ORANGE AND ROCKLAND UTILITIES, INC.

LOVETT COAL ASH MANAGEMENT FACILITY

1989 ANNUAL GROUNDWATER MONITORING REPORT

May 24, 1990

Lawler, Matusky & Skelly Engineers
Environmental Science & Engineering Consultants
One Blue Hill Plaza, Pearl River, New York 10965

Project No: 169-288

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF FIGURES

CHAPTER 1.0
INTRODUCTION

1.1 BACKGROUND

Orange and Rockland Utilities, Inc. (ORU) operates a Coal Ash Management Facility (CAMF) at its Lovett Generating Station in Tomkins Cove, NY (Figure 1.1). The CAMF is used as a disposal site for coal ash produced during the generation of electricity at the Lovett Station. Associated with this operation is a detention basin (0.7 acre, 2.5 million gallons) used for the collection of surface runoff and leachate from the facility (Figure 1.2).

A Part 360 Permit was issued by the New York State Department of Environmental Conservation (NYSDEC) which requires ORU to monitor specific water quality parameters in the detention basin and in four groundwater monitoring wells. Table 1.1 outlines the historical monitoring program summary.

ORU initiated a pre-operational baseline monitoring program (Phase I assessment) on April 26, 1986. During the subsequent construction phase, and prior to the start-up of disposal operations in 1987, additional Phase I samples were collected. The pre-operational testing terminated and the post-operational monitoring commenced on September 15, 1987, when coal ash was first deposited on the landfill. Since the initiation of facility operations, quarterly and annual sampling programs have been conducted by an ORU consultant in 1987, and Lawler, Matusky & Skelly Engineers (LMS) (1988 and 1989).

This annual report covers the 1989 post-operational sampling program (Phase IV) conducted by LMS. Results of all historical and current (1989) water quality data from the detention basin and groundwater wells are reviewed. This report includes a discussion of the following topics:

- groundwater flow and water table elevation
- evaluation of trends in upgradient/downgradient parameter

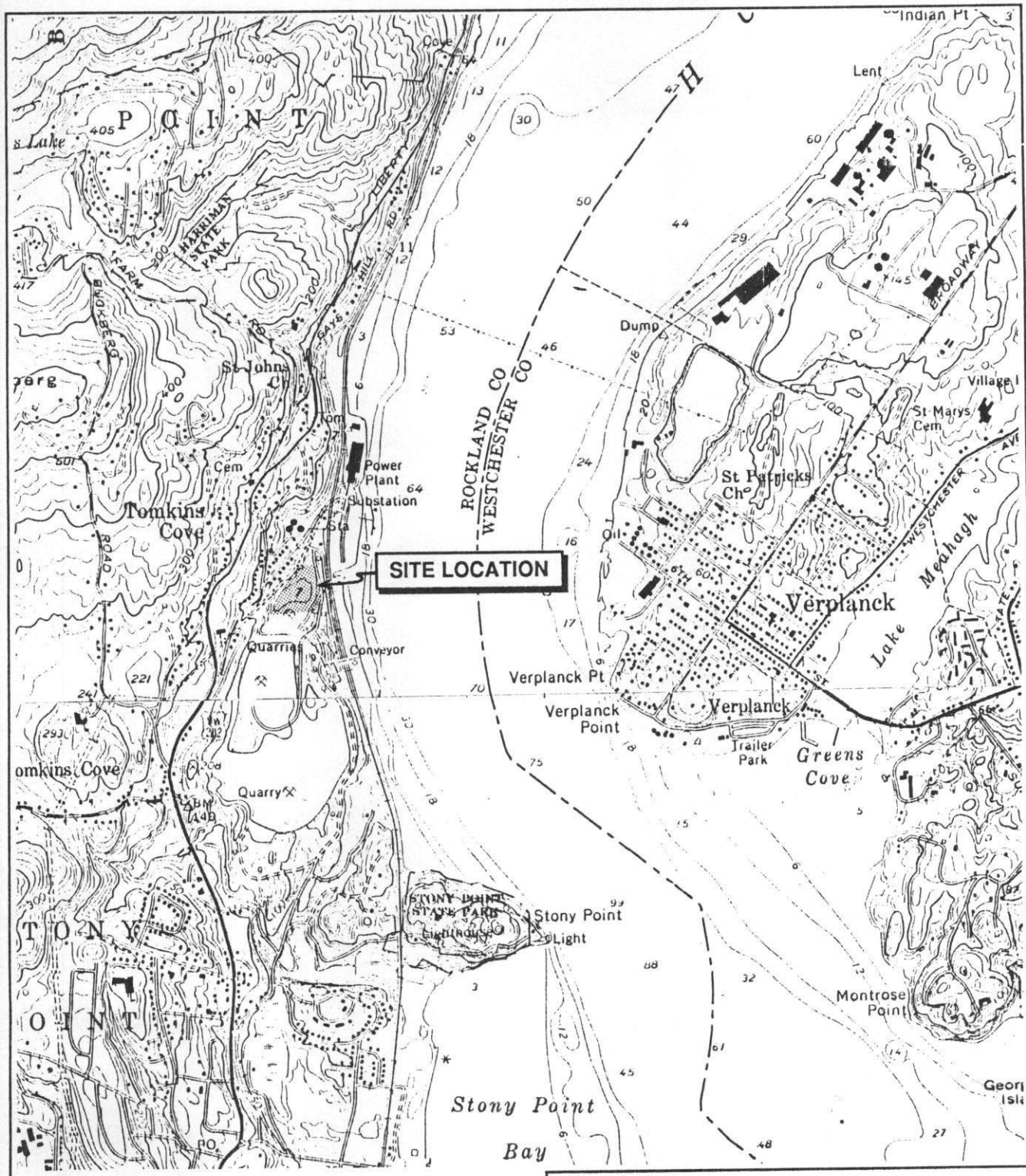


Figure 1.1
SITE LOCATION MAP

ORANGE & ROCKLAND UTILITIES, INC

LAWLER, MATUSKY & SKELLY ENGINEERS
One Blue Hill Plaza, Pearl River, New York 10965

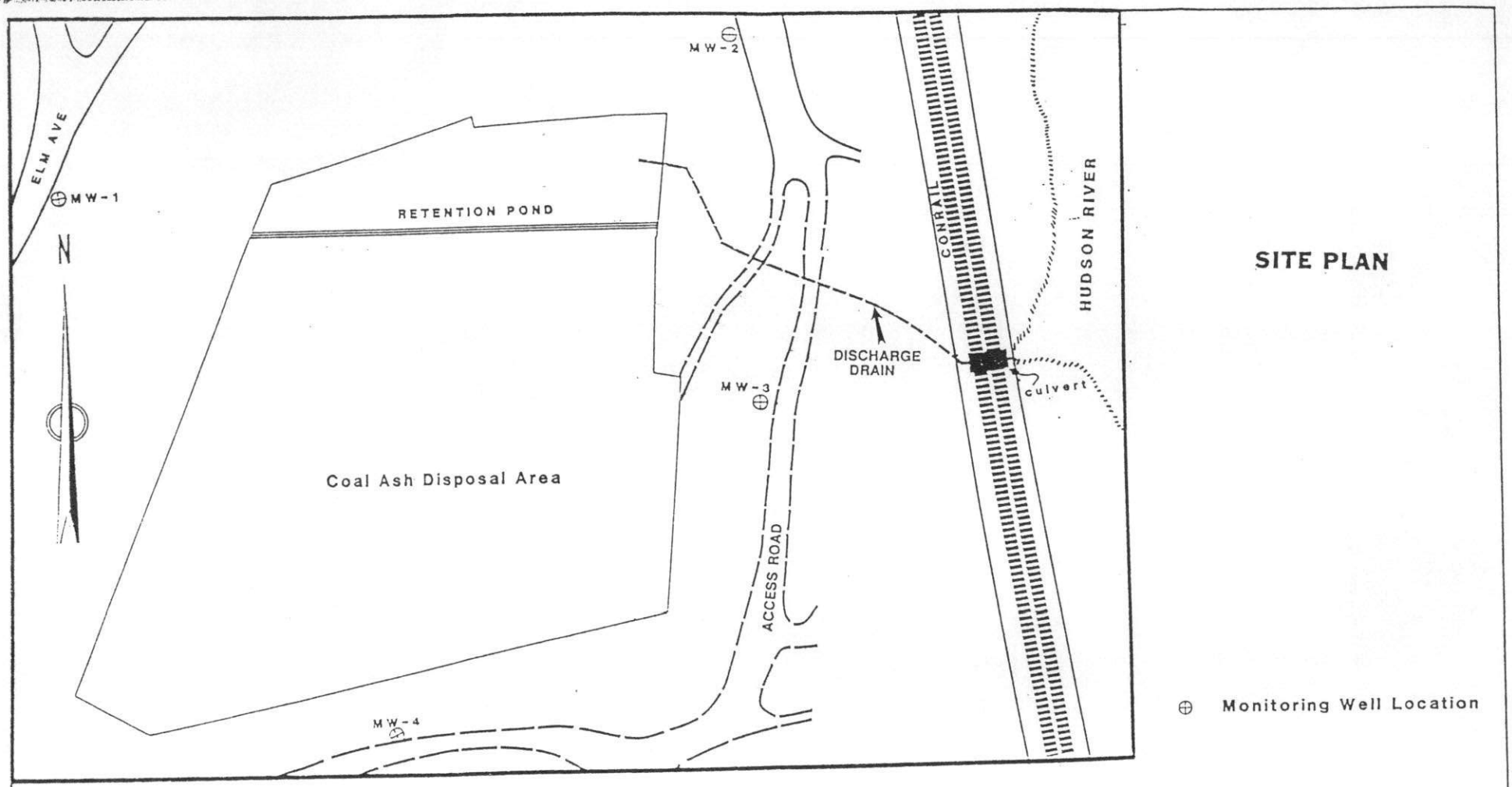


Figure 1.2

Orange & Rockland Utilities, Inc.

Coal Ash Management Facility

concentrations

- pre- and post-operational concentrations
- groundwater vs. detention basin concentrations
- evaluation of significant changes in groundwater quality
- facility compliance with applicable standards

1.2 SAMPLING AND ANALYSIS

As required by ORU's Part 360 permit, four groundwater monitoring wells were installed (MW-1: upgradient well; MW-2, MW-3, MW-4: downgradient wells) and used for pre-operational monitoring in 1986 and 1987 for water quality in the vicinity of the CAMF. In addition, the monitoring program required the collection of one grab sample at the CAMF detention basin during each groundwater survey.

Post-operational sampling was scheduled on a quarterly or annual basis during 1987, 1988 and 1989 according to the schedule outlined in Table 1.1, and the field protocols described in Appendices A and B. Analytical parameters and methodologies for both the annual and quarterly sampling programs are outlined in Tables 1.2 and 1.3.

TABLE 1.1

ORANGE AND ROCKLAND UTILITIES, INC.
COAL ASH MANAGEMENT FACILITY
1989 ANNUAL REPORT
DETENTION BASIN AND GROUNDWATER MONITORING PROGRAM
Historical Monitoring Program Summary

PROJECT PHASE	PROJECT DESCRIPTION	SAMPLING DATES
I	Pre-operational: Baseline Monitoring Program	4/29/86 7/28/86 10/27/86 1/9/87 4/15/87
	Pre-operational: Construction Monitoring Program	6/22/87 7/20/87
II	Post-operational: Annual Sampling Program	9/16/87
III	Post-operational: Quarterly Sampling Program	9/21/87 12/22/87
IV	Post-operational: Quarterly Sampling Program	3/30-31/88 6/13/88 12/27/88
	Post-operational: Annual Sampling Program	9/22/88
	Post-operational: Quarterly Sampling Program	3/13/89 6/23/89 12/18/89
	Post-operational: Annual Sampling Program	9/28/89

TABLE 1.2

ORANGE & ROCKLAND UTILITIES
LOVETT COAL ASH MANAGEMENT FACILITY ANNUAL REPORT
1989 DETENTION BASIN AND
GROUNDWATER MONITORING WELL PROGRAM
Parameters and Analytical Methodologies
for Annual Sample Analysis

PARAMETERS	*METHODOLOGY*
Metals[a]	
Aluminum	200.7
Arsenic	206
Barium	200.7
Boron	200.7
Cadmium	200.7
Chromium (T)	200.7
Chromium +6	218
Copper	200.7
Lead	200.7
Magnesium	200.7
Mercury	245
Potassium	200.7
Selenium	270
Sodium	200.7
Zinc	200.7
Inorganics[b]	
Ammonia (NH_3-N)	350
COD	350
Cyanide	335
Fluoride	340
Nitrate	335
Nitrogen (as TKN)	350
Phosphorus (T)	
Sulfate	375
Sulfide (H_2S)	376
Volatile Organics[c]	
Bromoform	601/602
Methyl Chloride	601/602
Chloroform	601/602
Carbon Tetrachloride	601/602
1,2 Dichloroethane	601/602
1,1 Dichloroethane	601/602
Trichloroethylene	601/602
1,1,1 Trichloroethane	601/602
Benzene	601/602
Toluene	601/602
Xylene	601/602

[a]Methods for Chemical Analysis of Water and Wastes, 1979. EPA 600/3-79-020 (Revised March 1983). USEPA, Cincinnati, Ohio 45268

[b]Standard Methods for the Examination of Water and Wastewater, 16th Ed., 1985, APHA, AWWA, WPCF.

[c]Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule. EPA 40CFR Part 136, USEPA, Cincinnati, Ohio 45268

TABLE 1.3

ORANGE & ROCKLAND UTILITIES
LOVETT COAL ASH MANAGEMENT FACILITY ANNUAL REPORT
1989 DETENTION BASIN AND
GROUNDWATER MONITORING WELL PROGRAM

Parameters and Analytical Methodologies
for Quarterly Sample Analysis

PARAMETERS	*METHODOLOGY*
Metals[a]	
Arsenic	206
Boron	200.7
Chromium +6	218
Iron	200.7
Lead	200.7
Manganese	200.7
Selenium	270
Inorganics[b]	
Alkalinity	310
Ammonia (NH_3-N)	350
Chloride	325
Hardness (T)	130
Nitrate	353
Sulfate	375
Sulfide (as H_2S)	376
Sulphur (T, as S)	200.7
TDS	160.1
TVS	160.4
TOC	

[a]Methods for Chemical Analysis of Water and Wastes, 1979. EPA 600/3-79-020 (Revised March 1983). USEPA, Cincinnati, Ohio 45268

[b]Standard Methods for the Examination of Water and Wastewater, 16th Ed., 1985, APHA, AWWA, WPCF.

[c]Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule. EPA 40CFR Part 136, USEPA, Cincinnati, Ohio 45268

CHAPTER 2.0
RESULTS

The 1989 Phase IV post-operational and historical groundwater quality data collected at the ORU CAMF groundwater monitoring wells and detention basin are summarized in several tables that follow.

2.1 *GROUNDWATER FLOW AND WATER TABLE ELEVATIONS*

Water table elevation data are presented, by survey date, in Figures 2.1 through 2.4 and Tables 2.1 through 2.4. Point of reference during the 1989 survey was from the top of the PVC casing at each of the four monitoring wells.

