
Dibromochloromethane	2	0	0	E		<0.48	<0.49
Dibutylphthalate	2	0	0	E		<5.9	<6.5
Dichloromethane	2	2	2	C	33	9.7	110

Table I-4 (Continued)

EPRI - Uncontrolled Oil-Fired Boiler
Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
Diethylphthalate	2	0	0	E		<5.9	<6.5
Dimethylphenethylamine	2	0	0	E		<5.9	<6.5
Dimethylphthalate	2	0	0	E		<5.9	<6.5
Di-n-octylphthalate	2	0	0	E		<5.9	<6.5
Diphenylamine	2	0	0	E		<5.9	<6.5
Ethyl methanesulfonate	2	0	0	E		<5.9	<6.5
Ethylbenzene	4	2	4	D	0.29	0.19	0.45
Fluoranthene	18	7	16	B	0.014	0.0064	0.030
Fluorene	18	10	16	A	0.012	0.0068	0.022
Formaldehyde	18	12	18	A	18	7.4	43
Indeno (1,2,3,-c,d) pyrene	18	2	15	D	0.0069	0.0046	0.010
Isophorone	2	0	0	E		<5.9	<6.5
Methyl bromide	2	0	0	E		<1.2	<1.7
Methyl chloroform	2	2	2	C	11	0.051	2500
Methyl methanesulfonate	2	0	0	E		<5.9	<6.5
m/p-Xylene	2	2	2	C	1.2	0.73	2.1
Naphthalene	18	14	18	A	0.83	0.30	2.3
Nitrobenzene	2	0	0	E		<5.9	<6.5
N-Nitrosodibutylamine	4	0	0	E		<5.9	<6.5
N-Nitrosodiethylamine	2	0	0	E		<0.04	<0.05
N-Nitrosodimethylamine	4	0	0	E		<0.03	<6.5
N-Nitrosodiphenylamine	2	0	0	E		<5.9	<6.5
N-Nitrosodipropylamine	4	0	0	E		<0.4	<6.5
N-Nitrosomorpholine	2	0	0	E		<0.4	<0.5
N-Nitrosopiperidine	4	0	0	E		<0.04	<6.5
N-Nitrosopyrrolidine	2	0	0	E		<0.04	<0.05
o-Xylene	4	2	4	D	0.35	0.15	0.84
p-Chloroaniline	2	0	0	E		<5.9	<6.5
p-Dimethylaminoazobenzene	2	0	0	E		<5.9	<6.5
Pentachlorobenzene	2	0	0	E		<5.9	<6.5
Pentachloronitrobenzene	2	0	0	E		<5.9	<6.5
Pentachlorophenol	2	0	0	E		<30	<32
Phenacetin	2	0	0	E		<5.9	<6.5
Phenanthrene	18	15	16	A	0.040	0.018	0.092

Table I-4 (Continued)

EPRI - Uncontrolled Oil-Fired Boiler Emission Factors (lb/trillion Btu)

Chemical Substance	Sites Tested	Sites Detected	Sample Size	DQ*	Log-Normal		
					Mean	LCI	UCI
Phenol	2	2	2	C	10	1.3	83
Pronamide	2	0	0	E		<5.9	<6.5
Pyrene	19	5	15	B	0.012	0.0064	0.024
Pyridine	2	0	0	E		<5.9	<6.5
Styrene	2	0	0	E		<0.48	<0.49
Tetrachloroethylene	4	0	0	E		<0.41	<1
Toluene	11	11	11	A	12	6.0	25
trans-1,2-Dichloroethene	2	0	0	E		<0.49	<1.9
trans-1,2-Dichloropropene	2	0	0	E		<0.49	<1.9
Trichloroethylene	4	0	0	E		<0.49	<1.9
Trichlorofluoromethane	4	3	4	C	1.7	0.23	13
Vinyl acetate	2	0	0	E		<4.9	<19
Vinyl chloride	4	0	0	E		<0.49	<1.9

** Ref; Field Chemical Emissions Monitoring Project: Guidelines for Estimating Trace Substance Emissions from Fossil Fuel Steam ElectricPlants, EPRI - DCN 95-213-152-64, August 1995

*Data quality:

A = Five or more detected values, no more than 50% nondetects in statistics.
B = Four or more detected values, no more than 67% nondetects in statistics.
C = Two or more detected values, no more than 75% in statistics.
D = One or more detected values, no limit on nondetects in statistics.
E = Substance has not been detected.

Table I-5 **

EPRI - Uncontrolled Gas-Fired Boiler Emission Factors (lb/trillion Btu)

Substances	Sites Tested	Sites Detected[a]	Sample Size[b]	DQ[c]	Arithmetic Mean Emission Factor
Arsenic	2	2	2	C	0.23
Beryllium	2	0	0	E	<0.01
Cadmium	2	1	1	D	0.04
Chromium	2	2	2	C	1.1
Cobalt	2	1	1	D	0.08
Lead	2	2	2	C	0.4
Manganese	2	2	2	C	0.4
Mercury[d]	2	1	2	D	0.0008
Nickel	2	2	2	C	2.4
Selenium	2	0	0	E	<0.02
Benzene	8	2	5	D	0.8
Formaldehyde[e]	9	8	9	A	175(0-410)
Toluene	2	2	2	C	10
Benzo(a)pyrene equivalents	2	0	0	E	ND[f]
2,3,7,8-TCDD equivalents	1	1	1	D	0.0000012

** Ref; Field Chemical Emissions Monitoring Project; Guidelines for Estimating Trace Substance Emissions from Fossil Fuel Steam ElectricPlants, EPRI - DCN 95-213-152-64, August 1995

[a] Number of times the substance was quantified.

[b] The number of site values used to calculate the mean and confidence interval. (Individual values with detection limits greater than two times the highest quantified value were not included in the mean.)

