State of New Jersey
Department of Environmental Protection
Division of Responsible Party Site Remediation
Southern Field Office
P.O. Box 407
Trenton, New Jersey 08625-0407
(609) 584-4150
(609) 584-4170 - Fax

Christine Todd Whitman
Governor

Robert C. Shinn, Jr.
Commissioner

AUG 17 2000

August 8, 2000

Mr. Michael B. Roche
Vice President and Director
GPU Nuclear Corporation
P.O. Box 388 – U.S. Route 9
Forked River, New Jersey 08731

Subject: Memorandum of Agreement – GPU Nuclear Corporation
Route 9 South, Lacey Township, Ocean County
DSPRS Case #93-06-28-1317-29 – File #15-12-03

Dear Mr. Roche:

A Memorandum of Agreement (MOA) was entered into by you on behalf of GPU Nuclear Corporation and the New Jersey Department of Environmental Protection (Department) on June 21, 1995 for remedial activities at the above referenced site. Due to the site triggering ISRA as a result of the sale of the property, the MOA is being terminated.

Therefore, the MOA between the Department and GPU Nuclear Corporation dated June 21, 1995 is Hereby Terminated and Departmental oversight will be conducted by the Bureau of Environmental Evaluation, Cleanup and Responsibility Assessment Section.

If you have any questions regarding this matter, please contact me at (609) 584-4150.

Sincerely,

Thomas W. Downey
Section Chief

c: File #18-08-99P
Health Department
Vince Krisak, CAS
Matt Coeffer

OYSTER CREEK NUCLEAR GENERATING STATION
GROUND WATER ASSESSMENT/REMEDIATION ACTIVTIES
SEMI-ANNUAL REPORT, JANUARY - JUNE 2002

FOR

ISRA CASE NO. 99575

Prepared by

Jersey Central Power & Light Company,
A FirstEnergy Company
300 Madison Avenue
Post Office Box 1911
Morristown, NJ 07962-1911

May 2003

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1.0 FACILITY BACKGROUND

The 650 MW Oyster Creek Nuclear Generating Station plant is a single-unit, five-loop General Electric Boiling Water Reactor (BWR). The plant site, about 800 acres, is located within Lacey and Ocean Townships of Ocean County, New Jersey. Located approximately nine miles south of Toms River, New Jersey, the Oyster Creek Nuclear Generating Station plant is about 50 miles east of Philadelphia, Pennsylvania and 60 miles south of Newark, New Jersey.

Oyster Creek is owned and operated by Amergen Inc. Specific environmental obligations pursuant to the June 1995 New Jersey Department of Environmental Protection (NJDEP) Memorandum of Agreement (MOA) between NJDEP and GPU Nuclear Corporation, currently GPU Energy, are continuing to be fulfilled by Jersey Central Power & Light Company, a FirstEnergy Company (JCP&L). This work and NJDEP oversight received NJDEP case number 93-06-28-1317-29. The NJDEP terminated the MOA via letter dated August 8, 2000 due to the site triggering ISRA as a result of the sale of the property. The NJDEP advised in the letter that oversight by the NJDEP will be conducted by the NJDEP's Bureau of Environmental Evaluation, Cleanup and Responsibility Assessment (BEECRA) Section. The NJDEP assigned ISRA Case No. 99575 to this project. Groundwater treatment effluent is discharged under Ocean County Utilities Authority (OCUA) Industrial Discharge Permit #C-13-1991-030.

2.0 SUMMARY OF GROUNDWATER TREATMENT/MONITORING ACTIVITIES

In 1995 a Memorandum of Agreement (MOA) and associated Remedial Action Workplan (RAW) replaced NJPDES permit #NJ0076147 as the documentation specifying the monitoring and reporting requirements for the remediation of the fuel oil and chlorinated solvent contamination of the soil and groundwater at the Oyster Creek Nuclear Generating Station (OCNGS). This document is the 14th semi-annual report, covering the period of January through June 2002. The NJDEP terminated the MOA via letter dated August 8, 2000 due to the site triggering ISRA as a result of the sale of the property. The NJDEP advised in the letter that oversight by the NJDEP will be conducted by the NJDEP's BEECRA Section. ISRA Case No. 99575 was assigned to the project by the NJDEP.

In October 1986 a small hole (1/8" x 1/4") in a No. 2 diesel fuel transfer line was discovered beneath a storage building at the OCNGS. The hole in the pressurized line resulted in the introduction of an estimated 15,000 gallons of diesel fuel into the soil and ground water. Soil and ground water contamination are confined to a relatively small area of the OCNGS site, north and east of the Emergency Diesel Generator (EDG) Building (Figure 1). The contamination appears to be limited to the upper Cape May formation and does not present a threat to the on-site or off-site drinking water wells. A clay layer up to 15 feet thick separates the Cape May formation from the lower Cohansey formation throughout most of the site. Major exceptions include those areas around the Turbine and Reactor Buildings where the clay layer was breached during foundation construction (Figure 2).

Injection of potable water into wells located between the Turbine Building foundation breach and the remediation project area prohibits migration of contaminated ground water to the underlying Cohansey Aquifer. The locations of the injection points are depicted on Figure 1. The injection effort creates a hydraulic barrier to the flow of shallow ground water in the Cape May Aquifer, directing it away from any potential mixing with the Cohansey Aquifer. Ground water contour maps for the Cape May aquifer wells were prepared based on water table elevation data for February and April 2002. These data are summarized in Tables 1 and 2. Figures 3 and 4 depict the orientation and magnitude of hydraulic gradient for the February and April 2002 quarterly ground water elevation monitoring episodes. These maps depict the effectiveness of the ground water injection activities in redirecting ground water flow.

Specifically, the maps illustrate a hydraulic mound at the injection area. This mounding deflects groundwater flow away from the foundation breach and toward the remediation area.

In addition to ground water injection in the area between the Turbine Building foundation breach and the remediation project, injection also occurs along the southern edge of the contaminant plume. In order to prevent southerly migration of the plume, the potable water treatment system sand filter backwash is discharged to the area south of the Machine Shop (Figure 1). Table 3 provides a summary of the potable water and sand filter backwash injection quantities.