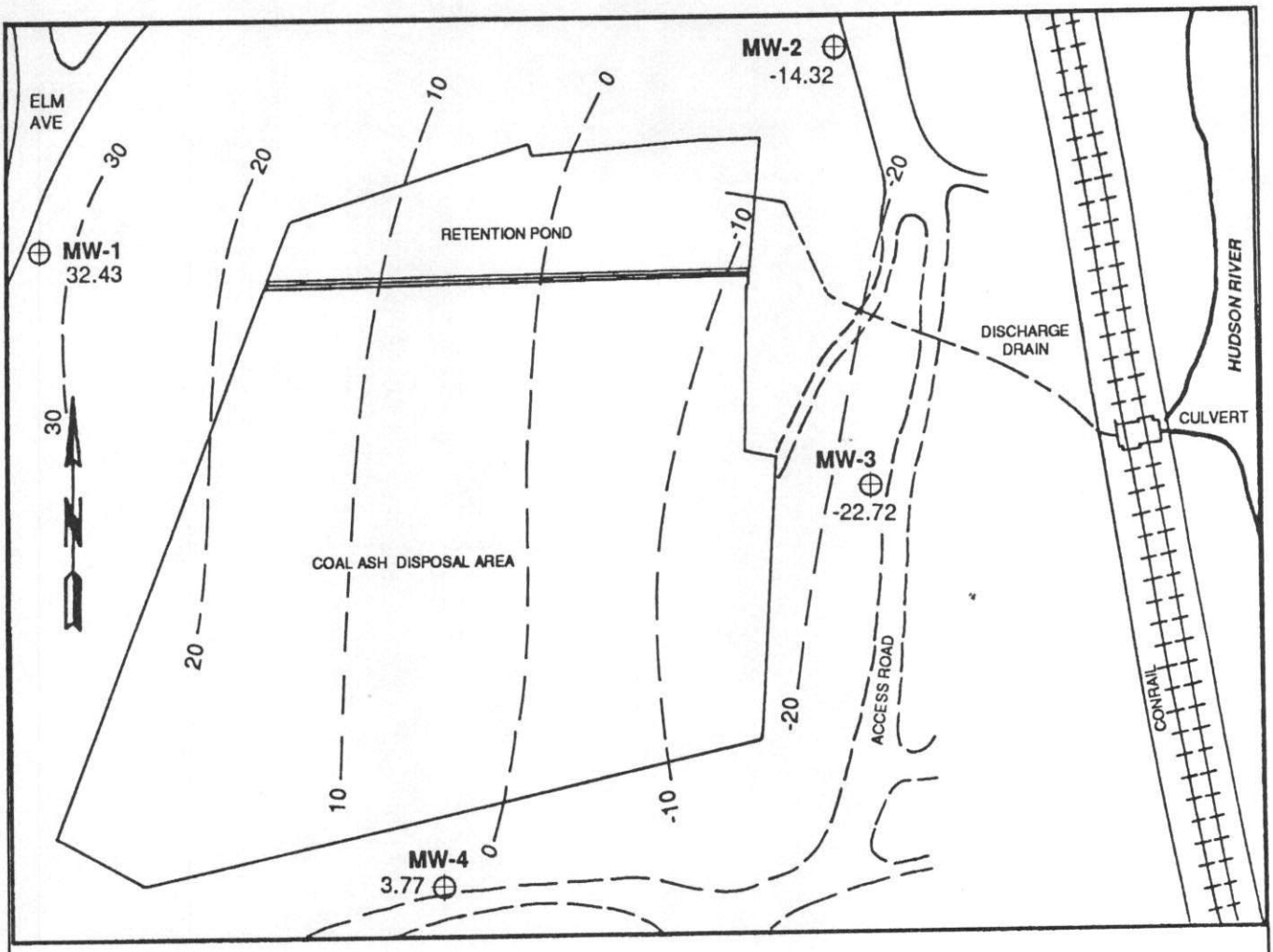
2.2 *ANALYTICAL RESULTS - QUARTERLY/ANNUAL SURVEYS - MW-1 THROUGH MW-4*

Tables 2.1 through 2.4 summarize the 1989 Phase IV post-operational well data collected by LMS during three quarterly and one annual survey. These analytical results are compared to Phase I baseline results and New York State Groundwater Standards (NYSGW) for Class GA waters (6NYCRR703.5).

Overall groundwater quality during 1989 in the project area has remained consistent with previous sampling phases, including the Phase I baseline survey. Generally, most metals and inorganic compounds were reported at levels near or below the method detection limit (MDL).

2.2.1 *Metals*

- *Aluminum* - Aluminum was sampled only during the annual sampling program. Analytical results remained consistent with the levels measured in 1988 and were below the concentrations monitored during the Phase I baseline survey.



LEGEND

Groundwater contour
(Contour interval 10 ft)

⊕ Monitoring well location

36.15 Groundwater elevation, in feet

0 = mean sea level

0 90 180 ft

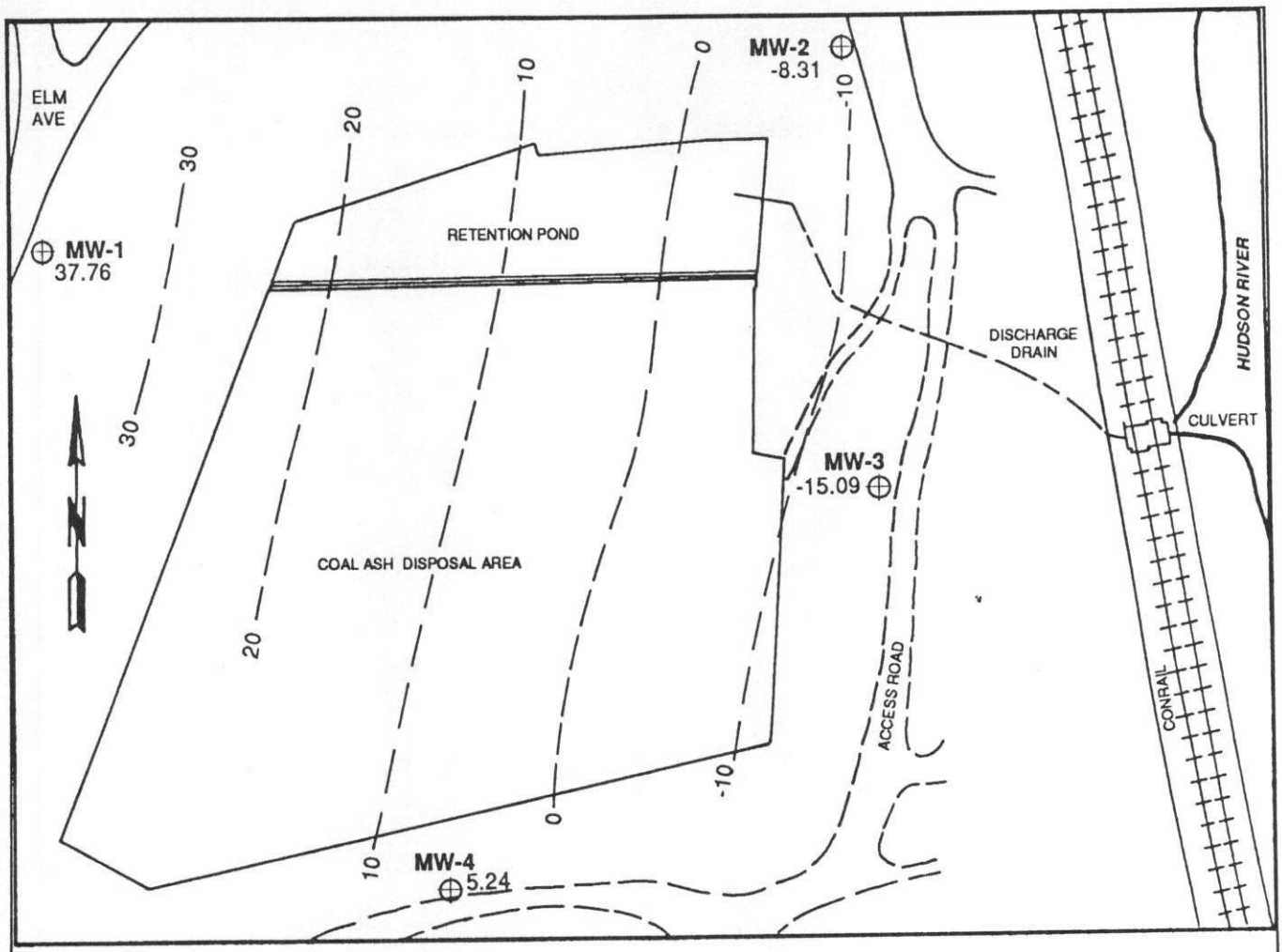
SCALE

Figure 2.1

GROUNDWATER CONTOUR MAP, 13 MARCH 1989

ORANGE & ROCKLAND UTILITIES, INC

LAWLER, MATUSKY & SKELLY ENGINEERS
One Blue Hill Plaza, Pearl River, New York 10965



LEGEND

Groundwater contour (Contour interval 10 ft)

⊕ Monitoring well location

36.15 Groundwater elevation, in feet

0 = mean sea level

0 90 180 ft

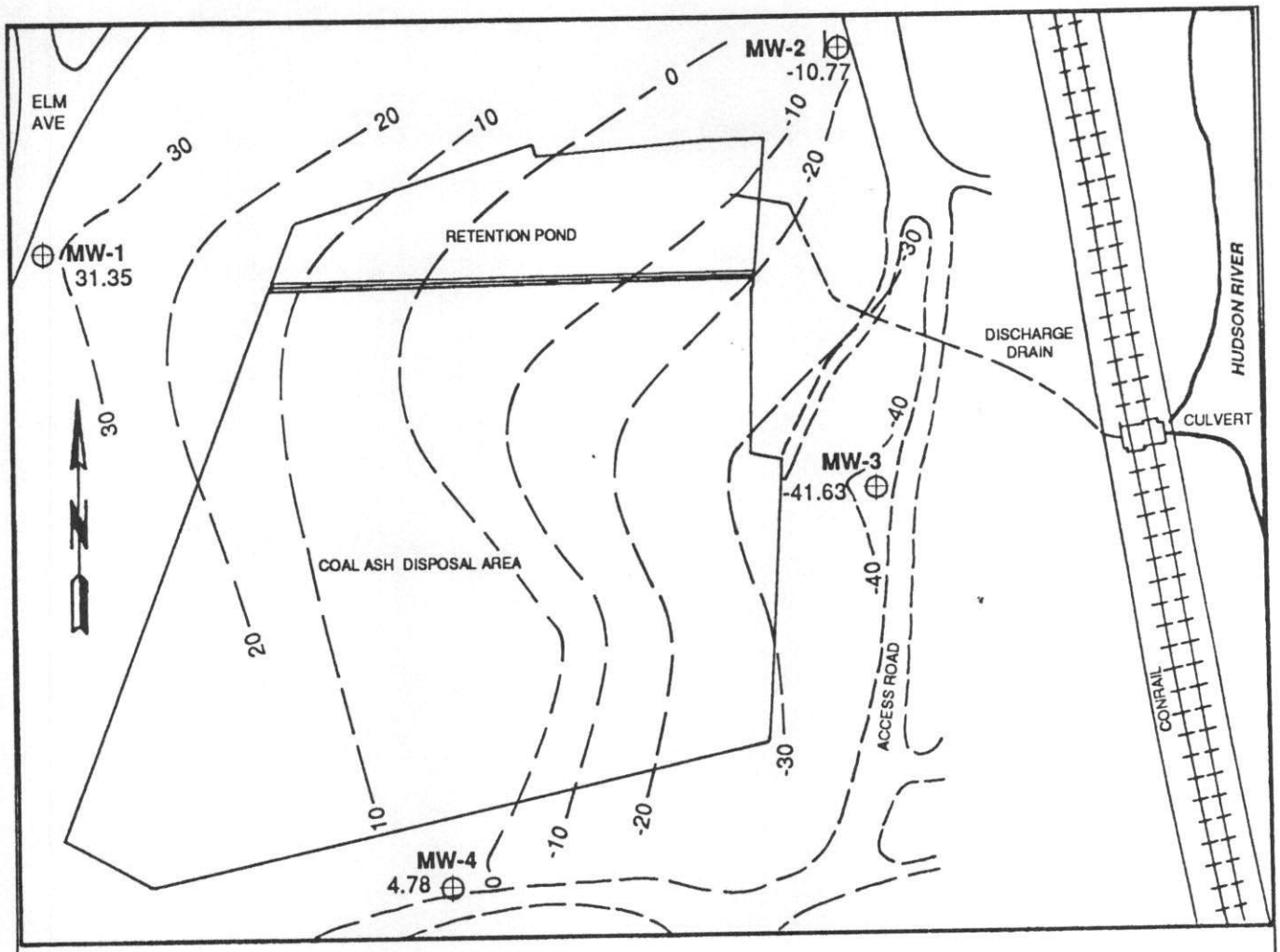
SCALE

Figure 2.2

GROUNDWATER CONTOUR MAP, 23 JUNE 1989

ORANGE & ROCKLAND UTILITIES, INC

LAWLER, MATUSKY & SKELLY ENGINEERS
One Blue Hill Plaza, Pearl River, New York 10965



LEGEND

Groundwater contour
(Contour interval 10 ft)

⊕ Monitoring well location

36.15 Groundwater elevation, in feet

0 = mean sea level

0 90 180 ft

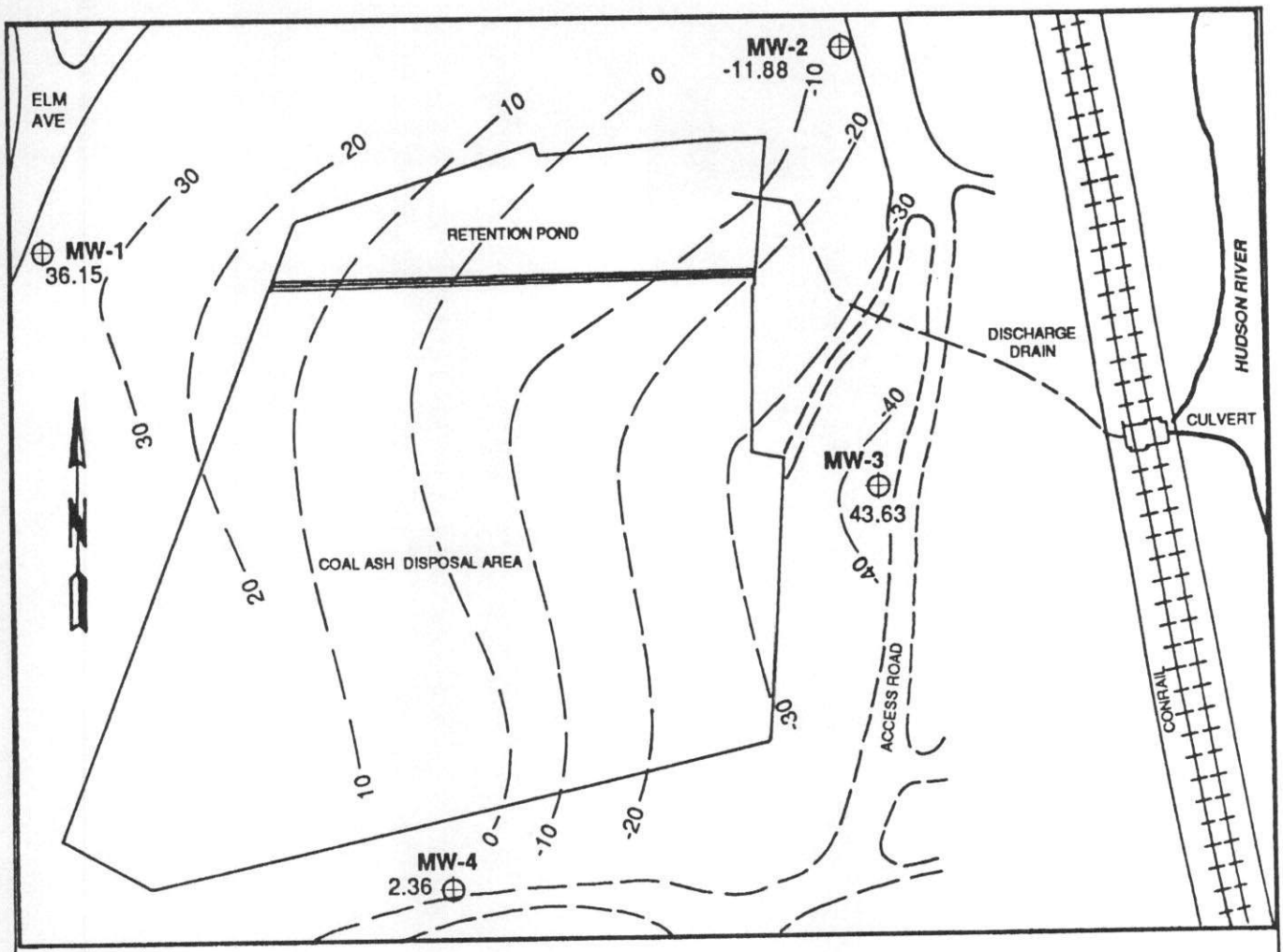
SCALE

Figure 2.3

GROUNDWATER CONTOUR MAP, 28 SEPTEMBER 1989

ORANGE & ROCKLAND UTILITIES, INC

LAWLER, MATUSKY & SKELLY ENGINEERS
One Blue Hill Plaza, Pearl River, New York 10965