[c] Data quality:
A = Five or more detected values, no more than 50% nondetects in statistics.
B = Four or more detected values, no more than 67% nondetects in statistics.
C = Two or more detected values, no more than 75% nondetects in statistics.
D = One or more detected values, no more on nondetects in statistics.
E = substance has not been detected.

[d] Based on natural gas analysis, not detected in stack gas at higher concentration.

[e] Median value and confidence intervals are 34, 7 to 150.

[f] ND = Not detected.

Table I - 6

EPRI - Gas Fired Simple Cycle Combustion Turbine Hazardous Metals Emission Factors (lb/trillion Btu)

Metal	Westinghouse 501 AA	General Electric Frame 7
Metals Detected Above Field Blank Level:		
Barium	6.6	3.8
Chromium	1.8	1.9
Copper	3.1	6.2
Lead	–	0.53
Manganese	3.5	–
Nickel	1.6	1.2
Metals Detected At Field Blank Level:		
Arsenic	–	0.18
Cobalt	0.50	–
Lead	1.00	–
Manganese	–	4.5
Mercury	0.69	–
Molybdenum	5.53	3.7
Phosphorous	17.8	11.9
Metals Not Detected:		
Arsenic	ND<0.10	–
Beryllium	ND<0.03	ND<0.02
Cadmium	ND<0.10	ND<0.07
Cobalt	–	ND<0.22
Mercury	–	ND<0.55
Selenium	ND<0.09	ND<0.06
Vanadium	ND<0.20	ND<0.13

Ref: 2 A Summary of Air Toxic Emissions From Natural Gas-Fired Combustion Turbines", Bruce A. Fangmeier et al, Carnot, AFRC/JFRC Pacific Rim International Conference on Environmental Control of Combustion Process, October 16-20, 1994, Electric Power Research Institute's (EPRI) Gas PISCES Study.

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Table I - 7

EPRI - Gas Fired Simple Cycle Combustion Turbine Hazardous Semi-Volatile Organic Emission Factors (lb/trillion Btu)

Species	Westinghouse 501 AA	General Electric Frame 7
PAH (detected species only):		
Naphthalene	0.72	0.28
Phenanthrene	0.111	-
2-Methylnapthalene	0.162	0.010
PCB:		
All PCB isomers not detected		
PCDD/PCDF (detected species only);		
123478-HxCDD	1.9 X 10-5	
123678- HxCDD	1.3 X 10-5	
123789-HxCDD	2.0 X 10 -5	
1234678-HpCDD	4.2 X 10 - 5	
OCDD	4.8 X 10-5	1.8 X 10-5
2378-TCDF	4.0 X 10-5	
23478-PeCDF	3.2 X 10-5	
123478-HxCDF	4.7 X 10-5	
123678-HxCDF	1.5 X 10-5	
234678-HxCDF	2.0 X 10-5	
1234678-HpCDF	5.7 X 10-5	
OCDF	1.5 X 10-5	
Total TCDD	1.6 X 10-4	
Total PeCDD	1.1 X 10-4	
Total HxCDD	1.5 X 10-4	
Total HpCDD	8.0 X 10-5	1.5 X 10-5
Total TCDF	1.5 X 10-4	
Total PeCDF	2.1 X 10-4	
Total HxCDF	1.4 X 10-4	
Total HpDCF	7.4 X 10-5	

Ref: 2 A Summary of Air Toxic Emissions From Natural Gas-Fired Combustion Turbines", Bruce A. Fangmeier et al, Carnot, AFRC/JFRC Pacific Rim International Conference on Environmental Control of Combustion Process, October 16-20, 1994, Electric Power Research Institute's (EPRI) Gas PISCES Study.

Table I - 8

EPRI - Gas Fired Simple Cycle Combustion Turbine
Hazardous Volatile Organic Emission Factors (lb/trillion Btu)

Volatile Organic Compound	Westinghouse 501AA	General Electric Frame 7
Formaldehyde	90.	15.
Benzene	7.	<2
Toluene	60.	20.

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Table I-9

Oil Fired Simple Cycle Combustion Turbine Hazardous Air Pollutants Identified By Title III of the 1990 Clean Air Act Amendments (CAAA) reported in PISCES Database

Substance	Minimum Stack Concentration mg/Nm3 **	Maximum Stack Concentration mg/Nm3 **	Turbine Type	MW	Oil Type	Stack Flow	Stack Flow Units	Stack Conditions
Acenaphthene	8.6 E - 6 **	190. E - 6	Simple-	62	distillate	509,595	dscfm	Temp=336 deg. F, Moisture=9.8%,
Acenaphthylene	8.6 E - 6 **	21 E - 6	Simple-	17	diesel	158,400	dscfm	Temp=987 deg. F, Moisture=5.7%,
Anthracene		8.6 E- 6 **	Simple-	17	diesel	153,330	dscfm	Temp=985 deg. F, Moisture=4.9%,
Antimony		1.3 E - 4 **	Simple-	61.5	No. 2 fuel oil	201	m3/sec	
Arsenic	4.3 E - 4	5.1 E - 4	Simple-	61.9	No. 2 fuel oil	205	m3/sec	
Barium	4.8 E - 4	37. E - 4	Simple-	61.5	No. 2 fuel oil	201	m3/sec	
Benz(a)anthracene		8.6 E - 6 **	Simple-	17	diesel	153,330	dscfm	Temp=985 deg. F, Moisture=4.9%,
Benzo(a)pyrene		8.6 E - 6 **	Simple-	17	diesel	153,330	dscfm	Temp=985 deg. F, Moisture=4.9%,
Benzo(b+k)fluoranthene		8.6 E - 6 **	Simple-	17	diesel	153,330	dscfm	Temp=985 deg. F, Moisture=4.9%,
Benzo(g,h,i)perylene		8.6 E - 6 **	Simple-	17	diesel	153,330	dscfm	Temp=985 deg. F, Moisture=4.9%,
Beryllium	8.6 E - 6	37 E - 6	Simple-	61.9	No. 2 fuel oil	205	m3/sec	
Cadmium	3.9 E - 4	1.4 E - 2	Simple-	61.5	No. 2 fuel oil	201	m3/sec	
Chromium	7.7 E - 3	1.8 E - 2	Simple-	61.5	No. 2 fuel oil	201	m3/sec	
Chrysene		8.6 E - 6 **	Simple-	17	diesel	153,330	dscfm	Temp=985 deg. F, Moisture=4.9%,
Cobalt	7.1 E - 6	83. E - 6	Simple-	61.9	No. 2 fuel oil	205	m3/sec	
Copper	4.5 E - 2	6.4 E - 2	Simple-	61.9	No. 2 fuel oil	205	m3/sec	

Table I-9 Cont.