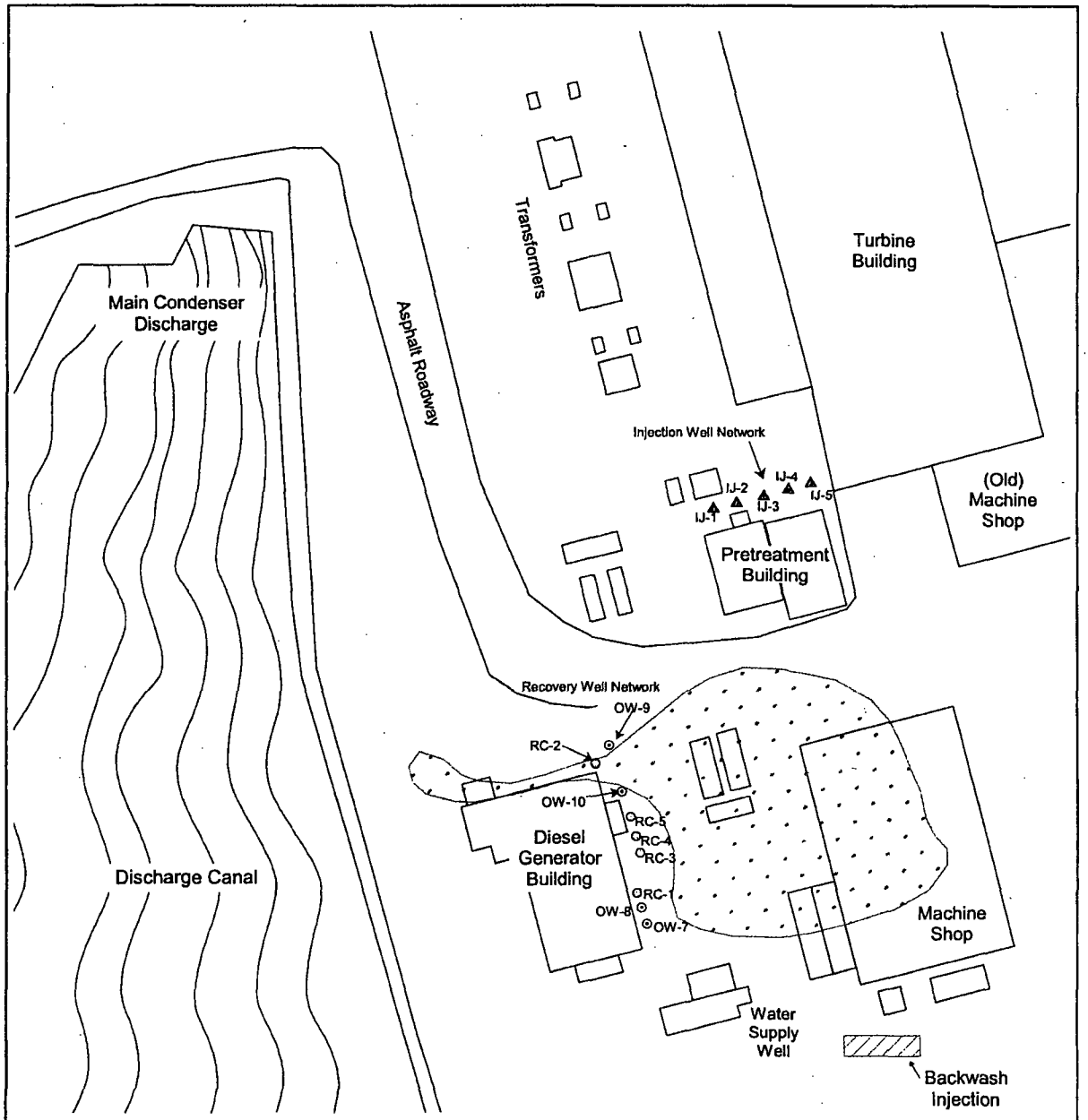
Measurable free-phase product was not detected in any of the onsite wells during the February 22, 2002 quarterly ground water elevation monitoring episode. Measurable free-phase product was detected in ground water monitoring wells OW-1, OW-3, OW-4, W-18, W-26, W-27, and W-31 during the April 9, 2002 water table elevation monitoring event. Figure 5 depicts the floating product isopleth map for the April 9, 2002 water table elevation monitoring event

Figure 6 depicts the locations of the ground water monitoring wells included in the semi-annual ground water sampling program. Some modification to the wells included in the sampling program occurred in response to NJDEP's August 21, 2000 correspondence. Specifically, in its letter, NJDEP required sampling from the contaminant plume area. Accordingly, during the May 2002 sampling event, a sample was obtained from well OW-5 and submitted for laboratory analysis. The laboratory analytical results of the May 2002 semi-annual groundwater sampling event are summarized in Table 4; contaminant concentrations exceeding NJDEP Ground Water Quality Standards (GWQS) are plotted on Figure 7. Decreases in Tetrachloroethene concentrations from the levels observed during the December 3, 2001 sampling event were observed in W-21, W-24, W-25, W-30, and W-34. Increases in the Tetrachloroethene concentrations from the levels observed during the December 3, 2001 sampling event were observed in W-3 and W-32, with W-7 remaining the same. Trichloroethene was observed in only W-34 and was a decrease in the concentration that was observed during the December 3, 2001 sampling event. Benzene concentrations decreased in W-30 and W-21 from those that were observed during the December 3, 2001 sampling event. The benzene concentrations in OW-5 and W-24 showed slight increases over those observed during the December 3, 2001 sampling event, but remained below the Ground Water Quality Standards.

Central to the remediation task was the continuous operation of a dewatering well network and package treatment plant. The 12-well dewatering system pumps ground water/product to the treatment plant which discharges to the local sanitary sewer. Startup of the plant in June 1994 was followed by full time operation in February 1995. Prior to the dewatering system operation, only one of the de-watering wells contained any fuel oil. Subsequent dewatering activities have drawn fuel oil into the dewatering wells, and have recovered 4,871 gallons of fuel oil.

For the period of January through June 2002, remediation activities resulted in the treatment of 46,555 gallons of water. Fuel oil recovery for the period totaled 63.9 gallons. A summary of water volume processed through the treatment system and quantity of fuel oil recovered is indicated in Figure 8.

FIGURES



Legend:

- recovery well
- Cape May monitor well - shallow (20')
- deep potable water supply well
- injection well
- location of fuel oil beneath soil surface
- backwash injection