LEGEND

Groundwater contour
(Contour interval 10 ft)

⊕ Monitoring well location

36.15 Groundwater elevation, in feet

0 = mean sea level

0 90 180 ft

SCALE

Figure 2.4

GROUNDWATER CONTOUR MAP, 18 DECEMBER 1989

ORANGE & ROCKLAND UTILITIES, INC

LAWLER, MATUSKY & SKELLY ENGINEERS
One Blue Hill Plaza, Pearl River, New York 10965

TABLE 2.1
ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY 1989 ANNUAL REPORT
LABORATORY ANALYTICAL RESULTS - MONITORING WELL 1 UPGRADIENT

PARAMETERS	UNITS	HIGHEST BASELINE (PHASE 1) CONC.	QUARTERLY 3/13/89	QUARTERLY 6/23/89	ANNUAL 9/28/89	QUARTERLY 12/18/89	NYSGW STD. CLASS GA
Water Table Elevation	Feet		32.43	37.76	31.35	36.15	
METALS							
Aluminum	mg/L	1.5	NA	NA	0.03	NA	
Arsenic	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	25
Barium	mg/L	<0.2	NA	NA	0.05	NA	1
Boron	mg/L	0.38	1.6	<0.005	0.54	<0.1	
Cadmium	mg/L	0.008	NA	NA	<0.002	NA	0.01
Chromium	mg/L	<0.05	NA	NA	<0.01	NA	
Chromium +6	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Copper	mg/L	0.09	NA	NA	0.01	NA	1
Iron	mg/L	0.75	0.30	0.22	NA	0.11	0.3
Lead	mg/L	0.07	<0.005	0.007	<0.005	<0.005	0.025
Magnesium	mg/L		NA	NA	3.8	NA	
Manganese	mg/L	0.02	0.03	0.03	NA	0.02	0.3
Mercury	ug/L	0.6	NA	NA	<0.4	NA	2.0
Potassium	mg/L	16	NA	NA	3.4	NA	
Selenium	ug/L	<2.0	<5.0	<5.0	<5.0	<5.0	20
Sodium	mg/L	25	NA	NA	21	NA	
Zinc	mg/L	<0.05	NA	NA	0.05	NA	5
INORGANICS							
Alkalinity	mg/L	85	100	110	NA	110	
Ammonia	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	
Chloride	mg/L		14	12	NA	16	250
COD	mg/L	9.4	NA	NA	17	NA	
Cyanide	mg/L	<0.01	NA	NA	<0.005	NA	0.2
Fluoride	mg/L	4.1	NA	NA	2.8	NA	1.5
Hardness	mg/L	69	110	98	NA	110	
Nitrate, Total Kjeldahl	mg/L	0.58	0.6	0.41	0.37	0.41	10
Nitrogen	mg/L	1.7	NA	NA	<0.5	NA	
Phosphorus	mg/L		NA	NA	<0.2	NA	
Sulfate	mg/L	26	21	22	22	22	250
Sulfide	mg/L		<0.05	<0.05	<0.05	<0.05	
Sulfur	mg/L		7.0	7.3	NA	7.3	
TDS	mg/L	190	190	150	NA	150	
TVS	mg/L	60	40	110	NA	72	
TOC	mg/L	9.2	9.2	6.1	NA	2.3	
FIELD CHEMISTRIES							
pH	Std. Units	8.8	7.2	8.0	8.0	7.8	
Spec. Conductance	(umhos/cm)	200	335	300	277	315	
Temperature	Deg. C	14	9.5	12.8	11.4	9.9	
Pre Purge Sample DO	mg/L		5.6	4.1	6.4	3.9	
pH	Std. Units	8.8	7.7	8.1	7.7	7.8	
Spec. Conductance	(umhos/cm)		389	210	227	220	
Temperature	Deg. C		9.7	11.2	112	10.5	
Post Purge Sample DO	mg/L		3.3	1.9	2.1	4.3	

Analyzed by EnviroTest Laboratories
NA - Analysis not required during this survey

TABLE 2.2
ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY 1989 ANNUAL REPORT
LABORATORY ANALYTICAL RESULTS - MONITORING WELL 2 DOWNGRADIENT

PARAMETERS	UNITS	HIGHEST BASELINE (PHASE 1) CONC.	QUARTERLY 3/13/89	QUARTERLY 6/23/89	ANNUAL 9/28/89	QUARTERLY 12/18/89	NYSGW STD. CLASS GA
Water Table Elevation	Feet		-14.32	-8.310	-10.77	-11.88	
METALS							
Aluminum	mg/L	3.2	NA	NA	0.06	NA	
Arsenic	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	25
Barium	mg/L	<0.2	NA	NA	<0.05	NA	1
Boron	mg/L	0.4	0.98	<0.005	0.14	<0.1	
Cadmium	mg/L	<0.01	NA	NA	<0.002	NA	0.01
Chromium	mg/L	<0.05	NA	NA	<0.01	NA	
Chromium +6	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Copper	mg/L	<0.05	NA	NA	0.01	NA	1
Iron	mg/L	0.41	0.41	0.10	NA	0.15	0.3
Lead	mg/L	0.1	<0.005	<0.005	<0.005	<0.005	0.025
Magnesium	mg/L		NA	NA	93	NA	
Manganese	mg/L	0.02	0.01	0.02	NA	<0.01	0.3
Mercury	ug/L	1.1	NA	NA	<0.4	NA	2.0
Potassium	mg/L	10	NA	NA	2.4	NA	
Selenium	ug/L	<2.0	<5.0	<5.0	<5.0	<5.0	20
Sodium	mg/L	29	NA	NA	24	NA	
Zinc	mg/L	0.06	NA	NA	0.04	NA	5
INORGANICS							
Alkalinity	mg/L	230	240	240	NA	260	
Ammonia	mg/L	<0.5	<0.2	<0.2	<0.2	<0.2	
Chloride	mg/L		110	81	NA	110	250
COD	mg/L	14	NA	NA	4.5	NA	
Cyanide	mg/L	<0.01	NA	NA	0.005	NA	0.2
Fluoride	mg/L	<0.3	NA	NA	<0.2	NA	1.5
Hardness	mg/L	1310	1100	1200	NA	1200	
Nitrate	mg/L	8.9	3.7	4.2	5.3	4.4	10
Nitrogen, Total Kjeldahl	mg/L	1.7	NA	NA	<0.5	NA	
Phosphorus	mg/L		NA	NA	<0.2	NA	
Sulfate	mg/L	930	650	710	680	680	250
Sulfide	mg/L		<0.05	<0.05	<0.05	<0.05	
Sulfur	mg/L		220	240	NA	230	
TDS	mg/L	1800	1500	1400	NA	1400	
TVS	mg/L	570	360	380	NA	400	
TOC	mg/L	11	0.6	1.4	NA	1.4	
FIELD CHEMISTRIES							
pH	Std. Units	7.7	7.0	7.1	7.3	6.6	
Spec. Conductance	(umhos/cm)	2100	1864	1727	1723	1545	
Temperature	Deg. C	16	10.7	15.3	13.9	11.2	
Pre Purge Sample DO	mg/L		8.0	5.6	5.3	5.0	
pH	Std. Units		6.9	7.0	7.2/7.1	7.2	
Spec. Conductance	(umhos/cm)		1920	1590	1564	1490	
Temperature	Deg. C		12.9	14.2	14.2/14.2	12.1	
Post Purge Sample DO	mg/L		4.8	4.4	6.1	5.9	

Analyzed by EnviroTest Laboratories
NA - Analysis not required during this survey

TABLE 2.3
ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY 1989 ANNUAL REPORT
LABORATORY ANALYTICAL RESULTS - MONITORING WELL 3 DOWNGRADIENT

PARAMETERS	UNITS	HIGHEST BASELINE (PHASE 1) CONC.	QUARTERLY 3/13/89	QUARTERLY 6/23/89	ANNUAL 9/28/89	QUARTERLY 12/18/89	NYSGW STD. CLASS GA
Water Table Elevation	Feet		-22.72	-15.09	-41.63	-43.63	
METALS							
Aluminum	mg/L	1.8	NA	NA	0.05	NA	
Arsenic	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	25
Barium	mg/L	<0.2	NA	NA	<0.05	NA	1
Boron	mg/L	0.36	0.69	<0.005	0.08	<0.1	
Cadmium	mg/L	<0.01	NA	NA	<0.002	NA	0.01
Chromium	mg/L	<0.05	NA	NA	<0.01	NA	
Chromium +6	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Copper	mg/L	0.4	NA	NA	0.01	NA	1
Iron	mg/L	1.0	0.30	0.32	NA	0.46	0.3
Lead	mg/L	0.08	<0.008	0.21	<0.005	0.076	0.025
Magnesium	mg/L		NA	NA	82	NA	
Manganese	mg/L	0.04	0.01	0.03	NA	0.02	0.3
Mercury	ug/L	<0.4	NA	NA	0.56	NA	2.0
Potassium	mg/L	4.3	NA	NA	2.3	NA	
Selenium	ug/L	<2.0	<5.0	<5.0	<5.0	<5.0	20
Sodium	mg/L	20	NA	NA	5.9	NA	
Zinc	mg/L	<0.05	NA	NA	0.09	NA	5
INORGANICS							
Alkalinity	mg/L	250	230	250	NA	250	
Ammonia	mg/L	0.24	<0.2	<0.2	<0.2	<0.2	
Chloride	mg/L		35	41	NA	41	250
COD	mg/L	15	NA	NA	37	NA	
Cyanide	mg/L	<0.01	NA	NA	<0.005	NA	0.2
Fluoride	mg/L	<0.3	NA	NA	<0.2	NA	1.5
Hardness	mg/L	900	790	1000	NA	930	
Nitrate	mg/L	0.37	<0.20	<0.5	<0.2	<0.2	10
Nitrogen, Total Kjeldahl	mg/L	1.7	NA	NA	<0.5	NA	
Phosphorus	mg/L		NA	NA	<0.2	NA	
Sulfate	mg/L	560	540	560	500	510	250
Sulfide	mg/L		<0.05	<0.05	<0.05	<0.05	
Sulfur	mg/L		180	190	NA	170	
TDS	mg/L	1200	1000	1200	NA	970	
TVS	mg/L	400	180	480	NA	230	
TOC	mg/L	20	1.5	21	NA	15	
FIELD CHEMISTRIES							
pH	Std. Units	7.7	7.2	7.5	7.2	7.3	
Spec. Conductance	(umhos/cm)	1400	1374	1255	1181	1187	
Temperature	Deg. C	14	10.4	16.0	13.8	10.5	
Pre Purge Sample DO	mg/L		8.6	7.5	2.2	6.0	
pH	Std. Units		7.0	6.9	7.3	7.4	
Spec. Conductance	(umhos/cm)		1405	1207	1205	1262	
Temperature	Deg. C		12.4	15.4	13.5	8.1	
Post Purge Sample DO	mg/L		4.9	3.4	1.4	4.1	

Analyzed by EnviroTest Laboratories
NA - Analysis not required during this survey

TABLE 2.4
ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY 1989 ANNUAL REPORT
LABORATORY ANALYTICAL RESULTS - MONITORING WELL 4 DOWNGRADIENT

PARAMETERS	UNITS	HIGHEST BASELINE (PHASE 1) CONC.	QUARTERLY 3/13/89	QUARTERLY 6/23/89	ANNUAL 9/28/89	QUARTERLY 12/18/89	NYSGW STD. CLASS GA
Water Table Elevation	Feet		3.77	5.24	4.78	2.36	
METALS							
Aluminum	mg/L	2.3	NA	NA	0.09	NA	
Arsenic	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	25
Barium	mg/L	<0.2	NA	NA	<0.05	NA	1
Boron	mg/L	0.48	1.7	<0.005	0.86	<0.1	
Cadmium	mg/L	0.02	NA	NA	<0.002	NA	0.01
Chromium	mg/L	<0.05	NA	NA	<0.01	NA	
Chromium +6	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Copper	mg/L	0.06	NA	NA	0.01	NA	1
Iron	mg/L	0.62	0.2	0.57	NA	0.17	0.3
Lead	mg/L	0.1	<0.005	0.006	<0.005	<0.005	0.025
Magnesium	mg/L		NA	NA	140	NA	
Manganese	mg/L	0.02	0.01	0.12	NA	0.07	0.3
Mercury	ug/L	<0.4	NA	NA	<0.4	NA	2.0
Potassium	mg/L	5.6	NA	NA	4.5	NA	
Selenium	ug/L	<2.0	<5.0	<5.0	<5.0	<5.0	20
Sodium	mg/L	29	NA	NA	37	NA	
Zinc	mg/L	<0.05	NA	NA	0.09	NA	5
INORGANICS							
Alkalinity	mg/L	380	350	330	NA	390	
Ammonia	mg/L	0.24	<0.2	<0.2	<0.2	<0.2	
Chloride	mg/L		96	73	NA	150	250
COD	mg/L	10	NA	NA	18	NA	
Cyanide	mg/L	<0.01	NA	NA	<0.005	NA	0.2
Fluoride	mg/L	<0.3	NA	NA	<0.2	NA	1.5
Hardness	mg/L	1500	1700	1900	NA	1600	
Nitrate	mg/L	1.5	0.23	<0.2	<0.2	<0.2	10
Nitrogen, Total Kjeldahl	mg/L	0.78	NA	NA	<0.5	NA	
Phosphorus	mg/L		NA	NA	<0.2	NA	
Sulfate	mg/L	1000	1010	890	1020	890	250
Sulfide	mg/L		<0.05	<0.05	<0.05	<0.05	
Sulfur	mg/L		340	300	NA	300	
TDS	mg/L	2100	2100	1900	NA	1900	
TVS	mg/L	750	280	730	NA	400	
TOC	mg/L	23	4.6	5.8	NA	14	
FIELD CHEMISTRIES							
pH	Std. Units	7.7	6.9	6.9	6.7	6.9	
Spec. Conductance	(umhos/cm)	1800	2360	1874	2000	1946	
Temperature	Deg. C	22	10.6	14.4	12.2	9.9/9.9	
Pre Purge Sample DO	mg/L		2.7	1.4	2.6	2.1	
pH	Std. Units		6.7	6.9	6.9	7.0	
Spec. Conductance	(umhos/cm)		2390	2040	2030	2020	
Temperature	Deg. C		11.5	14.4	12.5	11.2	
Post Purge Sample DO	mg/L		2.8	1.9	1.3	1.7	

Analyzed by EnviroTest Laboratories
NA - Analysis not required during this survey

- *Arsenic* - Arsenic levels in all four monitoring wells continued to be at concentrations below the MDL of 5.0 μg/L.

- *Barium* - Barium was sampled only during the annual program. Barium results were consistent with the 1988 concentrations and remained below the MDL for this analytical method (0.05 mg/L) at MW-2, MW-3 and MW-4.

- *Boron* - Although boron values in March at MW-1, MW-3 and MW-4 experienced a significant change, as described in Section 2.1.4, over baseline values, the overall trend for concentrations in 1989 was within historical ranges. This increase occurred at both the upgradient well (MW-1) and downgradient wells (MW-3, MW-4) and appears to be related to natural groundwater quality variability, not the operation of the CAMF.

- *Cadmium, Chromium* - These metals were only analyzed during the annual program. All parameter concentrations were less than the Phase I baseline values and MDLs for these methods (<0.001 mg/L for cadmium; <0.01 mg/L for chromium).

- *Chromium+6* - Hexavalent chromium was not detected above the MDL of <0.01 mg/L at all four monitoring wells.

- *Copper* - Copper was analyzed only during the annual program. Concentrations in all four monitoring wells were the same as levels in 1988 and well below the Phase I baseline values.