Oil Fired Simple Cycle Combustion Turbine
Hazardous Air Pollutants Identified By Title III of the
1990 Clean Air Act Amendments (CAAA) reported in PISCES Database

Substance	Minimum Stack Concentration mg/Nm3 **	Maximum Stack Concentration mg/Nm3 **	Turbine Type	MW	Oil Type	Stack Flow	Stack Flow Units	Stack Conditions
Dibenz(a,h)anthracene		8.6 E - 6 **	Simple-Cycle	17	diesel	153,330	dscfm	Temp=985 deg. F, Moisture=4.9%,
Fluoranthene	1.4 E - 5	5.2 E - 5	Simple-Cycle	62	distillate	509,595	dscfm	Temp=336 deg. F, Moisture=9.8%,
Fluorene	8.6 E - 6 **	110. E - 6	Simple-Cycle	17	diesel	158,400	dscfm	Temp=987 deg. F, Moisture=5.7%,
Indeno(1,2,3-c,d)pyrene		8.3 E - 6 **	Simple-Cycle	17	diesel	153,330	dscfm	Temp=985 deg. F, Moisture=4.9%,
Lead	2.2 E - 2	8.3 E - 2	Simple-Cycle	61.5	No. 2 fuel oil	201	m3/sec	
Manganese	1.4 E - 6	5.1 E - 6	Simple-Cycle	61.9	No. 2 fuel oil	205	m3/sec	
Mercury	2.5 E - 3	22. E - 3	Simple-Cycle	61.9	No. 2 fuel oil	205	m3/sec	
Molybdenum	8.8 E - 5 **	100. E - 5	Simple-Cycle	61.5	No. 2 fuel oil	201	m3/sec	
Naphthalene	1.7 E -2	2.2 E - 2	Simple-Cycle	62	distillate	509,595	dscfm	Temp=336 deg. F, Moisture=9.8%,
Nickel	2.1 E - 4	4.4 E - 4	Simple-Cycle	61.9	No. 2 fuel oil	205	m3/sec	
Phenanthrene	2.8 E - 5	13 E - 5	Simple-Cycle	63	distillate	620,710	dscfm	Temp=351 deg. F, Moisture=4.7%
Pyrene	8.6 E - 6 **	23 E - 6	Simple-Cycle	17	diesel	158,400	dscfm	Temp=987 deg. F, Moisture=5.7%,
Selenium	2.5 E - 4 **	4.3 E - 4 **	Simple-Cycle	61.5	No. 2 fuel oil	201	m3/sec	
Thallium	2.9 E - 4 **	3.8 E - 4	Simple-Cycle	61.9	No. 2 fuel oil	205	m3/sec	
Tin	4.3 E - 3 **	35. E -3	Simple-Cycle	61.9	No. 2 fuel oil	205	m3/sec	
Vanadium	2.4 E - 2	5.1 E - 2	Simple-Cycle	61.9	No. 2 fuel oil	205	m3/sec	
Zinc	8.1 E -1	8.2 E -1	Simple-Cycle	61.5	No. 2 fuel oil	201	m3/sec	

**** Note: The EPRI PISCES Database conservatively reports "Non-Detect" analytical results as the detection level of the analytical method used. Minimum and Maximum data marked by ** are Non-Detect data reported at the detection level of the analytical method(s) used.**

APPENDIX A

ANNUAL REPORT

by

Chief Engineer
S. A. LUBETKIN

to the

PASSAIC VALLEY SEWERAGE COMMISSIONERS

FOR THE YEAR

1973

Violation and Elimination - Public Service Electric and Gas Company, Maintenance Garage, Coal Street, Newark, N. J., and Dorsey Roofing Co., Harrison, N. J.

January 12, 1973

(J. McLaughlin)

On January 12, 1973, the PVSC received a complaint that workmen on the Public Service property has discarded approximately eight 5-gallon tar cans into the Passaic River. Inspector McLaughlin was sent to check. He contacted Mr. R. Rosenmeier, Superintendent of Public Service, who informed him that employees of a roofing contractor may have been the ones involved.

On January 22, Mr. Lubetkin wrote to Public Service informing them of the violation and asking for details and what would be done by Public Service to prevent a recurrence.

On January 26, Mr. Rosenmeier replied that they have no knowledge of the incident but they did have a private roofing contractor repairing their building at that time; therefore, it was possible to have occurred.

On January 31, 1973, Mr. Lubetkin wrote to Dorsey Roofing Co. informing them that the discarding of cans into the Passaic River was illegal and that they should so inform their employees to discard rubbish in a legal manner in the future.

On February 13, 1973, Mr. D. Dickson of Dorsey Roofing Co. replied that he questioned his men concerning the incident and the men denied discarding the cans into the river. Mr. Dickson stated he also posted a sign and informed all employees that it would result in immediate dismissal if anyone, at any time, discarded any refuse into the Passaic River.

Violation and Elimination - Public Service Electric and Gas Company, Essex Generating Station, Newark, N. J.