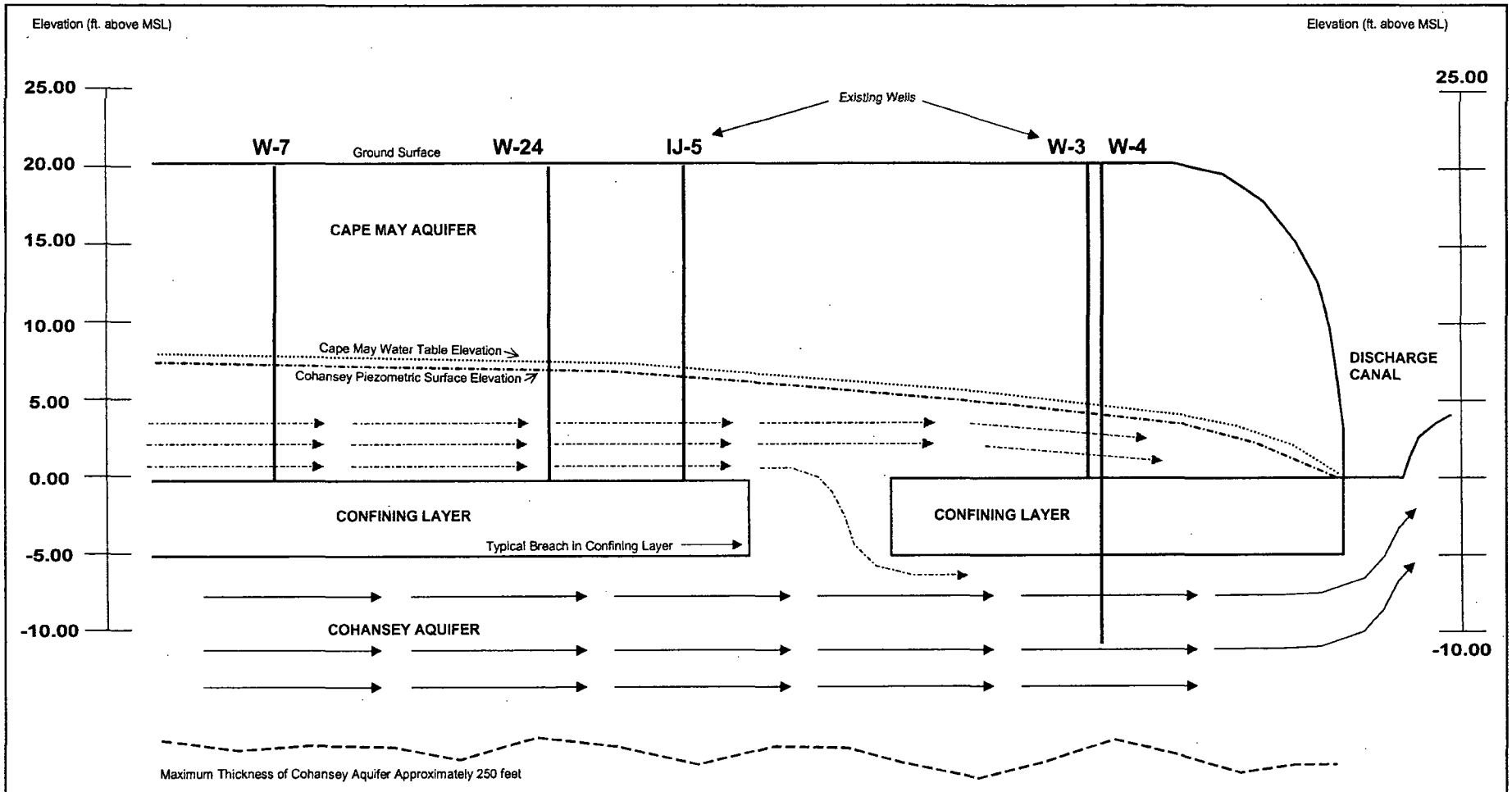
N W E S

50 0 50 Feet

FIGURE 1

GPU ENERGY

Location of Oyster Creek Nuclear Generating Station Injection and Fuel Oil Recovery Wells in Relation to the Fuel Oil Plume



0 100 200

Horizontal Scale: 1" = 100'
Vertical Scale: As Shown

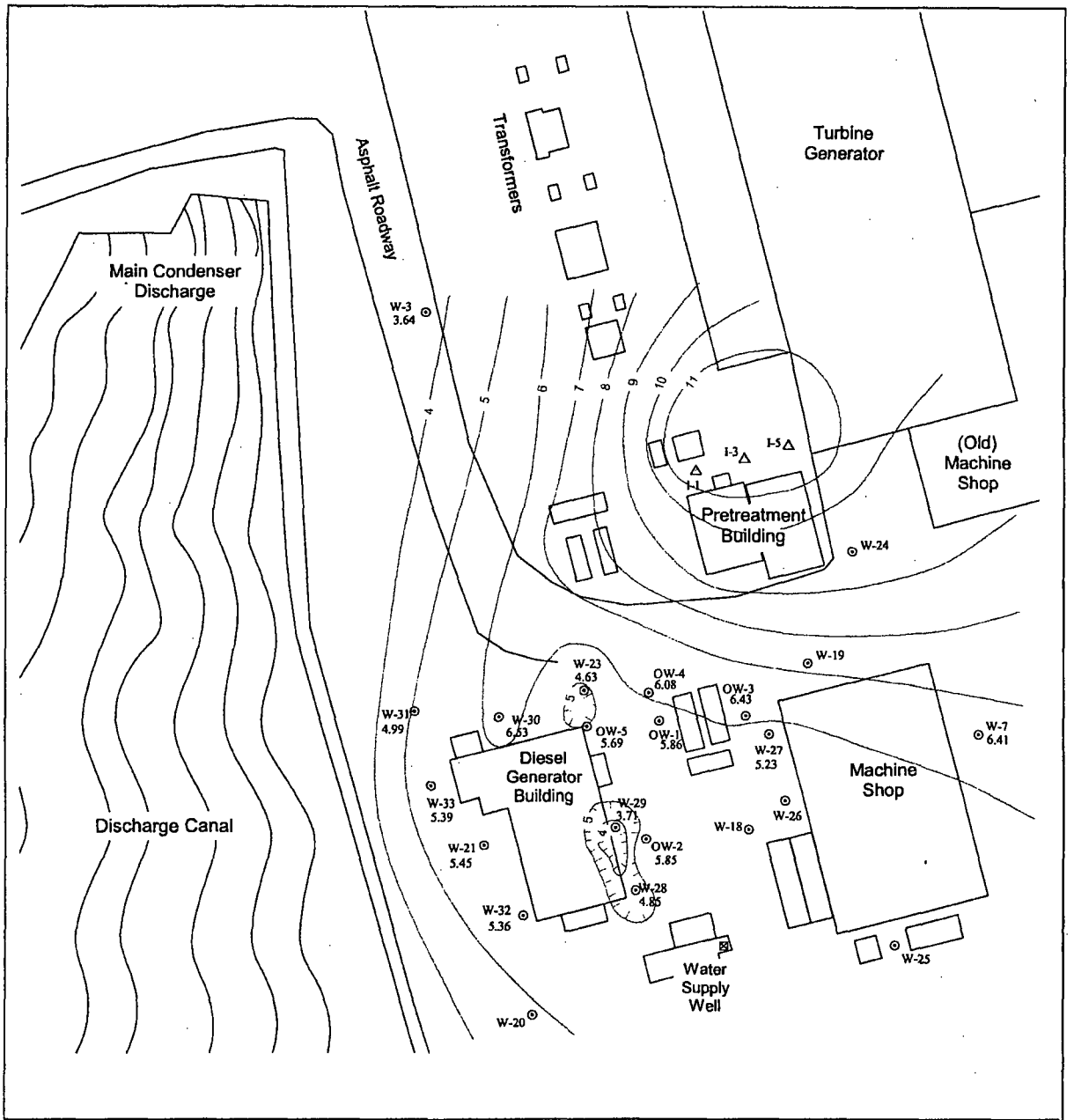
Source:
Woodward-Clyde Consultants (14 January 1991)