- *Iron* - Iron exceeded the NYSGW standard of 0.3 mg/L once in MW-2 (March), twice in MW-3 (June and December) and once in MW-4 (June). The highest concentration of iron was 0.57 mg/L in MW-4 on June 22, 1989. The iron concentrations reported during the remaining surveys were below the NYSGW standard. Although the concentrations exceeded the standard, the levels were

below the historical concentrations previously reported and do not represent a significant change to water quality levels.

- *Lead* - Lead exceeded the NYSGW standard of 0.025 mg/L at MW-3 in June (0.21 mg/L) and December (0.076 mg/L). The presence of volatile organic compounds from external sources in MW-3 (Section 2.2.3) during these surveys could have been responsible for the elevated lead levels. Concentrations of lead detected at MW-1, MW-2 and MW-4 during 1989 were below the NYSGW standards and were generally less than the MDL for this analytical method (0.005 mg/L) and Phase I baseline values. As discussed in the 1988 annual ORU groundwater monitoring report, these concentrations appear to be related to local variability of groundwater quality, not related to the operation of the CAMF.

- *Magnesium* - Magnesium was sampled only during the annual sampling program. Magnesium concentrations at MW-1 (upgradient well) was 3.8 mg/L. MW-2, MW-3 and MW-4 reported concentrations of 93 mg/L, 82 mg/L and 140 mg/L, respectively. These values are less than the Phase II annual sampling program data conducted on September 16, 1987, and are consistent with the 1988 Phase IV concentrations. Therefore, the magnesium concentrations are not related to CAMF operations.

- *Manganese* - Manganese concentrations exhibited a significant change at MW-4 during June and December. However, concentrations reported at all four wells during the 1989 Phase IV sampling program were less than the NYSGW standard of 0.3 mg/L and generally less than or equal to the Phase I baseline concentrations.

- *Mercury* - Mercury was sampled only during the annual sampling program. Concentrations at MW-1, MW-2 and MW-4 were below the MDL of 0.4 μg/L. The 0.56 μg/L value reported at MW-3 was above the Phase I baseline and 1988 concentrations of <0.4 μg/L, but below the NYSGW standard of 2.0 μg/L.

- *Potassium* - Potassium levels in all four monitoring wells were significantly less than the Phase I baseline values and consistent with the 1988 concentrations.

- *Selenium* - Selenium levels in all four monitoring wells were below the MDL of <5.0 μg/L during the 1989 quarterly and annual surveys.

- *Sodium* - Sodium was sampled only during the annual sampling program. Concentration were generally less than Phase I baseline values and were consistent with the 1988 results.

- *Zinc* - Zinc concentration have remained consistent with historical results and are less than the NYSGW standard of 5 mg/L.

2.2.2 *Inorganics*

- *Alkalinity* - Alkalinity values remained consistent with historical results, with no significant changes in concentration.

- *Ammonia* - Ammonia concentrations were less than the MDL of 0.2 mg/L and less than the Phase I baseline values.

- *Chloride* - Chloride values were consistent with historical results and were less than the NYSGW standard of 250 mg/L.

- *COD* - MW-3 experienced a significant change (147%) in COD (37 mg/L vs. 15 mg/L during the Phase I baseline survey). The presence of volatile organic compounds from external sources in MW-3 (Section 2.2.3) during these surveys could have been responsible for the elevated COD levels. MW-1, MW-2 and MW-4 remained within historical ranges.

- *Cyanide* - Cyanide values were less than the NYSGW standard (0.2 mg/L) and Phase I baseline values at all four monitoring wells. Concentrations at MW-1, MW-3 and MW-4 were below the MDL of 0.005 mg/L.

- *Fluoride* - The fluoride value of 2.8 mg/L at the upgradient well, MW-1, exceeded the NYSGW standard of 1.5 mg/L, but was less than the Phase I baseline concentration and remained at a similar concentration as reported during the 1988 program (2.9 mg/L). Concentrations of fluoride at the downgradient wells were below the NYSGW standard and the MDL of 0.2 mg/L. The concentration of fluoride in the upgradient well, MW-1, indicates a localized or regional influence on the groundwater quality for this parameter not related to the operation of the CAMF.

- *Hardness* - significant changes in hardness concentrations were found at MW-3 in June and MW-4 in March, June and December. Although the concentrations exceeded the Phase I baseline values, the values did not exceed the historical ranges for these wells. MW-1 and MW-2 did not exhibit a significant change in reported concentrations.

- *Nitrate* - Nitrate values generally did not exceed the Phase I baseline values and were significantly less than the NYSGW standard of 10 mg/L.

- *Nitrogen* - Nitrogen (TKN) values were less than the MDL of 5.0 mg/L and less than Phase I baseline concentrations.

- *Phosphorus* - Phosphorus concentrations were less than the MDL of 0.2 mg/L at all four monitoring wells.

- *Sulfate* - The sulfate levels reported at all four monitoring wells were generally less than or equal to the values reported during the Phase 1 baseline survey and are related to localized conditions that existed at the site prior to the construction and operation of the CAMF.

- *Sulfide* - Sulfide concentrations were less than the MDL of 0.05 mg/L at all four wells.

- *Sulfur* - Sulfur values did not exceed the Phase I baseline values and were consistent with the 1988 results.

- *TDS* - Total dissolved solids concentrations did not exhibit a significant change in 1989 as in 1988. TDS values in the downgradient wells remain consistently higher than in the upgradient well, MW-1, both before and after the beginning of CAMF operations on September 15, 1987. Figure 2.5 shows that TDS values have levelled off to concentrations at or near the Phase I baseline values.

- *TVS* - Although MW-1 (6/23 and 12/18/89) and MW-3 (6/23/89) exceeded the Phase I baseline values, these concentrations do not represent a significant change. Overall values for the remaining wells stayed within the historical ranges reported for this parameter.

- *TOC* - TOC values did not exhibit a significant change during 1989 and generally remained consistent with Phase I baseline concentrations.

2.2.3 *Volatile Organic Compounds*

Table 2.5 presents results of volatile organic compound analyses for samples collected during the annual sampling survey on September 28, 1989. No VOCs were detected in the upgradient well (MW-1) or in downgradient wells MW-2 and MW-4 at concentrations above the MDL of 1.0 μg/L.

At MW-3, concentrations of benzene, toluene, ethylbenzene and xylene were detected at levels above the MDL for these compounds. This information was reported to the New York State Department of Environmental Conservation (Mr. Richard Gardineer, Region 3 Regional Solid Waste Engineer) and the Rockland County Department of Health (Appendix C). The compounds listed are related to external sources, not related to the operation of the CAMF.

TABLE 2.5

ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY
1989 ANNUAL REPORT
VOLATILE ORGANIC COMPOUND DATA

September 28, 1989

METHOD 601/602 COMPOUND	METHOD DETECTION LIMIT (ug/L)	MW-1 RESULTS (ug/L)	MW-2 RESULTS (ug/L)	MW-3 RESULTS (ug/L)	MW-4 RESULTS (ug/L)	MW-4 DUP RESULTS (ug/L)	DETENTION BASIN RESULTS (ug/L)
Methylene Chloride	1.0	U	U	U	U	U	U
1,1-Dichloroethane	1.0	U	U	U	U	U	U
Chloroform	1.0	U	U	U	U	U	U
1,2-Dichloroethane	1.0	U	U	U	U	U	U
1,1,1-Trichloroethane	1.0	U	U	U	U	U	U
Carbon Tetrachloride	1.0	U	U	U	U	U	U
Trichloroethene	1.0	U	U	U	U	U	U
Bromoform	1.0	U	U	U	U	U	U
Benzene	1.0	U	U	49	U	U	U
Toluene	1.0	U	U	110	U	U	U
Ethylbenzene	1.0	U	U	61	U	U	U
Xylene (Total)	1.0	U	U	1400	U	U	U

U = Undetected

Analyzed by EnviroTest Laboratories

2.3 *ANALYTICAL RESULTS - DETENTION BASIN*

Tables 2.5 and 2.6 present the results of the grab sample collected from the CAMF detention basin impoundment during each 1989 field survey. Each sample was analyzed for the parameters outlined in Table 1.2 and 1.3. Overall, most metals and inorganic parameters were reported at levels at or below the MDLs. No parameters exceeded the discharge limits established for the CAMF operation.

No volatile organic compounds were detected in the detention basin sample at concentrations above the MDL of 1.0 μg/L.

2.4 *EVALUATION OF PARAMETERS WITH SIGNIFICANT CHANGES*

Tables 2.7 through 2.10 present the 1989 Phase IV post-operational parameters for which a significant change occurred. As defined in Section 7.3.2.1 of the Stone and Webster Engineering Corporation Lovett Generating Station Solid Waste Management Facility report, a significant change in groundwater quality is:

(A) A parameter exceeding the drinking water standard (NYSGW);

(B) A parameter exceeding the effluent discharge limits (SPDES);

(C) A 100% increase in a parameter; or

(D) An increase of 100 ppm in the concentration of a parameter

Tables 2.7 through 2.10 outline the significant changes detected during the 1989 monitoring program. Evaluation of significant changes (C) + (D) were made in comparison to the highest concentrations of each parameter reported during the Phase I baseline survey. A summary of significant changes by monitoring well, parameter, and date of occurrence is outlined below:

TABLE 2.6

ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY 1989 ANNUAL REPORT
LABORATORY ANALYTICAL RESULTS
DETENTION BASIN PART 360

PARAMETERS	UNITS	QUARTERLY 3/13/89	QUARTERLY 6/23/89	ANNUAL 9/28/89	QUARTERLY 12/18/89	SPDES LIMIT
METALS						
Aluminum	mg/L	NA	NA	0.12	NA	4
Arsenic	ug/L	<5.0	<5.0	8.6	<5.0	100
Barium	mg/L	NA	NA	<0.05	NA	0.4
Boron	mg/L	2.3	<0.005	10	1.6	
Cadmium	mg/L	NA	NA	<0.002	NA	0.1
Chromium	mg/L	NA	NA	<0.01	NA	0.5
Chromium +6	mg/L	<0.01	<0.01	<0.01	0.03	0.5
Copper	mg/L	NA	NA	<0.01	NA	0.5
Iron	mg/L	0.11	0.05	NA	0.05	4.0
Lead	mg/L	<0.005	0.007	<0.005	<0.005	0.4
Magnesium	mg/L	NA	NA	23	NA	
Manganese	mg/L	0.02	<0.01	NA	0.01	2.0
Mercury	ug/L	NA	NA	<0.4	NA	
Potassium	mg/L	NA	NA	24	NA	
Selenium	ug/L	40	22	26	<5.0	100
Sodium	mg/L	NA	NA	75	NA	0.4
Zinc	mg/L	NA	NA	0.02	NA	0.4
INORGANICS						
Alkalinity	mg/L	84	88	NA	160	
Ammonia	mg/L	<0.2	<0.2	<0.2	<0.2	
Chloride	mg/L	77	45	NA	310	
COD	mg/L	NA	NA	13	NA	
Cyanide	mg/L	NA	NA	<0.005	NA	
Fluoride	mg/L	NA	NA	0.35	NA	
Hardness	mg/L	220	140	NA	680	
Nitrate	mg/L	<0.20	<0.5	<0.2	0.80	
Nitrogen	mg/L	NA	NA	<0.5	NA	
Phosphorus	mg/L	NA	NA	<0.2	NA	
Sulfate	mg/L	80	65	330	630	
Sulfide	mg/L	<0.05	<0.05	<0.05	<0.05	
Sulfur	mg/L	27	22	NA	210	
TDS	mg/L	460	240	NA	1600	
TVS	mg/L	8.0	170	NA	160	
TOC	mg/L	1.7	3.1	NA	3.5	
FIELD CHEMISTRIES						
pH	Std. Units	8.6/8.6	9.0/8.9	8.9/8.8	8.2/8.2	
Spec. Conductance	(umhos/cm)	625/616	459/429	1028	2120	
Temperature	Deg. C	5.0/5.0	25.4/25.4	18.7/18.7	0.1/0.1	
DO	mg/L	14.6/14.4	14.7	10.6	20.7	

Analyzed by EnviroTest Laboratories
NA - Analysis not required during this survey

TABLE 2.7

ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY 1989 ANNUAL REPORT
PARAMETERS FOR WHICH A SIGNIFICANT CHANGE HAS OCCURRED
AS DEFINED IN THE SOLID WASTE FACILITY REPORT
MONITORING WELL 1 - UPGRADIENT

PARAMETERS	UNITS	QUARTERLY 3/13/89	QUARTERLY 6/23/89	ANNUAL 9/28/89	QUARTERLY 12/18/89	NYSGW STD.
METALS						
Aluminum	mg/L					
Arsenic	ug/L					25
Barium	mg/L					
Boron	mg/L	C (321%)				
Cadmium	mg/L					0.01
Chromium	mg/L					
Chromium +6	mg/L					0.05
Copper	mg/L					1
Iron	mg/L					0.3
Lead	mg/L					
Magnesium	mg/L					
Manganese	mg/L					0.3
Mercury	ug/L					2
Potassium	mg/L					
Selenium	ug/L					20
Sodium	mg/L					
Zinc	mg/L			C (100%)		5
INORGANICS						
Alkalinity	mg/L					
Ammonia	mg/L					
Chloride	mg/L					250
COD	mg/L					
Cyanide	mg/L					0.2
Fluoride	mg/L			A (2.8)		1.5
Hardness	mg/L					
Nitrate	mg/L					10
Nitrogen	mg/L					
Phosphorus	mg/L					
Sulfate	mg/L					250
Sulfide	mg/L					0.05
Sulfur	mg/L					
TDS	mg/L					
TVS	mg/L					
TOC	mg/L					

A = Parameter exceeds NYS groundwater standard; standards obtained from 6NYCRR Part 703.5. Measure value in ()
B = Parameter exceeds SPDES limit
C = Parameter increased by 100% from highest Phase I baseline value. Calculated % increase in ()
D = Parameter increased by 100 ppm from highest Phase I baseline value. Calculated ppm increase in ()

TABLE 2.8

ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY 1989 ANNUAL REPORT
PARAMETERS FOR WHICH A SIGNIFICANT CHANGE HAS OCCURRED
AS DEFINED IN THE SOLID WASTE FACILITY REPORT
MONITORING WELL 2 - DOWNGRADIENT

PARAMETERS	UNITS	QUARTERLY 3/13/89	QUARTERLY 6/23/89	ANNUAL 9/28/89	QUARTERLY 12/18/89	NYSGW STD.
METALS						
Aluminum	mg/L					
Arsenic	ug/L					25
Barium	mg/L					
Boron	mg/L	C (145%)				
Cadmium	mg/L					0.01
Chromium	mg/L					
Chromium +6	mg/L					0.05
Copper	mg/L					1
Iron	mg/L	A (0.41)				0.3
Lead	mg/L					
Magnesium	mg/L					
Manganese	mg/L					0.3
Mercury	ug/L					2
Potassium	mg/L					
Selenium	ug/L					20
Sodium	mg/L					
Zinc	mg/L					5
INORGANICS						
Alkalinity	mg/L					
Ammonia	mg/L					
Chloride	mg/L					250
COD	mg/L					
Cyanide	mg/L					0.2
Fluoride	mg/L					1.5
Hardness	mg/L					
Nitrate	mg/L					10
Nitrogen	mg/L					
Phosphorus	mg/L					
Sulfate	mg/L	A (650)	A (710)	A (680)	A (680)	250
Sulfide	mg/L					0.05
Sulfur	mg/L					
TDS	mg/L					
TVS	mg/L					
TOC	mg/L					

A = Parameter exceeds NYS groundwater standard; standards obtained from 6NYCRR Part 703.5. Measure value in ()
B = Parameter exceeds SPDES limit
C = Parameter increased by 100% from highest Phase I baseline value. Calculated % increase in ()
D = Parameter increased by 100 ppm from highest Phase I baseline value. Calculated ppm increase in ()

TABLE 2.9

ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY 1989 ANNUAL REPORT
PARAMETERS FOR WHICH A SIGNIFICANT CHANGE HAS OCCURRED
AS DEFINED IN THE SOLID WASTE FACILITY REPORT
MONITORING WELL 3 - DOWNGRADIENT