June 15, 1973

(J. McLaughlin)

At approximately 11:00 A.M. on June 15, 1973, traces of fuel oil were noticed by Public Service Electric and Gas Company in the circulating water discharge canal. Investigation revealed that the oil came from a pipe trench in the fuel oil room. There was a leak in the oil reclaim tank, and it was estimated that approximately 20 gallons of No. 6 oil leaked to the river. The leaking oil for the most part was contained by a fuel oil barge that was moored at the station dock.

The following agencies were notified at approximately 11:15 A.M. on June 15, 1973:

1. U. S. Coast Guard
2. Passaic Valley Sewerage Commissioners
3. Army Corps of Engineers
4. N. J. Department of Environmental Protection
5. U. S. Environmental Protection Agency

Coastal Service, Inc. arrived on the property at approximately 11:40 A.M. to assist Station personnel in the clean-up. Workmen vacuumed the oil into a tank truck and removed oil stained rocks from the Passaic River bank approximately fifty yards downstream. The clean-up was completed 1:45 P.M. the same day.

118A

CARMINE T. PERRAPATO
CHAIRMAN

ROBERT J. DAVENPORT
VICE CHAIRMAN

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JOSEPH M. KEEGAN
CHARLES A. LAGOS
COMMISSIONERS

PASSAIC VALLEY SEWERAGE COMMISSIONERS
600 WILSON AVENUE
NEWARK, N.J. 07105
(201) 344-1800

SEYMOUR A. LUBETKIN
CHIEF ENGINEER

Charles C. Carella
CHIEF COUNSEL

MRS. CHARLES T. SCHAEDEL
CLERK-TREASURER

March 15, 1976

RECEIVED
MAR 25 1976

Passaic Valley Sewerage Commissioners
600 Wilson Avenue
Newark, New Jersey

Re: <u>Monthly Report</u>
<u>January and February 1976</u>

Gentlemen:

The following is my report which covers the months of January and February 1976, and consists of three parts:

Violation and Elimination - Northwest Bergen County Sewer Auth.

During January and February of 1976, eight samples were taken by PVSC sampling crew and only one (January 13, 1976) was not considered satisfactory. Incidentally, this was the first unsatisfactory sample since June of 1972. Mr. George Baer, Supervisor, indicated to the inspector that they had been working on an experimental nitrogen removal system, and at times, while working with this, a surplus of activated sludge in aeration tanks exceeded the system return sludge pumping capacity for a short time, thus causing a temporary upset which lasted for about 20 minutes.

Violation and Elimination - Public Service Electric and Gas Company, Essex Generating Station, Newark, N. J.

January 14, 1976 (J. McLaughlin)

On a routine inspection, Inspector McLaughlin, accompanied by Supervisor F. D'Ascensio, observed a maintenance crew from Public Service pumping a black oily liquid from a manhole near their Essex Generating Station to the ground where it flowed to Lawyer's Ditch, a tributary of the Passaic River. They ceased operation when directed to by PVSC personnel.

On January 21, 1976, Mr. Lubetkin wrote them a letter that this had happened in the past, and on June 19, 1975, Mr. Maginn, Jr. of the Essex Division had promised that in the future a manhole cleaning tank truck would accompany the maintenance crew and discharge the polluting material into skimming facilities located in Irvington, and at their Roseland facilities.

On January 27, 1976, Mr. J. F. Schwanhausser, Division Superintendent of Elizabeth, replied, apologizing for not effectively controlling the transmission of this material, and he informed PVSC that all personnel of both divisions have been instructed in proper procedures so as to avoid repetition of this type of incident.

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849780001

JUL - 1 1997

GENERAL NOTICE LETTER
CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Lawrence R. Codey, President
Public Service Electric and Gas Company
P.O. Box 570
Newark, New Jersey 07101-0570

Re: Diamond Alkali Superfund Site
Notice of Potential Liability for Response Actions
in the Passaic River Study Area, Newark, New Jersey

Dear Mr. Codey:

The United States Environmental Protection Agency ("EPA") is charged with responding to the release and/or threatened release of hazardous substances, pollutants, and contaminants into the environment and with enforcement responsibilities under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), as amended, 42 U.S.C. §9601 et seq.

EPA has documented the release or threatened release of hazardous substances, pollutants and contaminants into the Passaic River Study Area which is part of the Diamond Alkali Superfund Site ("Site") located in Newark, New Jersey. By this letter, EPA is notifying Public Service Electric and Gas Company ("PSE&G") of its potential liability relating to the Site pursuant to Section 107 of CERCLA.

Sediment in the Passaic River contain numerous hazardous substances, pollutants and contaminants. Investigations undertaken by EPA indicated that hazardous materials were being released from the Essex and Harrison facilities operated by PSE&G in Newark and Harrison, New Jersey, into the Passaic River Study Area. Hazardous substances, pollutants and contaminants released from these outfalls into the Passaic River Study Area present a risk to the environment and the humans who may ingest contaminated fish and shellfish. Therefore, PSE&G may be potentially liable for all response costs which the government may incur relating to the Passaic River Study Area.

ORC	ORC	ERRD	ERRD	ERRD	ERRD
NICK/WAGNER	KARLEN	EVANGELISTA	HAUPTAMN	MCCABE	CASPE
2/28/97 2/28/97	2/28/97	6/27/97	6/29/97	6/27	~~6/[illegible]/97~~ 7/1

Under Sections 106(a) and 107(a) of CERCLA, 42 U.S.C. §9606(a) and §9607(a) and other laws, potentially responsible parties ("PRPs") may be obligated to implement response actions deemed necessary by EPA to protect public health, welfare or the environment, and may be liable for all costs incurred by the government in responding to any release or threatened release at the Site. If response actions are performed by EPA rather than by the PRPs, those PRPs may be subject to legal action pursuant to Section 107(a) of CERCLA, 42 U.S.C. §9607(a), to recover public funds expended by EPA in response to the release and threatened release of hazardous materials at the Site. Such actions and costs may include, but need not be limited to, expenditures for conducting a Remedial Investigation/Feasibility Study ("RI/FS"), a Remedial Design/Remedial Action, and other investigation, planning, response, oversight, and enforcement activities. In addition, responsible parties may be required to pay damages for injury to, destruction of, or loss of natural resources, including the cost of assessing such damages.