Figure 2

Schematic of Ground Water Flow In
The Cohansey and Cape May Aquifers
Oyster Creek Nuclear Generating Station
Forked River, New Jersey

NJDEP ISRA Case Number 99575

Jersey Central Power & Light Company,
A FirstEnergy Company



N
W E
S

Legend:

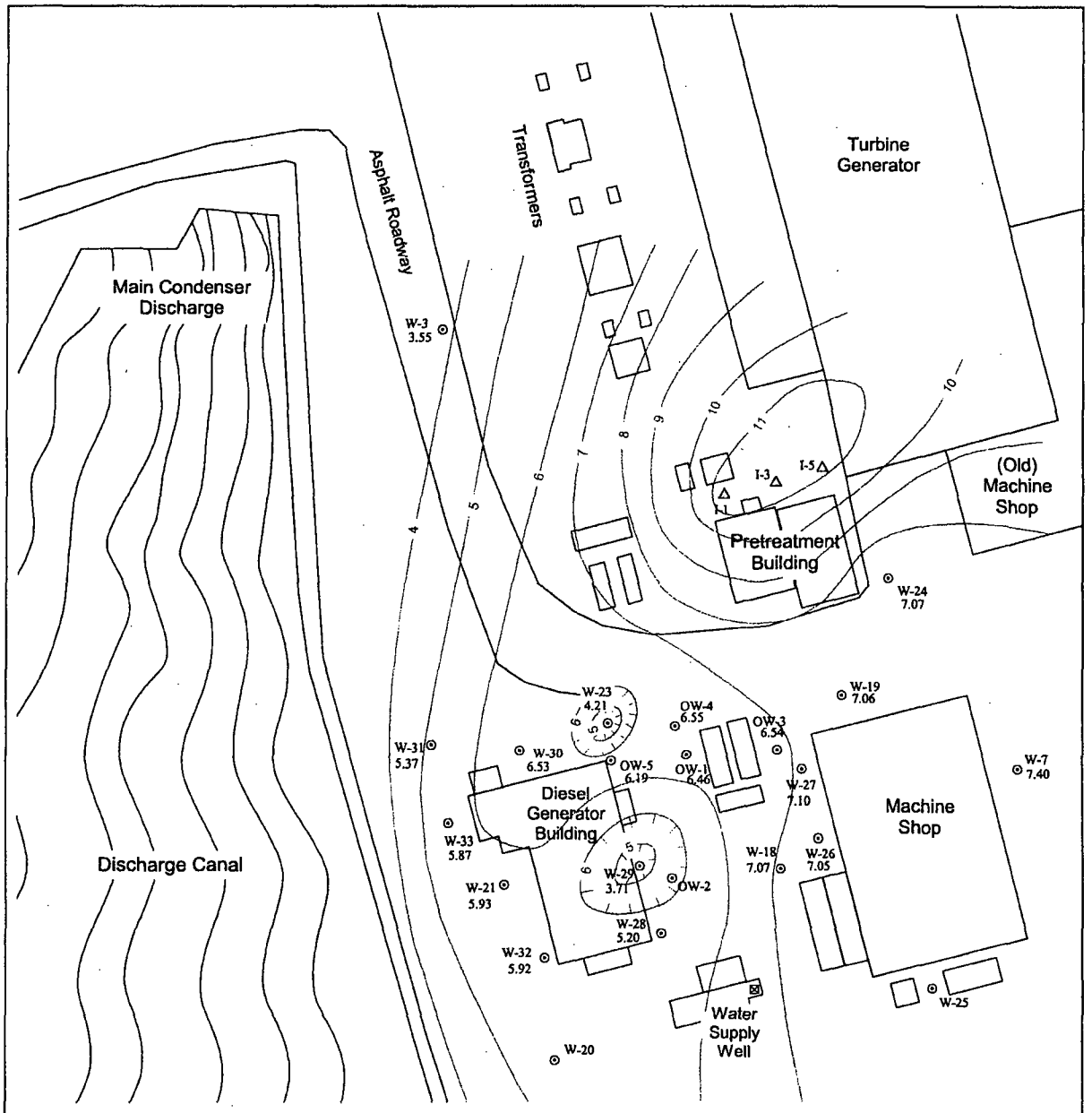
- ⊙ Cape May monitor well - shallow (20')
- ⊠ deep potable water supply well
- △ injection well
- ∿ water table surface (feet)

50 0 50 100 Feet

FIGURE 3

GPU ENERGY

Water Table Surface of the Cape May Formation (feet above mean sea level) February 22, 2002



Legend:

- ⊙ Cape May monitor well - shallow (20')
- ⊠ deep potable water supply well
- △ injection well
- ∿ water table surface (feet)