PARAMETERS	UNITS	QUARTERLY 3/13/89	QUARTERLY 6/23/89	ANNUAL 9/28/89	QUARTERLY 12/18/89	NYSGW STD.
METALS						
Aluminum	mg/L					
Arsenic	ug/L					25
Barium	mg/L					
Boron	mg/L					
Cadmium	mg/L					0.01
Chromium	mg/L					
Chromium +6	mg/L					0.05
Copper	mg/L					1
Iron	mg/L		A (0.32)		A (0.46)	0.3
Lead	mg/L		A (0.21)	C (162%)	A (0.076)	
Magnesium	mg/L					
Manganese	mg/L					0.3
Mercury	ug/L			C (40%)		2
Potassium	mg/L					
Selenium	ug/L					20
Sodium	mg/L					
Zinc	mg/L					5
INORGANICS						
Alkalinity	mg/L					
Ammonia	mg/L					
Chloride	mg/L					250
COD	mg/L			C (147%)		
Cyanide	mg/L					0.2
Fluoride	mg/L					1.5
Hardness	mg/L		D (100)			
Nitrate	mg/L					10
Nitrogen	mg/L					
Phosphorus	mg/L					
Sulfate	mg/L	A (540)	A (560)	A (500)	A (510)	250
Sulfide	mg/L					0.05
Sulfur	mg/L					
TDS	mg/L					
TVS	mg/L					
TOC	mg/L					

A = Parameter exceeds NYS groundwater standard; standards obtained from 6NYCRR Part 703.5. Measure value in ()
B = Parameter exceeds SPDES limit
C = Parameter increased by 100% from highest Phase I baseline value. Calculated % increase in ()
D = Parameter increased by 100 ppm from highest Phase I baseline value. Calculated ppm increase in ()

TABLE 2.10

ORANGE & ROCKLAND UTILITIES, INC.
LOVETT COAL ASH MANAGEMENT FACILITY 1989 ANNUAL REPORT
PARAMETERS FOR WHICH A SIGNIFICANT CHANGE HAS OCCURRED
AS DEFINED IN THE SOLID WASTE FACILITY REPORT
MONITORING WELL 4 - DOWNGRADIENT

PARAMETERS	UNITS	QUARTERLY 3/13/89	QUARTERLY 6/23/89	ANNUAL 9/28/89	QUARTERLY 12/18/89	NYSGW STD.
METALS						
Aluminum	mg/L					
Arsenic	ug/L					25
Barium	mg/L					
Boron	mg/L	C (254%)				
Cadmium	mg/L					0.01
Chromium	mg/L					
Chromium +6	mg/L					0.05
Copper	mg/L					1
Iron	mg/L		A (0.57)			0.3
Lead	mg/L					
Magnesium	mg/L					
Manganese	mg/L		C (500%)		C (250%)	0.3
Mercury	ug/L					2
Potassium	mg/L					
Selenium	ug/L					20
Sodium	mg/L					
Zinc	mg/L					5
INORGANICS						
Alkalinity	mg/L					
Ammonia	mg/L					
Chloride	mg/L					250
COD	mg/L					
Cyanide	mg/L					0.2
Fluoride	mg/L					1.5
Hardness	mg/L	D (200)	D (400)		D (100)	
Nitrate	mg/L					10
Nitrogen	mg/L					
Phosphorus	mg/L					
Sulfate	mg/L	A (1010)	A (890)	A (1020)	A (890)	250
Sulfide	mg/L					0.05
Sulfur	mg/L					
TDS	mg/L					
TVS	mg/L					
TOC	mg/L					

A = Parameter exceeds NYS groundwater standard; standards obtained from 6NYCRR Part 703.5. Measure value in ()
B = Parameter exceeds SPDES limit
C = Parameter increased by 100% from highest Phase I baseline value. Calculated % increase in ()
D = Parameter increased by 100 ppm from highest Phase I baseline value. Calculated ppm increase in ()

MONITORING WELL	PARAMETER	SURVEY DATE IN WHICH A SIGNIFICANT CHANGE OCCURRED
MW-1	Boron Fluoride Zinc	3/13/89 9/28/89 9/28/89
MW-2	Boron Iron Sulfate	3/13/89 3/13/89 3/13, 6/23, 9/28, 12/18/89
MW-3	Iron Lead Mercury COD Hardness Sulfate	6/23, 12/18/89 6/23, 12/18/89 9/28/89 9/28/89 6/23/89 3/13, 6/23, 9/28, 12/18/89
MW-4	Boron Iron Manganese Hardness Sulfate	3/13/89 6/23/89 6/23, 12/18/89 3/13, 6/23, 12/18/89 3/13, 6/23, 9/28, 12/18/89

2.5 TRENDS IN TDS CONCENTRATIONS

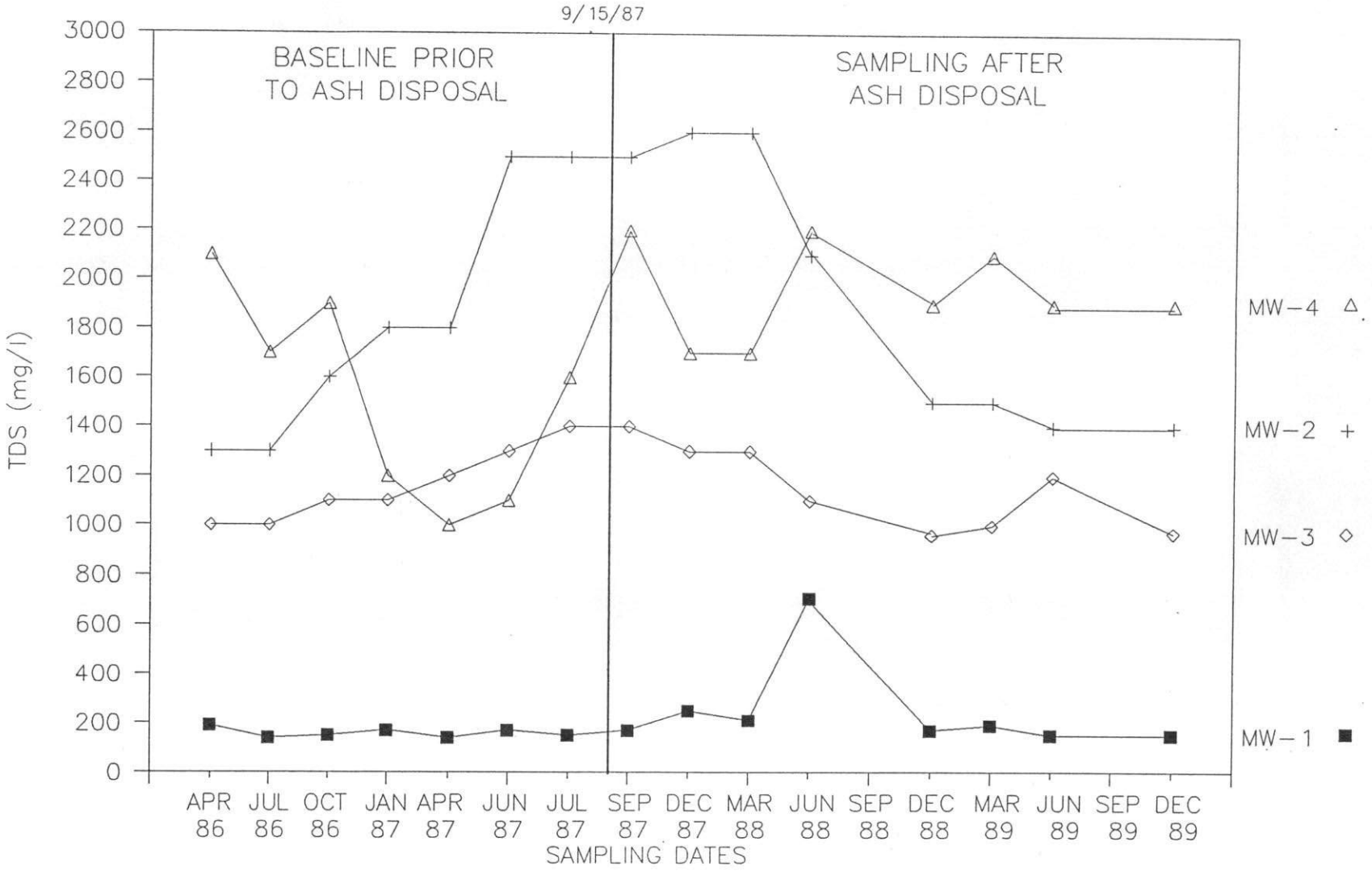
Figure 2.5 provides updated trends in total dissolved solids (TDS) concentrations from April 1986 to December 1989. These results are presented by survey date, concentrations by monitoring well, expressed as mg/L.

2.6 HISTORICAL DATA RESULTS - MONITORING WELLS

Appendices C and D contain analytical results from Phase I baseline studies (April 29, 1986) through 1988 Phase IV post-operational studies. Data presented in this report are categorized by parameter name, sampling well location, survey date and type, concentration (or detection limit if concentration is less than MDL), and units of concentration.

Figure 2.5
Orange & Rockland Utilities, Inc.
1989 Annual Report

TRENDS IN TDS CONCENTRATIONS



Note: September 1988 and September 1989 were not analyzed in annual sampling

2.7 *HISTORICAL DATA RESULTS - SIGNIFICANT CHANGE PARAMETERS*

Analytical results from the Phase II (September 16, 1987) through 1988 Phase IV post-operational studies for which a significant change has occurred are shown in Appendices E and F. Data are presented by sampling date, parameter and percentage of increase from Phase I baseline results.

CHAPTER 3.0
DISCUSSION AND CONCLUSIONS

Based on the analytical results presented in Chapter 2.0, the following conclusions can be made regarding the impact of Orange and Rockland Utilities, Inc. Coal Ash Management Facility on local groundwater quality.

3.1 GROUNDWATER FLOW AND WATER TABLE ELEVATIONS

1989 water table elevation data (Figures 2.1 through 2.4) show that groundwater flow at the CAMF is eastward toward the Hudson River. The 1989 elevations recorded indicate that although considerable variations in the water table elevations exist between the four wells during each survey, the relationship of well elevations during each sampling event has remained consistent with 1988 data. MW-1 has remained the upgradient well. Wells MW-2, MW-3 and MW-4 have continued to function as the downgradient wells.

3.2 EVALUATION OF GROUNDWATER QUALITY

Overall trends in parameter concentrations have remained within historical ranges, especially for those parameters directly related to the chemical characteristics of coal wastes processed at the site (i.e., sulfate, total dissolved solids [TDS], specific conductance, aluminum, iron, manganese, and selenium). The results recorded for these indicator parameters show that concentrations at the upgradient well (MW-1) have remained less than or equal to the Phase I baseline values. The concentrations recorded at the downgradient wells (MW-2, MW-3, MW-4) have also remained at or below the values recorded during the Phase I baseline studies. These values reflect conditions existing at the site prior to the construction and operation of the CAMF. Sulfate values (a common compound in bottom ash, fly ash and pyrites), although above the NYSGW standard of 250 mg/L during 1989, have actually decreased or remained at concentrations equal to the historical baseline values. TDS, specific conductance, aluminum, iron, manganese, selenium, and the remaining parameters tested during the 1989 program have all stayed within the historical ranges observed at the site and do not represent an effect on the local groundwater quality by the operation of the CAMF.

3.3 *GROUNDWATER vs. DETENTION BASIN CONCENTRATIONS*

In comparing detention basin concentrations with values reported in 1989 for the four monitoring wells, it is apparent that the processed coal wastes are being effectively contained in the basin, and are not having an effect on local groundwater quality.

3.4 *EVALUATION OF SIGNIFICANT CHANGES IN GROUNDWATER QUALITY*

The parameters which demonstrated a significant change (Tables 2.7 through 2.10) are generally consistent with those values calculated for 1987 and 1988. The parameter concentrations at MW-1 did not demonstrate any significant changes in concentrations. The significant changes measured at the downgradient wells were within the historical baseline ranges, or less than NYSGW standards, and do not represent an impact on the local groundwater quality.

3.5 *FACILITY COMPLIANCE WITH APPLICABLE STANDARDS*

Overall parameter concentrations at the four monitoring wells indicate that groundwater quality in the project area has remained consistent during 1989 with historical reported values and has not been affected by the operation of the CAMF.

Based on the 1989 analytical results reported for the four monitoring wells and detention basin, ORU's operation of the Lovett Coal Ash Management Facility has remained in compliance with the groundwater quality and discharge permit limits established by ORU's Part 360 operating permit.

APPENDIX A

SAMPLING PROCEDURES FOR GROUNDWATER MONITORING WELLS

SAMPLING PROCEDURE FOR
GROUNDWATER MONITORING WELLS

This procedure details the instructions that will be given to the field sampling crew.

1. Determine static water level with a static water level indicator and record depth to water. Record reference point, i..e, casing.

2. Determine depth of well by lowering static water level indicator to bottom. Record reference point.

3. Measure and record height of casing.

4. Prior to bailing the well, collect water samples and measure and record temperature, pH, conductivity, and dissolved oxygen.

5. Bail three volumes of well as determined by diameter of well and difference between static water level and bottom level. Use bailing procedure developed for that well. See chart for volumes versus column height.

6. After bailing, determine and record static water level. Allow well to recover to original level or greater than 75% of original water column depth. If refilling appears to be slow, go on to next well and come back later to sample.

7. Once well has refilled, take sample from mid-point of screened section using a bailer. Record sample depth. Collect sample in a 4 liter vacuum flask.

8. After collecting sample, turn off pump, mix contents of flash and remove sample for pH, temperature, conductivity,

and dissolved oxygen. Fill up sample bottles, cap bottles securely and keep on ice. Add preservative as needed. See Table A-1 for preservative to be added.

9. Determine and record static water level after sampling.

10. When finished, wash bailer inside and outside with deionized carbon treated water and place in wrapper.

11. The field sampling record will include, as a minimum, the following: job, job number, date, well number, location, sampling crew names, total well depth, depth to water, height of water column, volume conversion factor (based on well diameter), gallons in well.

    The record will include for well evacuation: method used, time bailing started, time bailing stopped, gallons removed.

    The record will include for sample collection:

    Field Tests Before Evacuation: time, temperature, pH, specific conductance, dissolved oxygen.

    After Evacuation: Collection method, date, time, sample number, blank number, field test results for pH, specific conductance, temperature, and dissolved oxygen, weather, comments.

12. Sample labels will include date, time, sample number, and individuals collecting sample, as a minimum.

APPENDIX B

SAMPLING PROCEDURES FOR DETENTION BASIN SAMPLES

SAMPLING PROCEDURE FOR COLLECTING DETENTION BASIN SAMPLES

1.1 To monitor the discharge from the detention basin, composite and/or grab samples will be collected as follows:

1.1.1 Composite Samples

Composite samples will be composed of a minimum of eight grab samples, collected once per hour at either a constant sample volume for a constant flow interval or at a flow-proportioned sample volume for a constant time interval.

1.1.1.1 All sample bottles (except volatiles) will be filled from the composite jug after the contents have been thoroughly mixed. The actual compositing of samples requires the homogenization of all component samples to ensure that a representative subsample is aliquoted. Preservatives will be added to the bottles (refer to Attachment III).

1.1.1.2 If volatile analyses are required, individual vials will be filled, capped, and maintained at 4°C during each hourly grab period.

1.1.2 Grab Samples

Grab samples will be a single sample taken over a period of not to exceed 15 minutes.

1.1.2.1 If grab samples are required, individual samples will be collected using an appropriate subsurface sampling device (Teflon dip bucket, Teflon Niskin sampler, Teflon bailer).

1.1.2.2 The sampling device will be laboratory-cleaned prior to use and rinsed with sample water in the field before use.

2.1 SAMPLE DOCUMENTATION

2.1.1 Chain-of-custody and chemical analysis order forms will be completed for each survey.

2.1.2 As a minimum, bottle labels, chain-of-custody, and chemical analysis forms will include the IMS station name, laboratory ID number, job number, date and time of sample collection, and preservative.