While EPA has the discretionary authority to invoke special notice procedures, EPA hereby notifies you that it will not utilize the special notice procedures contained in Section 122(e) of CERCLA, 42 U.S.C. §9622(e). EPA has concluded that use of the special notice procedures in Section 122(e) of CERCLA would delay the implementation of the RI/FS which is currently being performed at the Site to determine the extent of contamination and to evaluate possible actions to mitigate any adverse effects. EPA will determine at a subsequent time whether additional measures are required to mitigate releases from the Site in order to protect the public health, welfare, and the environment. The decision not to use the special notice procedures does not preclude you from entering into discussions with EPA regarding your participation in activities at the Site.

By this letter, EPA encourages you, as a PRP, to voluntarily participate in the EPA-approved activities underway at the Passaic River Study Area in conjunction with other PRPs. At the present time, an RI/FS is being performed at the Study Area under an Administrative Consent Order with the Occidental Chemical Corporation ("OCC"). The actual work is being performed by Chemical Land Holdings, Inc. ("CLH"), pursuant to certain contractual arrangements with OCC, and should be contacted for information pertaining to the work being done. CLH can be contacted at the addresses listed in the Attachment to this letter. Other PRPs who have received Notice letters are also listed in the Attachment. Be advised that notice of your potential liability at the Site is being forwarded to OCC by EPA.

EPA requests your cooperation in this matter. If you are interested in participating in the ongoing response action you should notify EPA of your intentions to join with OCC.

Notification should be in writing and should be delivered to EPA no later that fourteen (14) days after the date that you receive this letter. Your letter should be sent to:

Mr. Pasquale Evangelista
Remedial Project Manager
U.S. Environmental Protection Agency
Emergency and Remedial Response Division
290 Broadway, Floor 19
New York, NY 10007-1866

with a copy to Ms. Amelia Wagner, Esq., of the Office of Regional Counsel, Floor 17 at the same street address.

If EPA does not receive a written response from you in the time specified above, EPA will assume that you voluntarily decline to participate in any of the response actions taking place at the Site. EPA reserves the right to pursue its available enforcement options with regard to the site.

If you wish to discuss this matter further, please contact Mr. Evangelista of my staff at (212) 637-4403 or Ms. Wagner at (212) 637-3141. Please note that all communications from attorneys should be directed to Ms. Wagner.

Sincerely yours,

Richard Caspe, Director
Emergency and Remedial Response Division

Attachment

cc: Hugh J. Mahoney, Esq., General Environmental Counsel
Public Service Electric and Gas Company

John Dugdale, Esq.
Andrews & Kurth, L.L.P.

Mr. Richard P. McNutt
Chemical Land Holdings, Inc.

ATTACHMENT

Contact for Chemical Land Holdings, Inc.:

Mr. Richard P. McNutt
Chemical Land Holdings, Inc.
1015 Belleville Turnpike
Kearny, New Jersey 07032

Counsel: John Dugdale, Esq.
Andrews & Kurth, L.L.P.
1601 Elm Street, Suite 4400
Dallas, Texas 75201

PRPs in receipt of Notice Letters:

Mr. J. Roger Hirl
President and Chairman of the Board
Occidental Chemical Company
Occidental Tower
5005 LBJ Freeway
Dallas, Texas 75244

Brian C. Kelly, Esq.
Chris-Craft Industries, Inc.
767 Fifth Avenue, 46th Floor
New York, New York 10153

Counsel: Peter Simshauser, Esq.
Skadden, Arps, Slate, Meagher & Flom
300 South Grand Avenue
Los Angeles, California 90071-3144

Mr. Robert D. McNeeley, President
Reilly Industries, Inc.
1510 Market Square Center
151 North Delaware Street
Indianapolis, IN 46204

Counsel: Jacqueline A. Simmons, Esq.
Reilly Industries, Inc.

Mr. John G. Breen, Chairman of the Board
The Sherwin-Williams Company
101 Prospect Avenue, N.W.
Cleveland, Ohio 44115-1075

Counsel: Donald J. McConnell, Esq., Environmental Counsel
The Sherwin-Williams Company

Mr. Robert L. Ball, President
Alcan Aluminum Corporation
100 Erieview Plaza, 29th Floor
Cleveland, OH 44114

Counsel: Lawrence A. Salibra II, Esq., Senior Counsel
Alcan Aluminum Corporation
6060 Parkland Blvd.
Mayfield Hts., Ohio 44124

Mr. David J. D'Antoni, President
Ashland Chemical Company
P.O. Box 2219
Columbus, OH 43216

Counsel: Stephen W. Leermakers, Esq., Senior Litigation Counsel
Ashland Chemical Company
5200 Blazer Parkway
Dublin, Ohio 43017

Mr. Richard J. Mahoney, Chief Executive
Monsanto Company
800 N. Lindbergh Blvd.
St. Louis, MO 63167

Counsel: Peter H. Smith, Esq., Assistant Environmental Counsel
Monsanto Company

Mr. Maurice C. Workman, President
Benjamin Moore & Co.
51 Chestnut Ridge Road
Montvale, New Jersey 07645

Counsel: John T. Rafferty, Esq., General Counsel
Benjamin Moore & Co.