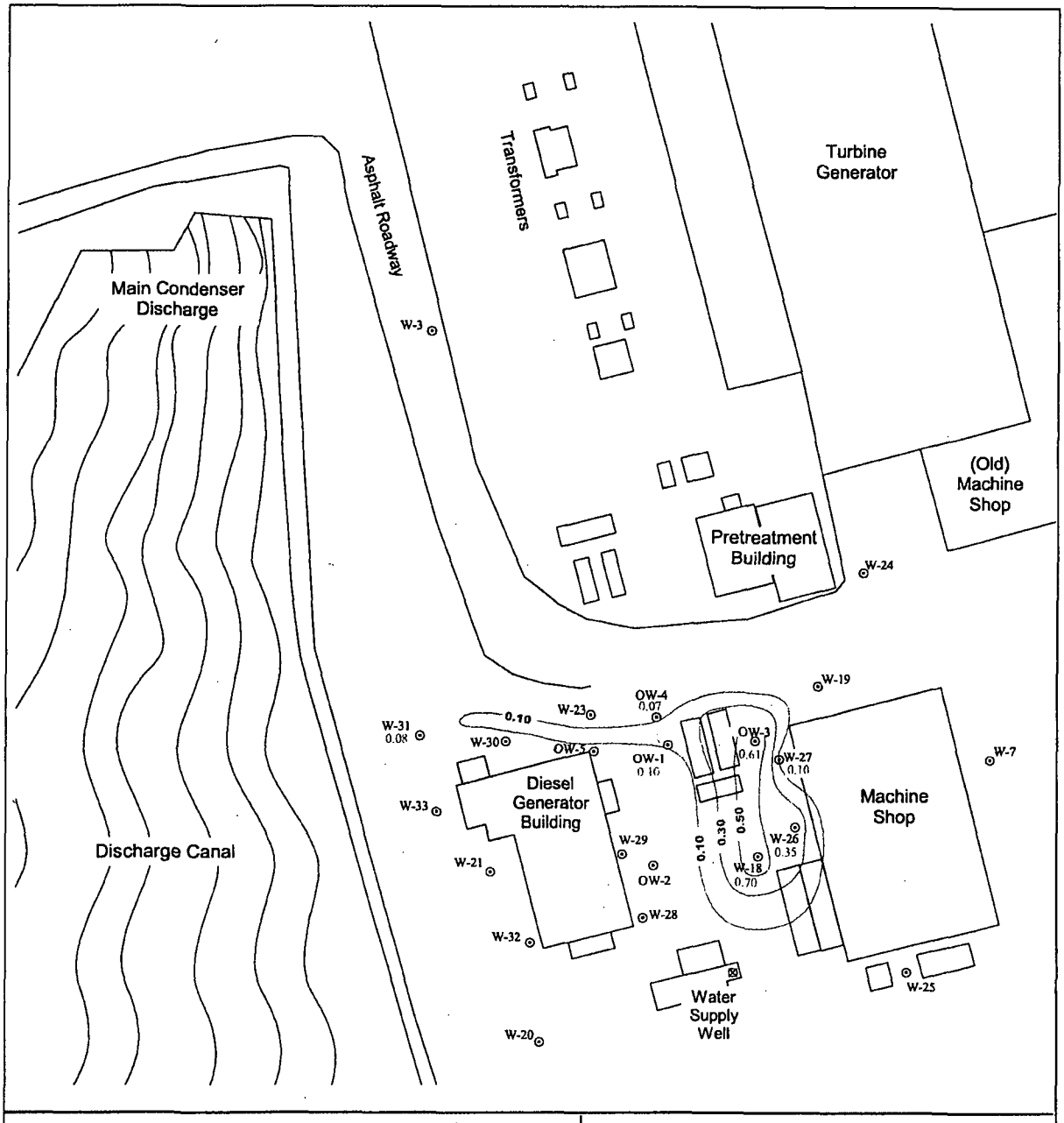
N W E S

50 0 50 100 Feet

FIGURE 4

GPU ENERGY

Water Table Surface of the Cape May Formation (feet above mean sea level) April 9, 2002



N
W
E
S

Legend:

- ⊙ Cape May monitor well - shallow (20')