3.1 DECONTAMINATION

All equipment used in sample collection will be laboratory cleaned, as follows:

- o non-phosphate detergent and tap water wash
- o tap water rinse
- o distilled/deionized water rinse
- o 10% nitric acid rinse (if metals collected)
- o distilled/dionized water rinse
- o acetone (pesticide grade) rinse
- o air dry or nitrogen blow-out
- o distilled/dionized water rinse

APPENDIX C

ORANGE & ROCKLAND UTILITIES
LETTER TO
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

ORANGE AND ROCKLAND One Blue Hill Plaza, Pearl River, New York 10965

July 12, 1989

Mr. Richard Gardineer
Regional Solid Waste Engineer, Region 3
New York State Department of
Environmental Conservation
21 South Putt Corners Road
New Paltz, NY 12561-1696

Subject: Lovett Coal Ash Management Facility
Permit No.: 3-3928-3913-0
Facility No.: 3-3928-39
Owner ID No.: 02378

Dear Mr. Gardineer:

This correspondence is a follow-up letter to my initial telephone contact to your office on June 27, 1989 and our conversation of June 30 relative to the apparent vandalism of monitoring well MW-3 at the subject facility. As reported to you, laboratory analyses of groundwater samples collected June 23 and June 26 showed the presence of hydrocarbon contamination. These contaminants are not representative of flyash disposal operations. A chronological account of the discovery of the condition by our consultant, Lawler, Matusky and Skelly Engineers, and results of all laboratory testing to date are enclosed.

Monitoring well MW-3 is located down-gradient of the CAMF, and is approximately 127 feet deep. The well is constructed of a four inch diameter PVC pipe, with steel casing from grade into bedrock. The well is drilled approximately 108 feet into bedrock. The screened interval measures the bottom 10.3 feet.

Pursuant to your recommendations, we will continue to purge the well every one to two weeks, depending on the well recovery rate. We will analyze the sample and compare concentrations of hydrocarbons to previous sampling events. The evaluation of this information will be coordinated with your office to assess our progress in purging the well of the contaminants.

Installation of bollards around well MW-3 is being investigated to prevent inadvertant damage to the exposed casing.

If you have any questions relative to this plan of action, do not hesitate to contact me.

Sincerely,

Robert T. Kosior

Robert T. Kosior, P.E.
Manager-Environmental Services

RTK:eb
Enc.
cc: C. Quinn (RCHD)
P. McGroddy (LMS)
1023T.RTK
bcc: F. E. Fischer, R. H. Metzger, S. F. Ferrazzara, L. F. Friscoe

APPENDIX D

HISTORICAL LABORATORY ANALYTICAL RESULTS
1986-1987

Table D-1

Laboratory Analytical Results - Coal Ash Management Facility
Monitoring Well MW-1 (Upgradient)

PARAMETERS	Phase I - Baseline					Phase I - Construction		Phase II	Phase III		NYS GW Standard
	4/29/86	7/28/86	10/27/86	1/9/87	4/15/87	6/22/87	7/20/87	9/16/87	9/21/87	12/22/87	
Water Table Elevation	39.9'	35.9'	35.9'	47.9'	38.4'	33.23'	28.4'	26.9'	27.07'	28.9'	
Alkalinity	68	85	75	80	75	87	82		83	81	
Aluminum	< 0.5	0.28	0.29	1.5	0.51		0.42	0.27			
Ammonia - Total				< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Arsenic (ug/l)	< 2.0	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	25
Barium	< 0.2	< 0.2	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05			1
BOD - Effluent	< 3.0	3.6	1.6	< 3.0	2.8		< 3.0				
Boron	0.38	0.03	< 0.05	< 0.05	0.14	0.12	0.08	0.19	0.19	0.11	
Cadmium	< 0.01	< 0.01	0.008	< 0.01	< 0.01		< 0.01	0.005			0.01
Calcium	6.5	20	18	240	19		19				
Chromium	< 0.05	< 0.05	< 0.01	< 0.02	< 0.02		< 0.05	< 0.02			
Chromium +6	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Chlorides						3			3.5	3.5	250
COD	7.7	3.2	9.4	2	0.77		< 2.0	< 2.0			
Copper	0.09	< 0.05	< 0.01	0.01	0.02		0.68	< 0.02			1
Cyanide	< 0.01	< 0.01			< 0.005		< 0.005	< 0.005			0.2
Fluorides	3.6	3.6	3.4	4.1	3.6		3.7	3.4			1.5
Hardness - Total	60	56	57	69	59	57	62		56	61	
Hydrogen Sulfide						< 0.05			< 0.05	< 0.05	0.05
Iron	< 0.05	0.17	0.15	0.11	0.75	0.14	1.2		0.12	0.26	0.3
Lead	< 0.01	< 0.01	< 0.01	0.07	< 0.01	< 0.05	0.05	< 0.01	< 0.01	< 0.01	0.025
Magnesium								2.3			
Manganese	< 0.05	< 0.05	< 0.01	0.01	0.02	0.06	< 0.05		< 0.02	0.02	0.3
Mercury (ug/l)	< 0.4	< 0.4	0.6	< 0.4	< 0.4		< 0.4	< 0.4			2
Nitrates	0.5	0.2	< 0.2	0.58	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	10
Nitrogen - Total Kjeldahl	1.7	0.78	< 0.5	< 0.5	< 0.5		0.9	1.5			
pH (std units)	8.8	7.9	8.3	8.3	8.2	7.9	8.3		8.3	7.2	6.5 - 8.5
Phenol	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005				0.001
Potassium	5	16	< 1.0	5.8	1.3		1.5	1.3			
Selenium (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	20
Silver	< 0.01	< 0.01	< 0.002	< 0.01	< 0.01		< 0.01				0.05
Sodium	25	24	13	22	22		24	25			
Specific Conductance (umhos/cm)	190	150	8	120	200	2100	150		160	170	
Sulfates	26	17	21	18	17	23	16	16	16	18	250
Sulfites						< 1.0		< 1.0	< 1.0	<1.0	
Sulphur - Total						7.7			5.3	6	
TDS	190	140	150	170	140	170	150		170	250	
Temperature (deg C)	13	12	11	8	14	13	15		8	11.5	
TOC	2.9	6.4	3.8	9.2	0.9	< 0.5	3.2		< 0.5	1.2	
Total Solids	150						410				
Volatile Solids	23	40	10	50	60	60	120		20	90	
Zinc	< 0.05	< 0.05	< 0.01	0.01	0.02		0.5	0.05			5
Benzene (ug/l)	1.6										ND
1,2 - Dichloroethane (ug/l)											0.8 *
Ethylbenzene (ug/l)											50 *
Toluene (ug/l)											50 *
Xylenes (ug/l)											50 *
Xylenes - meta (ug/l)											
Xylenes - ortho, para (ug/l)											

NOTES:

All results are in mg/l unless otherwise indicated.

Blank spaces indicate that parameter was not analyzed, except for volatiles, where blanks indicate that parameter was not detected in the scan.

Standards obtained from 6 NYCRR Part 703.5.

* New York State Ambient Ground Water Quality Guidance Levels.

Table D-2

Laboratory Analytical Results - Coal Ash Management Facility
Monitoring Well MW-2 (Downgradient)

PARAMETERS	Phase I - Baseline					Phase I - Construction		Phase II	Phase III		NYS GW Standard
	4/29/86	7/28/86	10/27/86	1/9/87	4/16/87	6/22/87	7/20/87	9/16/87	9/21/87	12/22/87	
Water Table Elevation	-28.54'	-12.54'	-8.96'	-13.04'	-9.54'	1.46'	-15.54'	-12.54'	-8.87'	-8.54'	
Alkalinity	140	210	220	230	240	260	260		250	33	
Aluminum	< 0.5	1.8	1.9	1.9	3.2		0.13	0.22			
Ammonia - Total				< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Arsenic (ug/l)	< 2.0	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	25
Barium	< 0.2	< 0.2	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05			1
BOD - Effluent	< 3.0	3.8	1.6	4	< 2.0		< 3.0				
Boron	0.4	0.02	< 0.05	< 0.05	0.15	0.08	0.07	0.11	0.11	0.09	
Cadmium	< 0.01	< 0.01	0.009	< 0.01	< 0.01		< 0.01				0.01
Calcium	130	230	210	310	280		380				
Chromium	< 0.05	< 0.05	< 0.01	< 0.02	< 0.02		< 0.05	< 0.02			
Chromium +6	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Chlorides						120			140	140	250
COD	6.5	8.8	14	12	8.4		2.5	< 2.0			
Copper	< 0.05	< 0.05	< 0.01	0.03	0.02		0.81	< 0.02			1
Cyanide	< 0.01	< 0.01			< 0.005		< 0.005	< 0.005			0.2
Fluorides	< 0.3	< 0.3	< 0.2	0.2	< 0.2		< 0.2	< 0.2			1.5
Hardness - Total	890	950	1140	1310	1410	1700	1960		2080	1880	
Hydrogen Sulfide						< 0.05			< 0.05	< 0.05	0.05
Iron	< 0.05	0.08	0.2	0.41	0.41	< 0.05	< 0.05		< 0.03	0.07	0.3
Lead	< 0.01	< 0.01	< 0.01	0.1	< 0.01	< 0.05	0.06	0.04	0.04	< 0.01	0.025
Magnesium								180			
Manganese	< 0.05	< 0.05	0.01	0.02	0.02	< 0.05	< 0.05		< 0.02	< 0.01	0.3
Mercury (ug/l)	< 0.4	< 0.4	0.4	< 0.4	1.1		< 0.4	< 0.4			2
Nitrates	2.3	4	5	8.9	0.3	10	11	6.8	10	1.4	10
Nitrogen - Total Kjeldahl	1.7	1	0.5	0.8	1.1		1.3	1.9			
pH (std units)	7.7	7.3	7.4	7.3	7.4	7	7.2		7.5	6.7	6.5 - 8.5
Phenol	< 0.005	<0.005	< 0.005	< 0.005	< 0.005		0.007				0.001
Potassium	10	5.8	5	5.6	5.6		5	3.3			
Selenium (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	20
Silver	< 0.01	< 0.01	< 0.002	< 0.01	< 0.01		< 0.01				0.05
Sodium	22	22	14	29	26		37	42			
Specific Conductance (umhos/cm)	1250	1500	1400	1200	2100	2100	1900		1900	2200	
Sulfates	580	740	700	930	910	1350	1350	1380	1380	1500	250
Sulfites						< 1.0		< 1.0	< 1.0	< 1.0	
Sulphur - Total						450			460	500	
TDS	1300	1300	1600	1800	1800	2500	2500		2500	2600	
Temperature (deg. C)	14	16	11	8	13	14	15		9	12.7	
TOC	3.8	8.9	4.3	11	2.5	1.4	4.2		1.5	18	
Total Solids	1300						2800				
Volatile Solids	270	540	300	440	570	380	710		670	140	
Zinc	< 0.05	< 0.05	0.03	0.06	0.05		0.47	0.03			5
Benzene (ug/l)											ND
1,2 - Dichloroethane (ug/l)											0.8 *
Ethylbenzene (ug/l)											50 *
Toluene (ug/l)											50 *
Xylenes (ug/l)											50 *
Xylenes - meta (ug/l)											
Xylenes - ortho, para (ug/l)											

NOTES:

All results are in mg/l unless otherwise indicated.

Blank spaces indicate that parameter was not analyzed, except for volatiles, where blanks indicate that parameter was not detected in the scan.

Standards obtained from 6 NYCRR Part 703.5

* New York State Ambient Ground Water Quality Guidance Levels.

Table
Laboratory Analytical Results - Coal Ash Management Facility
Monitoring Well MW-3 (Downgradient)

PARAMETERS	Phase I - Baseline					Phase I - Construction		Phase II	Phase III		NYS GW
	4/29/86	7/28/86	10/27/86	1/9/87	4/15/87	6/22/87	7/20/87	9/16/87	9/21/87	12/22/87	Standard
Water Table Elevation	-48.73'	-19.73'	-11.15'	-12.73'	-13.4'	5.77'	-18.4'	-17.73'	-13.73'	-13.73'	
Alkalinity	210	250	240	240	240	250	240		230	230	
Aluminum	< 0.5	1.3	1.3	1.1	1.8		0.18	0.2			
Ammonia - Total				< 0.5	0.24	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Arsenic (ug/l)	< 2.0	< 2.0	< 2.0	< 5.0	< 5.0	14	11	< 5.0	< 5.0	6.1	25
Barium	< 0.2	< 0.2	< 0.05	< 0.05	< 0.05		0.06	0.06			1
BOD - Effluent	< 3.0	5.2	1.6	< 3.0	< 2.0		< 3.0				
Boron	0.36	< 0.01	< 0.05	< 0.05	0.08	< 0.05	0.05	0.08	0.08	< 0.05	
Cadmium	< 0.01	< 0.01	0.005	< 0.01	< 0.01		< 0.01				0.01
Calcium	130	150	140	160	160		190				
Chromium	< 0.05	< 0.05	< 0.01	< 0.02	< 0.02		< 0.05	0.04			
Chromium +6	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Chlorides						50			58	57	250
COD	11	11	15	11	13		7.6	< 2.0			
Copper	< 0.05	< 0.05	< 0.01	0.11	< 0.01		0.79	< 0.02			1
Cyanide	< 0.01	< 0.01			< 0.005		< 0.005	< 0.005			0.2
Fluorides	< 0.3	< 0.3	< 0.2	0.2	< 0.2		< 0.2	< 0.2			1.5
Hardness - Total	710	770	860	820	900	980	1060		1070	1080	
Hydrogen Sulfide						< 0.05			< 0.05	< 0.05	0.05
Iron	< 0.05	0.27	0.64	1	0.95	0.14	0.96		0.81	0.84	0.3
Lead	0.018	< 0.01	< 0.01	0.08	< 0.01	< 0.05	0.03	0.02	0.02	< 0.01	0.025
Magnesium								120			
Manganese	< 0.05	< 0.05	0.04	0.04	0.04	0.06	< 0.05		0.03	0.01	0.3
Mercury (ug/l)	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4		< 0.4	< 0.4			2
Nitrates	< 0.2	0.2	< 0.2	0.37	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	10
Nitrogen - Total Kjeldahl	1.7	0.67	0.78	< 0.5	1.2		1.1	1.8			
pH (std. units)	7.7	7.5	7.5	7.5	7.6	7.1	7.4		7.8	6.9	6.5 - 8.5
Phenol	< 0.005	0.007	< 0.005	0.008	< 0.005		0.013				0.001
Potassium	4.3	3.3	2.4	2.5	2.8		4.2	2.7			
Selenium (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	20
Silver	< 0.01	< 0.01	< 0.002	< 0.01	< 0.01		< 0.01				0.05
Sodium	20	8.2	5.3	7.2	8.5		9.3	8.3			
Specific Conductance (umhos/cm)	1000	1100	900	800	1400	1190	1100		1100	1400	
Sulfates	350	480	500	560	520	1000	740	680	680	900	250
Sulfites						< 1.0		< 1.0	< 1.0	< 1.0	
Sulphur - Total						330			230	300	
TDS	1000	1000	1100	1100	1200	1300	1400		1400	1300	
Temperature (deg C)	13	14	10	5	12	12	15		8	11.8	
TOC	20	3.2	5	10	4.1	5	5.4		2.7	3.1	
Total Solids	1100						1700				
Volatile Solids	270	400	210	230	290	490	620		400	130	
Zinc	< 0.05	< 0.05	0.02	0.02	0.04		0.64	0.11			5
Benzene (ug/l)		2						1.2			ND
1,2 - Dichloroethane (ug/l)				2.1							0.8 *
Ethylbenzene (ug/l)	27	1.2						7.4			50 *
Toluene (ug/l)	31										50 *
Xylenes (ug/l)								63			50 *
Xylenes - meta (ug/l)	70	4.9									
Xylenes - ortho, para (ug/l)	290	19									

NOTES:
All results are in mg/l unless otherwise indicated.
Blank spaces indicate that parameter was not analyzed, except for volatiles, where blanks indicate that parameter was not detected in the scan.
Standards obtained from 6 NYCRR Part 703.5.
* New York State Ambient Ground Water Quality Guidance Levels.