Mr. Edgar S. Woolard, Jr., Chairman
E.I. du Pont de Nemours and Company
1007 Market Street
Wilmington, Delaware 19898

Counsel: Bernard J. Reilly, Esq., Corporate Counsel
E.I. du Pont de Nemours and Company

Mr. Joseph G. Gabriel
Vice President of Operations
360 North Pastoria Environmental Corporation
1100 Ridgeway Avenue
Rochester, New York 14652-6280

Mr. George M. Fisher, President
Eastman Kodak Company
343 State Street
Rochester, New York 14650

Counsel: Elliott Stern, Esq., Counsel
Eastman Kodak Company

President
Bayer Corporation
100 Bayer Road
Pittsburgh, Pennsylvania 15205-9741

Counsel: Gerard F. Hickel, Esq., Counsel
Bayer Corporation

Mr. Jean-Pierre van Rooy, President
Otis Elevator Company
North American Operations
10 Farm Springs Road
Farmington, Connecticut 06032

Counsel: Joseph A. Santos, Assistant Counsel
Otis Elevator Company

Mr. Lawrence R. Codey, President
Public Service Electric & Gas Company
P.O. Box 570
Newark, New Jersey 07101-0570

Counsel: Hugh J. Mahoney, Esq., General Environmental Counsel
Public Service Electric & Gas Company

Is your RETURN ADDRESS completed on the reverse side?

SENDER: A. W.

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "*Return Receipt Requested*" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. Lawrence R. Codey, President
Public Service Electric and Gas Company
P.O. Box 570
Newark, New Jersey 07101-0570

4a. Article Number
P 344 132 005

4b. Service Type

☐ Registered ☐ Certified
☐ Express Mail ☐ Insured
☐ Return Receipt for Merchandise ☐ COD

7. Date of Delivery
7/7/97

5. Received By: *(Print Name)*

6. Signature: *(Addressee or Agent)*
X

8. Addressee's Address *(Only if requested and fee is paid)*

Thank you for using Return Receipt Service.

PS Form 3811, December 1994 **Domestic Return Receipt**

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

- Print your name, address, and ZIP Code in this box ●

U.S. Environmental Protection Agency
Region II
Office of Regional Counsel
New Jersey Superfund Branch
290 Broadway, 17th Floor
New York, New York 10007-1866
Attn: Amelia Wagner

849780007

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

SEP 15 2003

GENERAL NOTICE LETTER
CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Lawrence Codey, President
PSE&G Co.
P.O. Box 570
Newark, New Jersey 07101-0570

RE: Diamond Alkali Superfund Site
Notice of Potential Liability for
Response Actions in the Lower Passaic River, New Jersey

Dear Mr. Codey:

The United States Environmental Protection Agency ("EPA") is charged with responding to the release and/or threatened release of hazardous substances, pollutants, and contaminants into the environment and with enforcement responsibilities under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. §9601 et seq.

You received a letter from EPA, dated July 1, 1997, notifying PSE&G Co. ("PSE&G") of its potential liability relating to the Passaic River Study Area, which is part of the Diamond Alkali Superfund Site ("Site") located in Newark, New Jersey, pursuant to Section 107(a) of CERCLA, 42 U.S.C. §9607(a). Under CERCLA, potentially responsible parties ("PRPs") include current and past owners of a facility, as well as persons who arranged for the disposal or treatment of hazardous substances at the Site, or the transport of hazardous substances to the Site. Accordingly, EPA is seeking your cooperation in an innovative approach to environmental remediation and restoration activities for the Lower Passaic River.

EPA has documented the release or threatened release of hazardous substances, pollutants and contaminants into the six-mile stretch of the river, known as the Passaic River Study Area, which is part of the Site located in Newark, New Jersey. Based on the results of previous CERCLA remedial investigation activities and other environmental studies, including a reconnaissance study of the Passaic River conducted by the United States Army Corps of Engineers ("USACE"), EPA has further determined that contaminated sediments and other potential sources of hazardous substances exist along the entire 17-mile tidal reach of the Lower Passaic River. Thus, EPA has decided to expand the Study to include the areal extent of contamination to which hazardous substances from the six-mile stretch were transported; and those sources from which hazardous substances outside the six-mile stretch have come to be located within the expanded Study Area.

In recognition of our complementary roles, EPA has formed a partnership with USACE and the New Jersey Department of Transportation-Office of Maritime Resources ("OMR") ["the governmental partnership"] to identify and to address water quality improvement, remediation, and restoration opportunities in the 17-mile Lower Passaic River. This governmental partnership is consistent with a national Memorandum of Understanding ("MOU") executed on July 2, 2002 between EPA and USACE. This MOU calls for the two agencies to cooperate, where appropriate, on environmental remediation and restoration of degraded urban rivers and related resources. In agreeing to implement the MOU, the EPA and USACE will use their existing statutory and regulatory authorities in a coordinated manner. These authorities for EPA include CERCLA, the Clean Water Act, and the Resource Conservation and Recovery Act. The USACE's authority stems from the Water Resources Development Act ("WRDA"). WRDA allows for the use of some federal funds to pay for a portion of the USACE's approved projects related to ecosystem restoration.

For the first phase of the Lower Passaic River Project, the governmental partners are proceeding with an integrated five- to seven-year study to determine an appropriate remediation and restoration plan for the river. The study will involve investigation of environmental impacts and pollution sources, as well as evaluation of alternative actions, leading to recommendations of environmental remediation and restoration activities. This study is being conducted by EPA under the authority of CERCLA and by USACE and OMR, as local sponsor, under WRDA. EPA, USACE, and OMR are coordinating with the New Jersey Department of Environmental Protection and the Federal and State Natural Resource Trustee agencies. EPA, USACE, and OMR estimate that the study will cost approximately $20 million, with the WRDA and CERCLA shares being about $10 million each. EPA will be seeking its share of the costs of the study from PRPs.