- ⊠ deep potable water supply well
- ∿ floating product isopleth (feet)
- 0.10 product thickness (feet)

50 0 50 100 Feet

FIGURE 5

GPU ENERGY

Floating Product Isopleth Map

April 9, 2002

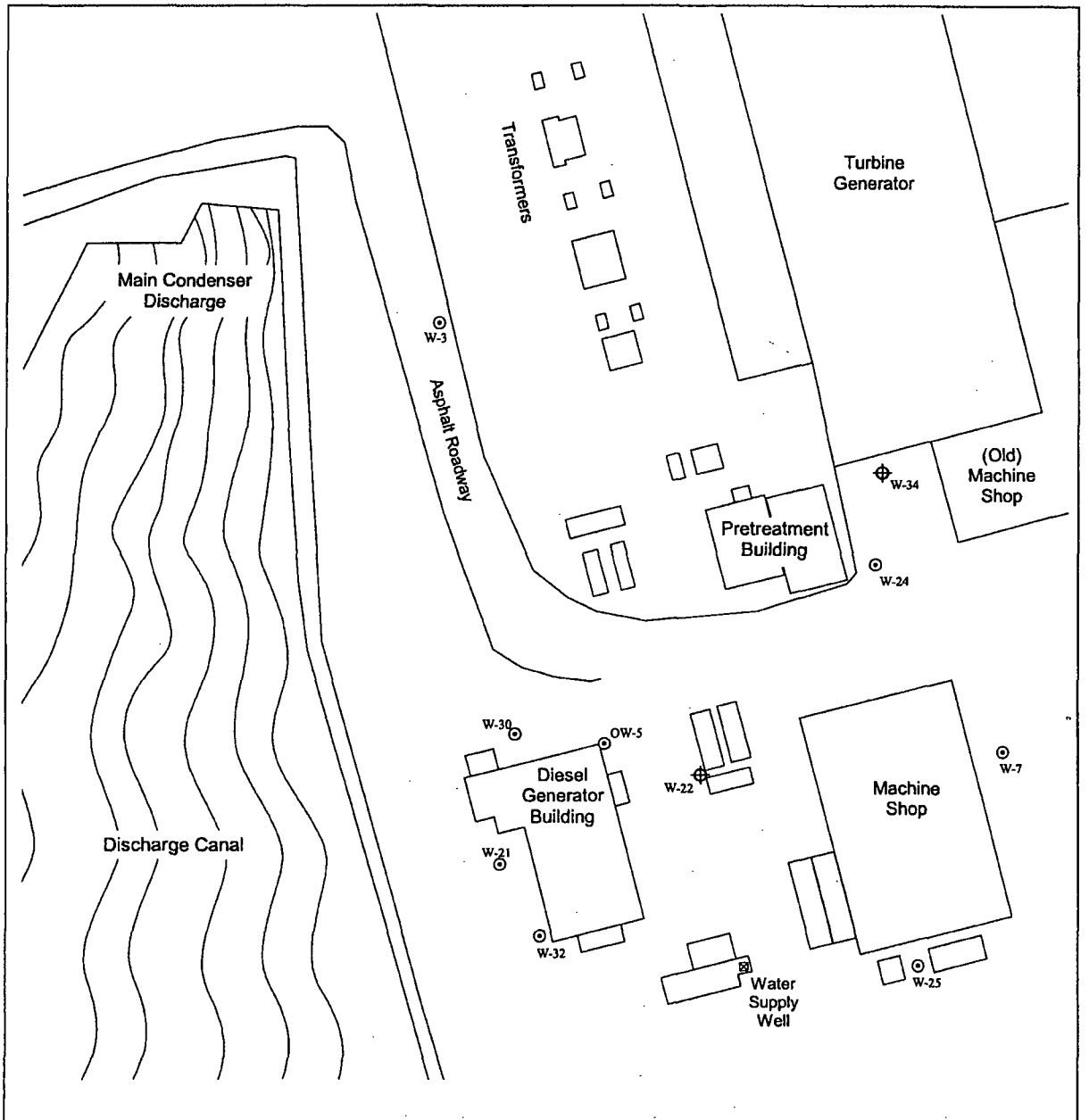
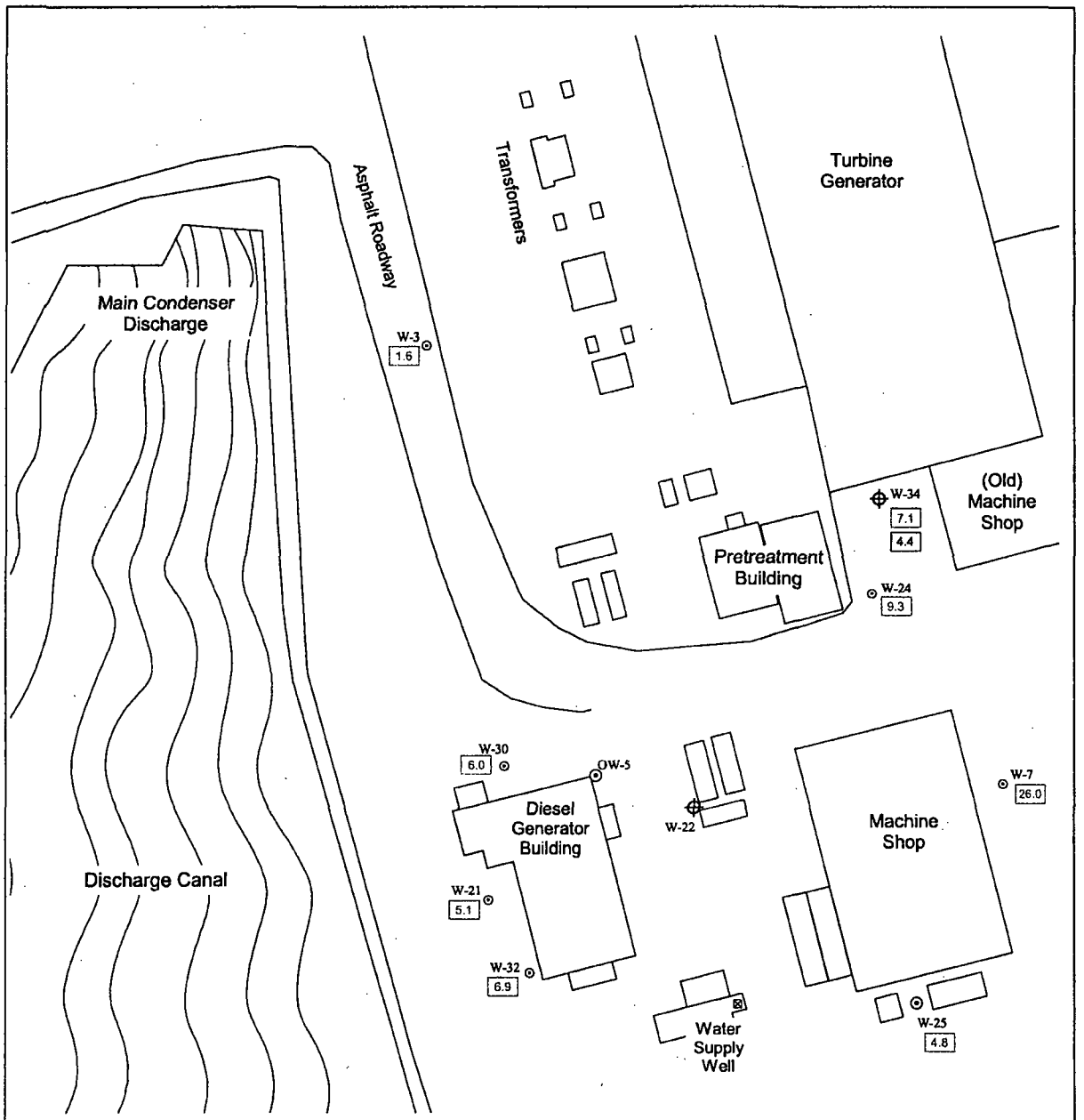