Table
Laboratory Analytical Results - Coal Ash Management Facility
Monitoring Well MW-4 (Downgradient)

PARAMETERS	Phase I - Baseline					Phase I - Construction		Phase II	Phase III		NYS GW
	4/29/86	7/28/86	10/27/86	1/9/87	4/15/87	6/22/87	7/20/87	9/15/87	9/21/87	12/22/87	Standard
Water Table Elevation	8.63'	4.63'	3.63'	5.63'	5.13'	3.38'	7.3'	5.13'	5.63'	4.13'	
Alkalinity	270	350	300	380	330	200	186		320	440	
Aluminum	< 0.5	2.3	2.2	1.5	2.1		0.17	0.17			
Ammonia - Total				< 0.5	0.24	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Arsenic (ug/l)	< 2.0	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	25
Barium	< 0.2	< 0.2	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05			1
BOD - Effluent	< 3.0	2.8	1.2	< 3.0	< 2.0		< 3.0				
Boron	0.48	0.03	< 0.05	0.06	0.13	0.11	0.08	0.17	0.17	< 0.05	
Cadmium	< 0.01	< 0.01	0.02	< 0.01	< 0.01		0.02				0.01
Calcium	210	320	260	230	180		250				
Chromium	< 0.05	< 0.05	< 0.01	< 0.02	< 0.02		< 0.05	< 0.02			
Chromium +6	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Chlorides						84			180	170	250
COD	8.6	7.2	7.2	7.5	10		< 2.0	< 2.0			
Copper	0.06	< 0.05	0.01	0.02	0.01		0.76	< 0.02			1
Cyanide	< 0.01	< 0.01			< 0.005		< 0.005	< 0.005			0.2
Fluorides	< 0.3	< 0.3	< 0.2	< 0.2	< 0.2		< 0.2	< 0.2			1.5
Hardness - Total	1500	1500	1500	910	800	790	1240		1530	1230	
Hydrogen Sulfide						< 0.05			< 0.05	< 0.05	0.05
Iron	< 0.05	0.07	0.17	0.15	0.62	0.06	< 0.05		0.05	0.03	0.3
Lead	< 0.01	< 0.01	< 0.01	0.1	< 0.01	< 0.05	0.02	0.03	0.03	< 0.01	0.025
Magnesium								160			
Manganese	< 0.05	< 0.05	0.01	0.02	0.02		< 0.05		< 0.02	< 0.01	0.3
Mercury (ug/l)	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4		< 0.4	< 0.4	< 0.4	< 0.4	2
Nitrates	0.5	0.7	0.5	1.5	0.7	1	0.9	0.36	0.5	0.7	10
Nitrogen - Total Kjeldahl	0.34	0.78	< 0.5	< 0.2	0.9		1.2	1.9			
pH (std. units)	7.7	7.2	7.3	7	7.5	7.8	7.1		7	6.6	6.5 - 8.5
Phenol	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005				0.001
Potassium	5.6	4.5	4.6	5	4.7		4.7	5.3			
Selenium (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	20
Silver	< 0.01	< 0.01	0.003	< 0.01	< 0.01		< 0.01				0.05
Sodium	22	20	12	24	29		50	47			
Specific Conductance (umhos/cm)	1800	1650	1800	1000	1300	1100	1400		1700	1600	
Sulfates	680	1000	900	500	330	120	640	1000	1000	860	250
Sulfites						< 1.0		< 1.0	< 1.0	< 1.0	
Sulphur - Total						40			330	290	
TDS	2100	1700	1900	1200	1000	1100	1600		2200	1700	
Temperature (deg. C)	14	14	22	7	13	11	14		8	11.8	
TOC	23	9.4	4.1	9.4	2.4	2.2	6.3		2.5	5.2	
Total Solids	2100						1700				
Volatile Solids	340	750	380	190	400	140	580		570	40	
Zinc	< 0.05	< 0.05	0.03	0.02	0.03		0.5	0.05			5
Benzene (ug/l)											ND
1,2 - Dichloroethane (ug/l)				2.1							0.8 *
Ethylbenzene (ug/l)											50 *
Toluene (ug/l)											50 *
Xylenes (ug/l)											50 *
Xylenes - meta (ug/l)											
Xylenes - ortho, para (ug/l)											

NOTES:
All results are in mg/l unless otherwise indicated.
Blank spaces indicate that parameter was not analyzed, except for volatiles, where blanks indicate that parameter was not detected in the scan.
Standards obtained from 6 NYCRR Part 703.5.
* New York State Ambient Ground Water Quality Guidance Levels.

APPENDIX E

HISTORICAL LABORATORY ANALYTICAL RESULTS
1988

Table E-1

Laboratory Analytical Results - Coal Ash Management Facility
Monitor Well MW-1

PARAMETERS	Phase IV 3/20/88*	Phase IV 6/13/88	Phase IV 9/22/88	Phase IV 12/27/88	NYSGW** Standard
Water Table Elev.	34.2	34.9	29.7	30.09	
Alkalinity	96	110	N.A.	96	
Aluminum	N.A.	N.A.	0.19	N.A.	
Ammonia - Total	< 0.2	< 0.2	< 0.2	< 0.2	
Arsenic (ug/l)	< 5.0	< 5.0	< 5.0	< 5.0	25
Barium	N.A.	N.A.	0.07	N.A.	1
Boron	0.25	0.25	< 0.5	0.72	
Cadmium	N.A.	N.A.	< 2.0	N.A.	0.01
Chromium	N.A.	N.A.	< 0.02	N.A.	
Chromium +6	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Chlorides	17	24	N.A.	11	250
COD	N.A.	N.A.	12	N.A.	
Copper	N.A.	N.A.	< 0.01	N.A.	1
Cyanide	N.A.	N.A.	< 0.005	N.A.	0.2
Fluorides	N.A.	N.A.	2.9	N.A.	1.5
Hardness - Total	110	150	N.A.	86	
Hydrogen Sulfide	< 0.05	< 0.05	< 0.05	< 0.05	
Iron	0.26	0.18	N.A.	0.07	0.3
Lead (ug/l)	< 10	< 5	< 5	< 5	25
Magnesium	N.A.	N.A.	4.3	N.A.	
Manganese	0.04	< 0.05	N.A.	< 0.05	0.3
Mercury (ug/l)	N.A.	N.A.	<0.4	N.A.	2
Nitrates	0.4	< 0.2	0.46	0.28	10
Nitrogen - Total Kjeldahl	N.A.	N.A.	0.6	N.A.	
Potassium	N.A.	N.A.	1.3	N.A.	
Phosphorus	N.A.	N.A.	<0.2	N.A.	
Selenium (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	20
Sodium	N.A.	N.A.	27	N.A.	
Sulfates	23	21	22	20	250
Sulphur - Total	7.6	6.3	N.A.	6.7	
TDS	210	710	N.A.	170	
TOC	1.7	3.9	N.A.	< 0.5	
Volatile Solids	50	70	N.A.	32	
Zinc	N.A.	N.A.	< 0.01	N.A.	5
pH (SU)	8.1/8.1	7.5	7.9	8.1/8.1	
Spec. Cond. (u omhs)	304	355	329	302	
Temperature (°C)	10.8	12	11.4	8.5/8.5	

NOTES:
All results are in mg/l (ppm) unless otherwise indicated.
N.A. indicates that parameter was not analyzed.
Standard for inorganic parameters obtained from 6 NYCRR Part 703.5
*Sampling occurred over two days, 3/30-31/88
**New York State Ground Water

Table E-2
Laboratory Analytical Results - Coal Ash Management Facility
Monitor Well MW-2

PARAMETERS	Phase IV 3/20/88*	Phase IV 6/13/88	Phase IV 9/22/88	Phase IV 12/27/88	NYSGW** Standard
Water Table Elevation	-8.74	-11.94	-10.14	-11.58	
Alkalinity	250	240	N.A.	240	
Aluminum	N.A.	N.A.	0.18	N.A.	
Ammonia - Total	< 0.2	< 0.2	< 0.2	< 0.2	
Arsenic (ug/l)	< 5.0	< 5.0	< 5.0	< 5.0	25
Barium	N.A.	N.A.	< 0.05	N.A.	1
Boron	0.23	0.11	< 0.5	0.35	
Cadmium	N.A.	N.A.	< 2.0	N.A.	0.01
Chromium	N.A.	N.A.	< 0.02	N.A.	
Chromium +6	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Chlorides	140	150	N.A.	140	250
COD	N.A.	N.A.	< 2.0	N.A.	
Copper	N.A.	N.A.	< 0.01	N.A.	1
Cyanide	N.A.	N.A.	< 0.005	N.A.	0.2
Fluorides	N.A.	N.A.	0.87	N.A.	1.5
Hardness - Total	1700	1400	N.A.	1200	
Hydrogen Sulfide	< 0.05	< 0.05	< 0.05	< 0.05	
Iron	0.12	0.7	N.A.	< 0.05	0.3
Lead (ug/l)	90	< 5	< 5	< 5	25
Magnesium	N.A.	N.A.	130	N.A.	
Manganese	0.02	0.06	N.A.	< 0.05	0.3
Mercury (ug/l)	N.A.	N.A.	< 0.4	N.A.	2
Nitrates	12	< 0.2	8.1	5.2	10
Nitrogen - Total Kjeldahl	N.A.	N.A.	1.6	N.A.	
Potassium	N.A.	N.A.	2.5	N.A.	
Phosphorus	N.A.	N.A.	<0.2	N.A.	
Selenium (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	20
Sodium	N.A.	N.A.	36	N.A.	
Sulfates	1340	920	793	730	250
Sulphur - Total	440	310	N.A.	240	
TDS	2600	2100	N.A.	1500	
TOC	1.8	4.2	N.A.	2.6	
Volatile Solids	720	720	N.A.	360	
Zinc	N.A.	N.A.	< 0.01	N.A.	5
pH (SU)	6.9/7.0	6.9/6.9	7.1/7.2	7	
Spec. Cond. (u omhs)	2550	2190/2160	- -	1944	
Temp (°C)	13.4	15.5/15.5	16.4/16.4	7.7	

NOTES:
All results are in mg/l (ppm) unless otherwise indicated.
N.A. indicates that parameter was not analyzed.
Standard for Inorganic parameters obtained from 6 NYCRR Part 703.5
*Sampling occurred over two days, 3/30-3/31/88.
**New York State Ground Water

Table E-3
Laboratory Analytical Results - Coal Ash Management Facility
Monitor Well MW-3

PARAMETERS	Phase IV 3/20/88*	Phase IV 6/13/88	Phase IV 9/22/88	Phase IV 12/27/88	NYSGW** Standard
Water Table Elevation	-10.43	-23.33	-17.93	-19.54	
Alkalinity	220	240	N.A.	240	
Aluminum	N.A.	N.A.	0.14	N.A.	
Ammonia - Total	< 0.2	< 0.2	< 0.2	< 0.2	
Arsenic (ug/l)	< 5.0	< 5.0	< 5.0	< 5.0	25
Barium	N.A.	N.A.	< 0.05	N.A.	1
Boron	0.18	0.1	< 0.5	0.18	
Cadmium	N.A.	N.A.	< 2.0	N.A.	0.01
Chromium	N.A.	N.A.	< 0.02	N.A.	
Chromium +6	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Chlorides	49	40	N.A.	37	250
COD	N.A.	N.A.	7.7	N.A.	
Copper	N.A.	N.A.	< 0.01	N.A.	1
Cyanide	N.A.	N.A.	< 0.005	N.A.	0.2
Fluorides	N.A.	N.A.	0.49	N.A.	1.5
Hardness - Total	1400	1000	N.A.	75	
Hydrogen Sulfide	< 0.05	0.05	< 0.05	< 0.05	
Iron	11	2.9	N.A.	< 0.05	0.3
Lead (ug/l)	140	6.8	< 5	< 5	25
Magnesium	N.A.	N.A.	92	N.A.	
Manganese	0.06	0.1	N.A.	< 0.05	0.3
Mercury (ug/l)	N.A.	N.A.	< 0.4	N.A.	2
Nitrates	< 0.2	< 0.2	< 0.2	<0.2	10
Nitrogen - Total Kjeldahl	N.A.	N.A.	0.7	N.A.	
Potassium	N.A.	N.A.	1.8	N.A.	
Phosphorus	N.A.	N.A.	<0.2	N.A.	
Selenium (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	20
Sodium	N.A.	N.A.	6.8	N.A.	
Sulfates	660	510	440	540	250
Sulphur - Total	220	340	N.A.	180	
TDS	1300	1100	N.A.	960	
TOC	4	5.6	N.A.	2	
Volatile Solids	440	350	N.A.	260	
Zinc	N.A.	N.A.	< 0.01	N.A.	5
pH (SU)	7.4/7.5	7.3	7.3	7.4	
Spec. Cond. (u omhs)	1431	1375	1340	1351	
Temp (°C)	12.9	16	14.1	8.4	

NOTES:
All results are in mg/l (ppm) unless otherwise indicated.
N.A. indicates that parameter was not analyzed.
Standard for Inorganic parameters obtained from 6 NYCRR Part 703.5
* Sampling occurred over two days, 3/30-3/31/88
**New York State Ground Water

Table E-4
Laboratory Analytical Results - Coal Ash Management Facility
Monitor Well MW-4

PARAMETERS	Phase IV 3/20/88*	Phase IV 6/13/88	Phase IV 9/22/88	Phase IV 12/27/88	NYSGW Standard
Water Table Elevation	4.93	4.03	3.83	2.82	
Alkalinity	430	350	N.A.	380	
Aluminum	N.A.	N.A.	0.15	N.A.	
Ammonia - Total	< 0.2	< 0.2	< 0.2	< 0.2	
Arsenic (ug/l)	< 5.0	< 5.0	< 5.0	< 5.0	25
Barium	N.A.	N.A.	< 0.05	N.A.	1
Boron	0.24	0.15	1	1.1	
Cadmium	N.A.	N.A.	< 2.0	N.A.	0.01
Chromium	N.A.	N.A.	< 0.02	N.A.	
Chromium +6	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Chlorides	140	130	N.A.	150	250
COD	N.A.	N.A.	6.8	N.A.	
Copper	N.A.	N.A.	< 0.01	N.A.	1
Cyanide	N.A.	N.A.	< 0.005	N.A.	0.2
Fluorides	N.A.	N.A.	1.1	N.A.	1.5
Hardness - Total	1200	1400	N.A.	1500	
Hydrogen Sulfide	< 0.05	0.06	< 0.05	< 0.05	
Iron	< 0.03	0.08	N.A.	< 0.05	0.3
Lead (ug/l)	< 10	< 5	< 5	< 5	25
Magnesium	N.A.	N.A.	150	N.A.	
Manganese	< 0.01	0.09	N.A.	0.1	0.3
Mercury (ug/l)	N.A.	N.A.	< 0.4	N.A.	2
Nitrates	0.5	0.3	< 0.2	0.27	10
Nitrogen - Total Kjeldahl	N.A.	N.A.	< 0.5	N.A.	
Potassium	N.A.	N.A.	3.9	N.A.	
Phosphorus	N.A.	N.A.	<0.2	N.A.	
Selenium (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	20
Sodium	N.A.	N.A.	47	N.A.	
Sulfates	790	1010	1040	970	250
Sulphur - Total	260	340	N.A.	320	
TDS	1700	2200	N.A.	1900	
TOC	3.2	9.8	N.A.	6.5	
Volatile Solids	470	610	N.A.	360	
Zinc	N.A.	N.A.	< 0.01	N.A.	5
pH (SU)	6.8/6.8	6.7/6.8	6.7/6.8	6.7	
Spec. Cond. (u omhs)	1530	2410/2380	2330	2370	
Temp (°C)	12.6	13.5/13.5	13.1/13.1	8.6	

NOTES:
All results are in mg/l (ppm) unless otherwise indicated.
N.A. indicates that parameter was not analyzed.
Standard for Inorganic parameters obtained from 6 NYCRR Part 703.5
* Sampling occurred over two days, 3/30-3/31/88
**New York State Ground Water