Based on information that EPA evaluated during the course of its investigation of the Site, EPA believes that hazardous substances were being released from the PSE&G facilities located at 155 Raymond Boulevard in Newark, and 4th Street in Harrison, New Jersey, into the Lower Passaic River. Hazardous substances, pollutants and contaminants released from the facility into the river present a risk to the environment and the humans who may ingest contaminated fish and shellfish. Therefore, PSE&G may be potentially liable for response costs which the government may incur relating to the study of the Lower Passaic River. In addition, responsible parties may be required to pay damages for injury to, destruction of, or loss of natural resources, including the cost of assessing such damages.

Enclosed is a list of the other PRPs who have received Notice letters. This list represents EPA's findings on the identities of PRPs to date. We are continuing efforts to locate additional PRPs who have released hazardous substances, directly or indirectly, into the Passaic River. Inclusion on, or exclusion from, the list does not constitute a final determination by EPA concerning the liability of any party for the release or threat of release of hazardous substances at the Site. Be advised that notice of your potential liability at the Site is being forwarded to all parties on this list.

We request that you consider becoming a "cooperating party" for the Lower Passaic River

Project. As a cooperating party, you, along with many other such parties, will be expected to fund EPA's share of the study costs. Upon completion of the study, it is expected that CERCLA and WRDA processes will be used to identify the required remediation and restoration programs, as well as the assignment of remediation and restoration costs. At this time, the commitments of the cooperating parties will apply only to the study. For those who choose not to cooperate, EPA may apply the CERCLA enforcement process, pursuant to Sections 106 (a) and 107(a) of CERCLA, 42 U.S.C. §9606(a) and §9607(a) and other laws.

Pursuant to CERCLA Section 113(k), EPA must establish an administrative record that contains documents that form the basis of EPA's decision on the selection of a response action for a site. The administrative record files, which contain the documents related to the response action selected for this Site are located at EPA's Region 2 office (290 Broadway, New York) on the 18th floor. You may call the Records Center at (212) 637-4308 to make an appointment to view the administrative record for the Lower Passaic River Project.

EPA will be holding a meeting with all PRPs on October 29, 2003 at 10:00 AM in Conference Room 27A at the Region 2 office. At that meeting, EPA will provide information about the actions taken to date in the Lower Passaic River, as well as plans for future activities. After the presentation, PRPs will be given the opportunity to caucus, and EPA will return to answer any questions that might be generated during the private session. Please be advised that due to increased security measures, all visitors need to be registered with the security desk in the lobby in order to gain entry to the office. In order to ensure a smooth arrival, you will need to provide EPA with a list of attendees no later than October 15, 2003.

EPA recommends that the cooperating parties select a steering committee to represent the group's interest as soon as possible, since EPA expects a funding commitment for the financing of the CERCLA share of the $20 million study by mid-November 2003. If you wish to discuss this further, please contact Ms. Alice Yeh, Remedial Project Manager, at (212) 637-4427 or Ms. Kedari Reddy, Assistant Regional Counsel, at (212) 637-3106. Please note that all communications from attorneys should be directed to Ms. Reddy.

Sincerely yours,

George Pavlou, Director
Emergency and Remedial Response Division

Enclosure

cc: Hugh Mahoney, Esq.
PSE&G Co.

Form DEP-061 C
9/88

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MW

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DUTY OFFICER NOTIFICATION REPORT

PAGE 1 OF ____

CASE NO. 90 . 01 . 28 . 1450

DATE 01 . 28 . 91 REC'D BY Barry / R14 TIME 1502

INCIDENT REPORT BY:
Name RUSS FURNARI Phone (201) 430-8964
Street ESSEX Generating Station
City 155 RAYMOND Bd / NEWARK - ESSEX
Affiliation/Title PSEG

INCIDENT LOCATION: ____ Transportation ____ Facility ____ Other: ____
Name (Site): ____ Phone ____
Street (SAME AS above)
City ____ County ____ State ____ Zip Code ____
Date of Incident: 01 . 28 . 91 Time: 1100

IDENTITY OF SUBSTANCE(S) SPILLED, RELEASED, ETC.: ____ Suspected ____ Unknown
Name of Substance(s) [Gas, Liquid, Solid]: Kerosene
Amount Released/Spilled UNK ____ Actual ____ Potential ____ Estimated Substance Contained Y [✓ N] U
Type of Release/Spill: ✓ Terminated ____ Continuous ____ Intermittent Hazardous Material [✓ Y] N U

INCIDENT DESCRIPTION:
____ Fire ____ Explosion ____ Air Rel ✓ Spill ____ MVA ____ Derailment ____ Smoke/Dust
____ Odors ____ Sewage ____ NJPDES ____ Noise ____ Wildlife ____ Illegal Dumping ____ Drums
____ Equip Start-Up/Shutdown, Equip Fail/Upset, etc. ____
____ Other (specify) ____

Injuries	Y [✓ N] U	Public Exposure	Y [✓ N] U
Facility Evacuation	Y [✓ N] U	Fire Department at Scene	Y [✓ N] U
Population Evacuation	Y [✓ N] U	Police at Scene	Y [✓ N] U
Potable Water Source	Y [✓ N] U	Assistance Requested	Y [✓ N] U
Contamination of ____ Air ✓ Land ✓ Water		Precipitation	Y [✓ N] U
Receiving Water PASSAIC		Wind Direction/Speed	____

Location Type: ____ Residential ✓ Industrial ____ Commercial ____ Rural ____ Sensitive Population (Hosp., School, Nurs. Home)
STATUS AT INCIDENT SCENE Kerosene line found to be leaking under roadway - Responsible PARTY will contact.