FIGURE 6

GPU ENERGY

Location of Monitoring Wells Used for Semi-Annual Groundwater Sampling and Chemical Analyses



Legend:

N
W
E
S

- ⊙ Cape May monitor well - shallow (20')
- ⊕ Cohansey monitor well - deep (50')
- ⊠ deep potable water supply well
- [3.2] Tetrachloroethene concentration (ug/L)
- [1.2] Trichloroethene concentration (ug/L)

50 0 50 100 Feet

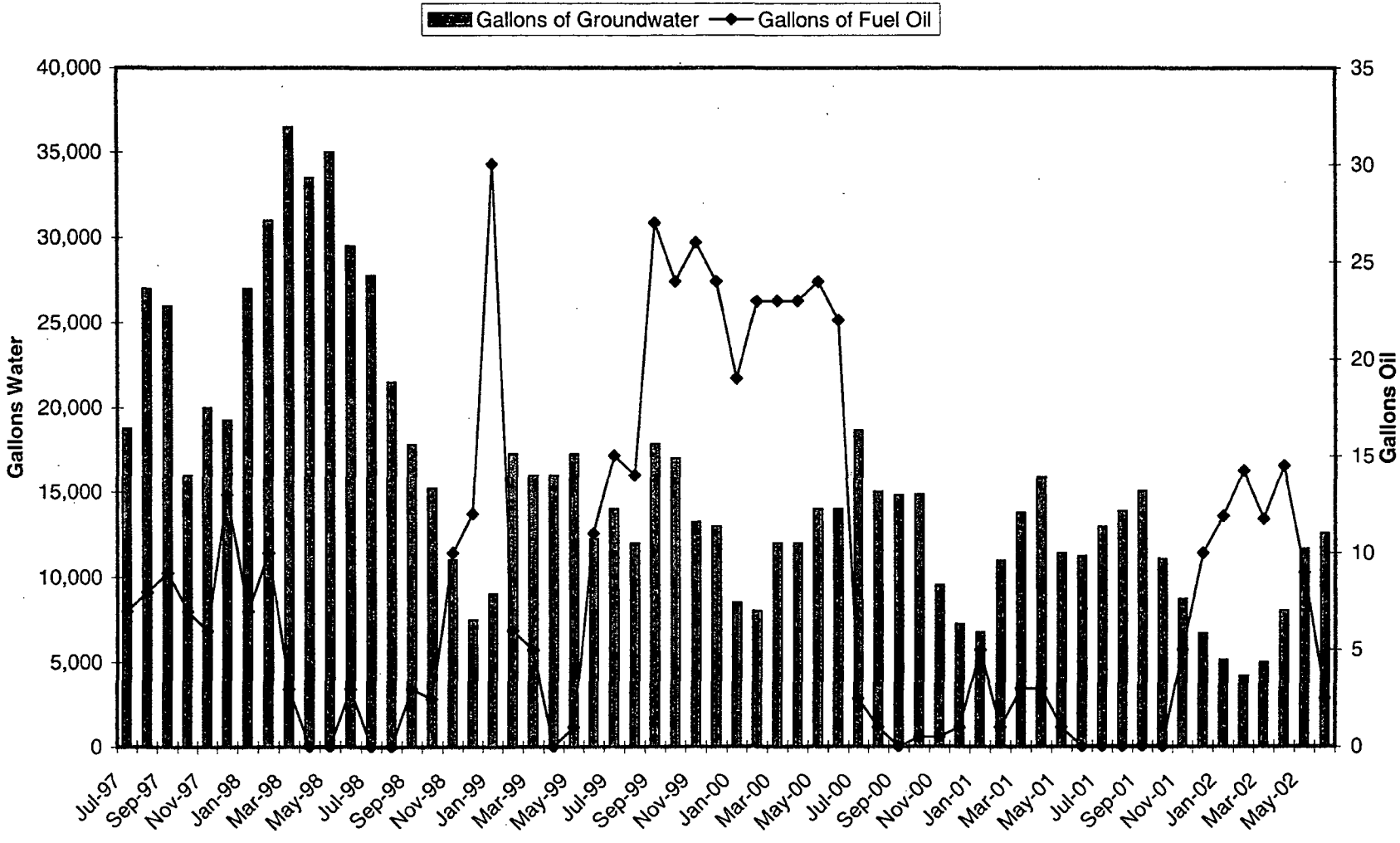
FIGURE 7

GPU ENERGY

Monitoring Well Semi-Annual Groundwater Sampling
Analytical Data above GWQS (ug/L)

May 9, 2002

Figure 8
Gallons of Water Treated and Oil Recovered



TABLES

TABLE 1							
OYSTER CREEK GENERATING STATION - QUARTERLY MONITOR WELL DATA REPORT AND INSPECTION LOG - FEBRUARY 22, 2002							
Well Number	Reference Elevation (feet)	Depth to Water (feet)	Water Elevation (feet)	Depth to Floating Product (feet)	Floating Product Elevation (feet) [a]	Product Thickness (inches)	Remarks
OW-1	23.21	17.35	5.86	---	---	---	---
OW-2	23.15	17.30	5.85	---	---	---	---
OW-3	22.88	16.45	6.43	---	---	---	---
OW-4	23.19	17.11	6.08	---	---	---	---
OW-5	22.90	17.21	5.69	---	---	---	---
W-2	22.72	19.30	3.42	---	---	---	---
W-3	20.55	16.91	3.64	---	---	---	---
W-4	20.55	17.10	3.45	---	---	---	---
W-7	23.36	16.95	6.41	---	---	---	---
W-18	23.43	---	---	---	---	---	Well inaccessible (equipment storage); no data
W-19	23.32	---	---	---	---	---	Well inaccessible (equipment storage); no data
W-20	23.24	---	---	---	---	---	Well inaccessible (buried under crushed stone); no data
W-21	23.76	18.31	5.45	---	---	---	---
W-22	23.39	---	---	---	---	---	Well inaccessible (equipment storage); no data
W-23	22.99	18.36	4.63	---	---	---	---
W-24	22.86	---	---	---	---	---	Well inaccessible (equipment storage); no data
W-25	23.39	18.25	5.14	---	---	---	---
W-26	23.11	---	---	---	---	---	Well inaccessible (equipment storage); no data
W-27	23.17	---	---	---	---	---	No measurable ground water in well; no data
W-28	23.20	18.35	4.85	---	---	---	---
W-29	23.22	19.51	3.71	---	---	---	---
W-30	24.40	18.20	6.20	---	---	---	---
W-31	23.94	18.95	4.99	---	---	---	---
W-32	23.50	18.14	5.36	---	---	---	---
W-33	24.23	18.84	5.39	---	---	---	---
W-34	23.13	19.21	3.92	---	---	---	---

[a] Water table elevation corrected for presence of floating product (diesel fuel) per following formula:

$$h_c = h + [\, t_{fp} * SG \,]$$

where:
h_c = corrected ground water elevation (feet)
h = measured ground water elevation (feet)
t_{fp} = free product thickness
SG = specific gravity of free product (0.84 g/cc assumed for diesel fuel)

TABLE 2							
OYSTER CREEK GENERATING STATION - QUARTERLY MONITOR WELL DATA REPORT AND INSPECTION LOG - APRIL 9, 2002							
Well Number	Reference Elevation (feet)	Depth to Water (feet)	Water Elevation (feet)	Depth to Floating Product (feet)	Floating Product Elevation (feet) [a]	Product Thickness (inches)	Remarks
OW-1	23.21	16.83	6.38	16.73	6.46	0.10	—
OW-2	23.15	—	—	—	—	—	Well inaccessible (buried under crushed stone); no data
OW-3	22.88	16.85	6.03	16.24	6.54	0.61	—
OW-4	23.19	16.70	6.49	16.63	6.55	0.07	—
OW-5	22.90	16.71	6.19	—	—	—	—
W-2	22.72	19.64	3.08	—	—	—	—
W-3	20.55	17.00	3.55	—	—	—	—
W-4	20.55	17.57	2.98	—	—	—	—
W-7	23.36	15.96	7.40	—	—	—	—
W-18	23.43	16.95	6.48	16.25	7.07	0.70	—
W-19	23.32	16.26	7.06	—	—	—	—
W-20	23.24	—	—	—	—	—	Well inaccessible (buried under crushed stone); no data
W-21	23.76	17.83	5.93	—	—	—	—
W-22	23.39	—	—	—	—	—	Well inaccessible (equipment storage); no data
W-23	22.99	18.78	4.21	—	—	—	—
W-24	22.86	15.79	7.07	—	—	—	—
W-25	23.39	15.64	7.75	—	—	—	—
W-26	23.11	16.35	6.76	16.00	7.05	0.35	—
W-27	23.17	16.15	7.02	16.05	7.10	0.10	—
W-28	23.20	18.00	5.20	—	—	—	—
W-29	23.22	—	—	—	—	—	No measurable ground water in well; no data
W-30	24.40	17.87	6.53	—	—	—	—
W-31	23.94	18.62	5.32	18.54	5.39	0.08	—
W-32	23.50	17.58	5.92	—	—	—	—
W-33	24.23	18.36	5.87	—	—	—	—
W-34	23.13	19.01	4.12	—	—	—	—

[a] Water table elevation corrected for presence of floating product (diesel fuel) per following formula:

$$h_c = h + [\, t_{fp} * SG \,]$$

where:
h_c = corrected ground water elevation (feet)
h = measured ground water elevation (feet)
t_{fp} = free product thickness
SG = specific gravity of free product (0.84 g/cc assumed for diesel fuel)

Table 3

Gallons of water delivered each month into the Cape May aquifer by backwash along the south edge and by injection along the north edge of the fuel oil plume at OCNGS from January 2002 through June 2002.