Table E-5
Volitile Organic Compound Data - 1988 Annual Sampling
Sample Concentration ug/l

COMPOUND	MW-1	MW-2	MW-3	MW-4	MDL ug/l
Acrolein	ND	ND	ND	ND	100
Acrylonitrile	ND	ND	ND	ND	100
Benzene	88	ND	ND	ND	5
Bromodichloromethane	ND	ND	ND	ND	5
Bromoform	ND	ND	ND	ND	5
Bromomethane	ND	ND	ND	ND	5
Carbon Tetrachloride	ND	ND	ND	ND	5
Chlorobenzene	ND	ND	ND	ND	5
Chloroethane	ND	ND	ND	ND	5
2-Chloroethylvinyl ether	ND	ND	ND	ND	5
Chloroform	ND	ND	ND	ND	5
Chloromethane	ND	ND	ND	ND	5
Cis-1,3-dichloropropene	ND	ND	ND	ND	5
Dibromochloromethane	ND	ND	ND	ND	5
1,2-Dichlorobenzene	ND	ND	ND	ND	5
1,3-Dichlorobenzene	ND	ND	ND	ND	5
1,4-Dichlorobenzene	ND	ND	ND	ND	5
1,1-Dichloroethane	ND	ND	ND	ND	5
1,2-Dichloroethane	ND	ND	ND	ND	5
1,1-Dichloroethene	ND	ND	ND	ND	5
1,2-Dichloropropane	ND	ND	ND	ND	5
Ethylbenzene	ND	ND	ND	ND	5
Methlylene chloride	ND	ND	ND	ND	5
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	5
Tetrachloroethene	ND	ND	ND	ND	5
Toluene	ND	ND	ND	ND	5
trans-1,3-Dichloropropene	ND	ND	ND	ND	5
trans-1,2-Dichloroethylene	ND	ND	ND	ND	5
1,1,1-Trichloroethane	ND	ND	ND	ND	5
1,1,2-Trichloroethane	ND	ND	ND	ND	5
Trichoroethene	ND	ND	ND	ND	5
Trichlorofluoromethane	ND	ND	ND	ND	5
Vinyl Choride	ND	ND	ND	ND	5
Total Xylenes	ND	ND	ND	ND	5

ND= NOT DETECTED

APPENDIX F

PARAMETERS FOR WHICH A SIGNIFICANT CHANGE OCCURRED: 1987

Table F-1

Parameters For Which A Significant Change Has Occurred
As Defined In The Solid Waste Facility Report
Monitoring Well MW-2 (Downgradient)

PARAMETERS	Phase II	Phase III		NYS GW
	9/15/87	9/21/87	12/22/87	Standard
Alkalinity				
Aluminum				
Ammonia - Total				
Arsenic (ug/l)				25
Barium				1
BOD - Effluent				
Boron				
Cadmium				0.01
Calcium				
Chromium				
Chromium +6				0.05
Chlorides				250
COD				
Copper				1
Cyanide				0.2
Fluorides				1.5
Hardness - Total		(D)(670)	(D)(470)	
Hydrogen Sulfide				0.05
Iron				0.3
Lead	(A)(0.04)	(A)(0.04)		0.025
Magnesium				
Manganese				0.3
Mercury (ug/l)				2
Nitrates				10
Nitrogen - Total Kjeldahl				
pH (std. units)				6.5 - 8.5
Phenol				0.001
Potassium				
Selenium (ug/l)				20
Silver				0.05
Sodium				
Specific Conductance (umhos/cm)				
Sulfates	(A)(1380),(D)(450)	(A)(1380),(D)(450)	(A)(1500),(D)(570)	250
Sulfites				
Sulphur - Total				
TDS		(D)(700)	(D)(800)	
Temperature (deg. C)				
TOC				
Total Solids				
Volatile Solids		(D)(100)		
Zinc				5
Benzene (ug/l)				ND
1,2 - Dichloroethane (ug/l)				0.8 *
Ethylbenzene (ug/l)				50 *
Toluene (ug/l)				50 *
Xylenes (ug/l)				50 *
Xylenes - meta (ug/l)				
Xylenes - ortho, para (ug/l)				

NOTES:
All results are in mg/l unless otherwise noted.
(A) Parameter exceeds state ground water standard. Standards obtained from 6 NYCRR Part 703.5. Measured value in parentheses.
(B) Parameter exceeds SPDES permit limits. Measured value in parentheses.
(C) Parameter increased by 100% from highest Phase I Baseline value. Calculated % increase in parentheses.
(D) Parameter increased by 100 ppm from highest Phase I Baseline value. Calculated ppm increase in parentheses.
* New York State Ambient Ground Water Quality Guidance Levels.

Table F-2

Parameters For Which A Significant Change Has Occurred
As Defined In The Solid Waste Facility Report
Monitoring Well MW-3 (Downgradient)

PARAMETERS	Phase II	Phase III		NYS GW
	9/16/87	9/21/87	12/22/87	Standard
Alkalinity				
Aluminum				
Ammonia - Total				
Arsenic (ug/l)				25
Barium				1
BOD - Effluent				
Boron				
Cadmium				0.01
Calcium				
Chromium				
Chromium +6				0.05
Chlorides				250
COD				
Copper				1
Cyanide				0.2
Fluorides				1.5
Hardness - Total		(D)(170)	(D)(180)	
Hydrogen Sulfide				0.05
Iron		(A)(0.81)	(A)(0.84)	0.3
Lead				0.025
Magnesium				
Manganese				0.3
Mercury (ug/l)				2
Nitrates				10
Nitrogen - Total Kjeldahl				
pH (std. units)				6.5 - 8.5
Phenol				0.001
Potassium				
Selenium (ug/l)				20
Silver				0.05
Sodium				
Specific Conductance (umhos/cm)				
Sulfates	(A)(680),(D)(120)	(A)(680),(D)(120)	(A)(900),(D)(340)	250
Sulfites				
Sulphur - Total				
TDS		(D)(200)	(D)(100)	
Temperature (deg. C)				
TOC				
Total Solids				
Volatile Solids				
Zinc	(C)(175%)			5
Benzene (ug/l)	(A)(2)			ND
1,2 - Dichloroethane (ug/l)				0.8 *
Ethylbenzene (ug/l)				50 *
Toluene (ug/l)				50 *
Xylenes (ug/l)	(A)(63)			50 *
Xylenes - meta (ug/l)				
Xylenes - ortho, para (ug/l)				

NOTES:

All results are in mg/l unless otherwise noted.

(A) Parameter exceeds state ground water standard. Standards obtained from 6 NYCRR Part 703.5. Measured value in parentheses.

(B) Parameter exceeds SPDES permit limits. Measured value in parentheses.

(C) Parameter increased by 100% from highest Phase I Baseline value. Calculated % increase in parentheses.

(D) Parameter increased by 100 ppm from highest Phase I Baseline value. Calculated ppm increase in parentheses.

* New York State Ambient Ground Water Quality Guidance Levels.

Table F-3

Parameters For Which A Significant Change Has Occurred
As Defined In The Solid Waste Facility Report
Monitoring Well MW-4 (Downgradient)

PARAMETERS	Phase II	Phase III		NYS GW
	9/16/87	9/21/87	12/22/87	Standard
Alkalinity				
Aluminum				
Ammonia - Total				
Arsenic (ug/l)				25
Barium				1
BOD - Effluent				
Boron				
Cadmium				0.01
Calcium				
Chromium				
Chromium +6				0.05
Chlorides				250
COD				
Copper				1
Cyanide				0.2
Fluorides				1.5
Hardness - Total				
Hydrogen Sulfide				0.05
Iron				0.3
Lead	(A)(0.03)	(A)(0.03)		0.025
Magnesium				
Manganese				0.3
Mercury (ug/l)				2
Nitrates				10
Nitrogen - Total Kjeldahl	(C)(110%)			
pH (std. units)				6.5 - 8.5
Phenol				0.001
Potassium				
Selenium (ug/l)				20
Silver				0.05
Sodium				
Specific Conductance (umhos/cm)				
Sulfates	(A)(1000)	(A)(1000)	(A)(860)	250
Sulfites				
Sulphur - Total				
TDS		(D)(100)		
Temperature (deg. C)				
TOC				
Total Solids				
Volatile Solids				
Zinc				5
Benzene (ug/l)				ND
1,2 - Dichloroethane (ug/l)				0.8 *
Ethylbenzene (ug/l)				50 *
Toluene (ug/l)				50 *
Xylenes (ug/l)				50 *
Xylenes - meta (ug/l)				
Xylenes - ortho, para (ug/l)				

NOTES:

All results are in mg/l unless otherwise noted.

(A) Parameter exceeds state ground water standard. Standards obtained from 6 NYCRR Part 703.5. Measured value in parentheses.

(B) Parameter exceeds SPDES permit limits. Measured value in parentheses.

(C) Parameter increased by 100% from highest Phase I Baseline value. Calculated % increase in parentheses.

(D) Parameter increased by 100 ppm from highest Phase I Baseline value. Calculated ppm increase in parentheses.

* New York State Ambient Ground Water Quality Guidance Levels.

APPENDIX G

PARAMETERS FOR WHICH A SIGNIFICANT CHANGE OCCURRED: 1988

Table G-1

Parameters For Which A Significant Change Has Occurred
As Defined In The Solid Waste Facility Report
Monitor Well MW-1

PARAMETERS	Phase IV 3/20/88*	Phase IV 6/13/88	Phase IV 9/22/88	Phase IV 12/27/88	NYSGW** Standard
Alkalinity					
Aluminum					
Ammonia - Total					
Arsenic (ug/l)					25
Barium					1
Boron					
Cadmium					0.01
Chromium					
Chromium +6					0.05
Chlorides	(C)(467%)	(C) (700%)		(C) (267%)	250
COD					
Copper					1
Cyanide					0.2
Fluorides			(A) (2.9)		1.5
Hardness - Total		(C) (117%)			
Hydrogen Sulfide					
Iron					0.3
Lead (ug/l)					25
Magnesium					
Manganese					0.3
Mercury (ug/l)					2
Nitrates					10
Nitrogen - Total Kjeldahl					
Potassium					
Selenium (ug/l)					20
Sodium					
Sulfates					250
Sulphur - Total					
TDS		(C) (273%); (D) (520)			
TOC					
Volatile Solids					
Zinc					5

NOTES:

All results are in mg/l (ppm) unless otherwise indicated. * Sampling occurred over two days, 3/30-31/88

(A) Parameter exceeds state ground water standard; standards obtained from 6 NYCRR Part 703.5. Measured value in parentheses.

(B) Parameter exceeds SPDES Permit limits. Measured value in Parentheses.

(C) Parameter increased by 100% from highest Phase I Baseline value. Calculated % increase in parentheses.

(D) Parameter increased by 100 ppm from highest Phase I Baseline value. Calculated ppm increase in parentheses.

**New York State Ground Water

Table G-2
Parameters For Which A Significant Change Has Occurred
As Defined in The Solid Waste Facility Report
Monitor Well MW-2

PARAMETERS	Phase IV 3/20/88*	Phase IV 6/13/88	Phase IV 9/22/88	Phase IV 12/27/88	NYSGW** Standard
Alkalinity					
Aluminum					
Ammonia - Total					
Arsenic (ug/l)					25
Barium					1
Boron					
Cadmium					0.01
Chromium					
Chromium +6					0.05
Chlorides					250
COD					
Copper					1
Cyanide					0.2
Fluorides			(C)(335%)		1.5
Hardness - Total	(D)(390)				
Hydrogen Sulfide					
Iron		(A)(0.7)			0.3
Lead (ug/l)	(A)(90)				25
Magnesium					
Manganese		(C)(200%)			0.3
Mercury (ug/l)					2
Nitrates	(A)(12)				10
Nitrogen - Total Kjeldahl					
Potassium					
Selenium (ug/l)					20
Sodium					
Sulfates	(A)(1340),(D)(410)	(A)(920)	(A)(793)	(A)(730)	250
Sulphur - Total					
TDS	(D)(800)	(D)(2100)			
TOC					
Volatile Solids					
Zinc					5

NOTES:
All results are in mg/l (ppm) unless otherwise indicated. *Sampling occurred over two days, 3/30-31/88
(A) Parameter exceeds state ground water standard; standards obtained from 6 NYCRR Part 703.5. Measured value in parentheses.
(B) Parameter exceeds SPDES Permit limits. Measured value in Parentheses.
(C) Parameter increased by 100% from highest Phase I Baseline value. Calculated % increase in parentheses.
(D) Parameter increased by 100 ppm from highest Phase I Baseline value. Calculated ppm increase in parentheses.
**New York State Ground Water

Table G-3
Parameters For Which A Significant Change Has Occurred
As Defined in the Solid Waste Facility Report
Monitor Well MW-3

PARAMETERS	Phase IV 3/20/88*	Phase IV 6/13/88	Phase IV 9/22/88	Phase IV 12/27/88	NYSGW** Standard
Alkalinity					
Aluminum					
Ammonia - Total					
Arsenic (ug/l)					25
Barium					1
Boron					
Cadmium					0.01
Chromium					
Chromium +6					0.05
Chlorides					250
COD					
Copper					1
Cyanide					0.2
Fluorides			(C)(145%)		1.5
Hardness - Total	(D)(500)	(D)(100)			
Hydrogen Sulfide					
Iron	(A)(11),(B)(11), (C)(1058%)	(A)(2.9),(C)(205%)			0.3
Lead (ug/l)	(A)(140)				25
Magnesium					
Manganese		(C)(150%)			0.3
Mercury (ug/l)					2
Nitrates					10
Nitrogen - Total Kjeldahl					
Potassium					
Selenium (ug/l)					20
Sodium					
Sulfates	A)(660), (D)(100)	(A)(510)	(A)(440)	(A)(540)	250
Sulphur - Total					
TDS	(D)(100)				
TOC					
Volatile Solids					
Zinc					5

NOTES:
All results are in mg/l (ppm) unless otherwise indicated. *Sampling occurred over two days, 3/30-31/88.
(A) Parameter exceeds state ground water standard; standards obtained from 6 NYCRR Part 703.5. Measure value in parentheses.
(B) Parameter exceeds SPDES Permit limits. Measured value in Parentheses.
(C) Parameter increased by 100% from highest Phase I Baseline value. Calculated % increase in parentheses.
(D) Parameter increased by 100 ppm from highest Phase I Baseline value. Calculated ppm increase in parentheses.
**New York State Ground Water

Table 6-4

Parameters For Which A Significant Change Has Occurred
As Defined in the Solid Waste Facility Report
Monitor Well MW-4

PARAMETERS	Phase IV 3/20/88*	Phase IV 6/13/88	Phase IV 9/22/88	Phase IV 12/27/88	NYSGW** Standard
Alkalinity					
Aluminum					
Ammonia - Total					
Arsenic (ug/l)					25
Barium					1
Boron			(C)(108%)	(C)(129%)	
Cadmium					0.01
Chromium					
Chromium +6					0.05
Chlorides					250
COD					
Copper					1
Cyanide					0.2
Fluorides			(C)(267%)		1.5
Hardness - Total					
Hydrogen Sulfide					
Iron					0.3
Lead (ug/l)					25
Magnesium					
Manganese		(C)(350%)		(C)(400%)	0.3
Mercury (ug/l)					2
Nitrates					10
Nitrogen - Total Kjeldahl					
Potassium					
Selenium (ug/l)					20
Sodium					
Sulfates	(A)(790)	(A)(1010)	(A)(1040)	(A)(970)	250
Sulphur - Total					
TDS		(D)(100)			
TOC					
Volatile Solids					
Zinc					5

NOTES:
All results are in mg/l (ppm) unless otherwise indicated. *Sampling occurred over two days, 3/30-31/88
(A) Parameter exceeds state ground water standard; standards obtained from 6 NYCRR Part 703.5. Measured value in parentheses.
(B) Parameter exceeds SPDES Permit limits. Measured value in Parentheses.
(C) Parameter increased by 100% from highest Phase I Baseline value. Calculated % increase in parentheses.
(D) Parameter increased by 100 ppm from highest Phase I Baseline value. Calculated ppm increase in parentheses.
**New York State Ground Water