RESPONSIBLE PARTY: ____ Suspected ____ Unknown
Company Name PSE&G Phone 430-8789
Contact Michael Cullen Title Lead Eng.
Street Ft. of Hackensack Ave.
City Kearny County Hudson State NJ Zip Code ____

OFFICIALS NOTIFIED (Name/Title):

NJSP: Marine Flow (Newark)	/ [illegible]	Phone [illegible]-1173	Date/Time 1/28/91 / 1520	(T/A)
Local Health	/	Phone	Date/Time /	(T/A)
Local Munic	/	Phone	Date/Time /	(T/A)
USCG NY	/ [illegible]	Phone 212 668-7222	Date/Time 1/28/91 / 1530	(T/A)

Amount Released/Spilled UNK ____ Actual ____ Potential ____ Estimated Substance Contained Y [✓ N] U
Type of Release/Spill: ✓ Terminated ____ Continuous ____ Intermittent Hazardous Material [✓ Y] N U

INCIDENT DESCRIPTION:

____ Fire ____ Explosion ____ Air Rel ✓ Spill ____ MVA ____ Derailment ____ Smoke/Dust
____ Odors ____ Sewage ____ NJPDES ____ Noise ____ Wildlife ____ Illegal Dumping ____ Drums
____ Equip Start-Up/Shutdown, Equip Fail/Upset, etc. ____
____ Other (specify) ____

Injuries Y [✓ N] U
Facility Evacuation Y [✓ N] U
Population Evacuation Y [✓ N] U
Potable Water Source Y [✓ N] U
Contamination of ____ Air ✓ Land ✓ Water
Receiving Water PASSAIC
Public Exposure Y [✓ N] U
Fire Department at Scene Y [✓ N] U
Police at Scene Y [✓ N] U
Assistance Requested Y [✓ N] U
Precipitation Y [✓ N] U
Wind Direction/Speed ____
Location Type ____ Residential ✓ Industrial ____ Commercial ____ Rural ____ Sensitive Population (Hosp, School, Nurs. Home)
STATUS AT INCIDENT SCENE Kerosene line found to be leaking under roadway - Responsible party will contact.

RESPONSIBLE PARTY: ____ Suspected ____ Unknown
Company Name PSE&G Phone 430-8789
Contact Michael Cutler Title Lead Eng
Street [illegible] Hackensack Ave.
City Kearny County Hudson State NJ Zip Code ____

OFFICIALS NOTIFIED (Name/Title)
[illegible] / [illegible] Phone [illegible] Date/Time [illegible] / 1520 (T/M)
Local Health ____ / ____ Phone ____ Date/Time ____ / ____ (T/M)
Local Munic ____ / ____ Phone ____ Date/Time ____ / ____ (T/M)
[illegible] / [illegible] Phone [illegible] Date/Time [illegible] / [illegible] (T/M)

INCIDENT REFERRED TO:

____ DEO ____ DWR ____ DSWM ____ DHSM ✗ DHWM ____ DOH ____ DFG ____ DPF ____ DCJ ____ DCR
Region ____ Northern ✗ Metro ____ Central ____ Southern ✗ ER1 ____ ER2 ____ BUST
1. Name/Affil M. Gatchings / R-15 Phone (OFFICE) Date/Time 01/28/91 / 1545 (T/M)
2. Name/Affil ____ / ____ Phone ____ Date/Time ____ / ____ (T/M)
3. Name/Affil ____ / ____ Phone ____ Date/Time ____ / ____ (T/M)

DEP RESPONSE [✓ Emergency] Immediate Priority No Response

COMMENTS REFER TO CASES 91-01-27-1252 & 91-01-28-0829. ATTEMPT TO CONTACT MR FURNARI - NO ANSWER ON SEVERAL OCCASIONS. R-15 responded. PSE&G excavating underground kerosene fill pipeline to above ground tank. Clean Harbors to place booms along shoreline. Suspect leak from pipeline possible source for Passaic River sheen.

COPIES: White - Lead Agency Yellow - Other Pink - Other

850240018

1130
NFA

New Jersey Department of Environmental Protection
COMMUNICATIONS CENTER NOTIFICATION REPORT

Received: 1/28/91
Operator:RICH
TD Log # 1170
Case # 91-1-28-0829-00

Notification Type: Citizen

Reported By	Affiliation	Phone
PETER VIVIRITO	CITIZEN	201-729-2686
Street Address	Municipality	State
71 EDISON TERR	SPARTA	NJ

Incident Location: Other
Site IN RIVER SOUTH OF FIREBOAT
Phone
Street Address DOCK-TO PSE&G PLT
Municipality NEWARK
County ESSEX
State NJ
Location Type Industrial
Incident Date 1/28/91
Time 0745

Substance Released OIL SHEEN
Amount Released (Known)UNKNOWN
ID:Known State Liquid CAS#
Additional Substances
Release Is Continuous
Substance Contained? N Hazardous Material? Y TCPA? N A310 Letter? Y
COMU CODE: 0714 REF CODE: 001

Incident Description Spill

Injuries? N Public Evac? N Facility Evac? N Public Exposure? N
Police On Scene? N Firemen On Scene? N DEP Requested? Y Wind Sp/Dir

Contamination Of Water
Receiving Water PASSAIC RIVER
Status At Scene SLICK MOVING DOWN WITH THE TIDE - SOURCE UNKNOWN- CONSTANT

Responsible Party UnKnown
Party
Contact
Phone
Title
Street Address
Municipality
County
State

OFFICIALS NOTIFIED

	NAME	TITLE	PHONE	DATE	TIME
NJSP :	OEM		609-882-2000	1/28	
MUNIC:	NEWARK CITY	OPER 41	201-733-7400	1/28	0840
OTHER:					

	Name	Affiliation		Method	Date	Time	T/M
1.	MATT GARAMONE	DEQ	ER1	Office,Faxed	1/28	0838	T
2.							
3.							

COMMENTS

No answer at Mr. Vivirito's Residence. 0844 - notified NJSP Marine Bureau in Newark. 0845 - Notified USCG/NY. → Spoke to [illegible] Ricardo of NJSP Marine + Officer Hanger of USCG/NY. Coast Guard + Marine Police to respond. 0953 - t/c Officer Hanger - USCG/NY. Newark F.D. has checked the area but reports finding no sheen.

Referred to DHWM-Metro.

NFA-BERI