Month	Injected	Backwash	Total
January	8,598	6,500	15,098
February	7,766	6,500	14,266
March	16,704	6,500	23,204
April	8,083	6,500	14,583
May	22,209	6,500	28,709
June	24,858	6,500	31,358

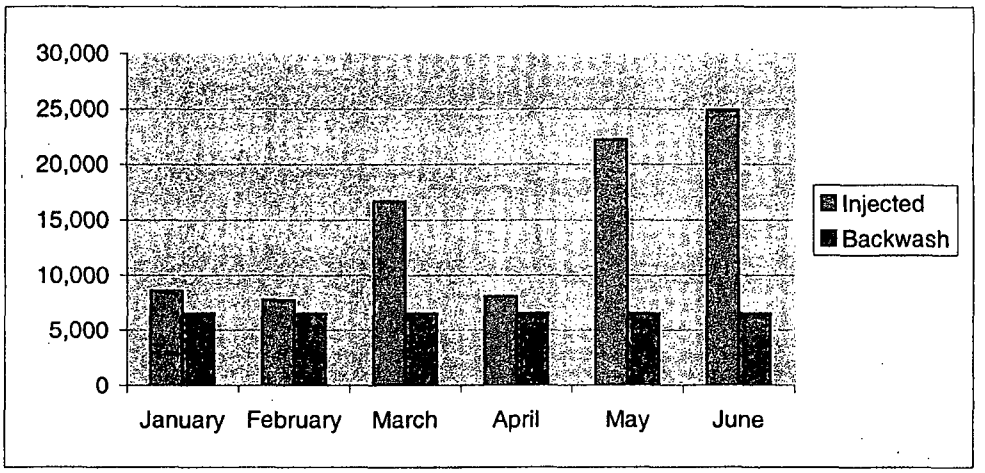


Table 4 Concentration (ppb) of the contaminants detected in monitoring wells at OCNGS during May 2002

Parameter	NJDEP GWQS [a]	OW-5	W-3	W-7 [f]	W-21	W-22	W-24	W-25	W-30	W-32	W-34
Volatile Organic Compounds											
1,1-Dichloroethane	50	< 0.3 [b]	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.4
cis-1,2-Dichloroethene	70	< 0.3	< 0.3	< 0.3	5.3	< 0.3	< 0.3	< 0.3	0.7	< 0.3	5.7
1,1,1-Trichloroethane	30	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.7	< 0.3	< 0.3	0.5	< 0.3
Trichloroethene	1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	4.4
Benzene	1	0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.6	< 0.3	0.5	< 0.3	< 0.3
Tetrachloroethene	1	0.3	1.6	26.0	5.1	< 0.2	9.3	4.8	6.0	6.9	7.1
Toluene	1,000	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Ethylbenzene	700	0.4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Xylenes	1,000	1.7	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
VOA TIC's [c]		222				8.2			124		
Semi-Volatile Organic Compounds											
Naphthalene	300	< 1.3	< 0.6	< 0.6	< 0.6	< 0.6	0.8	< 0.6	< 1.3	< 0.6	< 0.6
Acenaphthene	400	2.0	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 1.2	< 0.6	< 0.6
Diethylphthalate	5,000	< 0.9	< 0.4	< 0.4	< 0.4	< 0.4	< 0.5	< 0.4	< 0.9	< 0.4	< 0.4
Fluorene	300	1.4	< 0.6	< 0.6	< 0.6	< 0.6	< 0.7	< 0.6	< 1.2	< 0.6	< 0.6
Phenanthrene [e]	100	4.1	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	1.9	< 0.5	< 0.5
Anthracene	2,000	3.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.5	< 0.4	2.4	< 0.4	< 0.4
Di-n-butylphthalate	900	< 0.8	< 0.4	< 0.4	< 0.4	< 0.4	< 0.5	< 0.4	< 0.8	< 0.4	< 0.4
Fluoranthene	300	2.0	< 0.4	< 0.4	< 0.4	< 0.4	1.3	< 0.4	1.0	< 0.4	< 0.4
Pyrene	200	3.1	< 0.4	< 0.4	< 0.4	< 0.4	0.9	< 0.4	2.1	< 0.4	< 0.4
Butylbenzylphthalate	100	< 0.8	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.8	< 0.4	< 0.4
Benzo (a) anthracene [e]	5	< 0.8	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.8	< 0.4	< 0.4
Chrysene [e]	5	< 1.0	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 1.0	< 0.5	< 0.5
bis (2-Ethylhexyl) phthalate	30	16.0 B [d]	1.4 B	3.6 B	1.2 B	1.1 B	1.9 B	0.9 B	2.3 B	1.5 B	2.6 B
Di-n-octylphthalate	100	0.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3	< 0.1	< 0.1
Benzo (b) fluoranthene [e]	5	0.6	< 0.3	< 0.3	< 0.3	< 0.3	1.0	< 0.3	< 0.5	< 0.3	< 0.3
Benzo (k) fluoranthene [e]	5	< 1.6	< 0.8	< 0.8	< 0.8	< 0.8	< 0.9	< 0.8	< 1.6	< 0.8	< 0.8
Benzo (a) pyrene [e]	5	0.3	< 0.2	< 0.2	< 0.2	< 0.2	0.5	< 0.2	< 0.3	< 0.2	< 0.2
Indeno (1,2,3-cd) pyrene [e]	5	< 0.3	< 0.1	< 0.1	< 0.1	< 0.1	0.7	< 0.1	< 0.3	< 0.1	< 0.1
Dibenz (a,h) anthracene [e]	5	< 1.3	< 0.6	< 0.6	< 0.6	< 0.6	< 0.7	< 0.6	< 1.3	< 0.6	< 0.6
Benzo (g,h,I) perylene [e]	5	< 0.7	< 0.4	< 0.4	< 0.4	< 0.4	0.7	< 0.4	< 0.7	< 0.4	< 0.4
Semi VOA TIC's		1,483			8.3				3,862	9.5	

Notes:

[a] New Jersey Department of Environmental Protection Ground Water Quality Standards (GWQS; promulgated February 1993)

[b] Method detection limit listed for compounds listed as not detected (ND) in laboratory analytical data package

[c] *Tentatively Identified Compounds*

[d] Detected compounds with "B" qualifier indicates analyte was found in the laboratory blank as well as the sample, indicating possible laboratory contamination.

[e] Interim Generic Ground Water Quality Criteria for Synthetic Organic Compounds

[f] Well W-7 identified as MW-7 in analytical laboratory data package

Compounds detected at concentrations exceeding NJDEP GWQS shown in shaded cells 26.0

APPENDIX A

May 9, 2002 Semi-Annual Monitoring Well

Volatile and Semi-Volatile

Organic Analysis, QA/QC Report and

Electronic Deliverable Format