K/SUB/90-NH989/2

K-25

OAK RIDGE
K-25 SITE

990 ANNUAL GROUNDWATER REPORT
K-1407-B AND K-1407-C
INTERIM STATUS UNITS
OAK RIDGE K-25 SITE

MARTIN MARIETTA

ENVIRONMENTAL MANAGEMENT DEPARTMENT
HEALTH, SAFETY, AND ENVIRONMENTAL
MANAGEMENT DIVISION

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Prepared by

Geraghty & Miller, Inc.
Environmental Services, Groundwater Consultants
255 South Tulane Avenue
Oak Ridge, Tennessee 37830
Under
Subcontract No. 90K-NH989C

MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

February 1991

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Prepared for the

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7314
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

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1.0 INTRODUCTION

The Tennessee Department of Health and Environment (TDHE) Rules Governing Hazardous Waste Management require that specific ground-water information for interim status units be reported in conjunction with the annual hazardous waste treatment, storage, and disposal report (TN 1200-1-11-.05(6)(e)1 and 2). To be included in the report are the data from annual/semiannual ground-water sampling, results of statistical analyses, and an evaluation of ground-water surface elevations for units in detection monitoring. This report prepared by Geraghty & Miller, Inc. (Geraghty & Miller) fulfills these reporting requirements for interim status units in detection monitoring.

Martin Marietta Energy Systems, Inc. manages the K-25 Site in Oak Ridge, Tennessee for the Department of Energy. Two interim status units at K-25 require ground-water monitoring, the K-1407-B and K-1407-C Holding Ponds (Figure 1). Both of these units were surface impoundments that have been drained and the waste sludges removed in response to the November 8, 1988, interim status closure milestone. The K-1407-C Pond was drained in mid-1987 and sludge removal activities were completed in November of 1988. The K-1407-B Pond was drained in October 1988, and sludge removal activities were completed in August of 1989. Both units have undergone soil sampling to verify complete sludge removal which would allow them to be "clean closed" under interim status regulations. Analytical results of soil samples from K-1407-C Pond are currently being evaluated and soil samples from K-1407-B Pond are undergoing laboratory analysis at this time.

This report presents the results of the ground-water monitoring conducted at each unit in compliance with interim status regulations. The statistical analyses contained in this report were performed by Sherry Williams of the K-25 Statistical Analysis organization.

2.0 HYDROGEOLOGY

The K-1407-B and K-1407-C Ponds occupy a small valley, the K-1700 watershed, that drains the northeastern corner of the K-25 Site in a westerly direction then on northward to Poplar Creek. The hydrogeologic framework consists of two parts: an upper unconsolidated zone and a lower bedrock zone. The unconsolidated zone consists of fill material, alluvium, and residuum of weathered bedrock. Bedrock consists of limestones and shales (Figure 2). The thickness of the unconsolidated zone in the area of the ponds, based on depth of penetration of the monitor wells, ranges in thickness from 11 to 40 ft.

Ground water in the area is derived from local precipitation that infiltrates the upper unconsolidated material and in some areas moves into the underlying bedrock. Ground water flows from areas of recharge along relatively short and shallow flow paths toward areas of discharge. Ground-water flow in the upper unconsolidated zone is strongly controlled by surface topography. Ground-water occurrence and movement in the bedrock is largely dependent on the presence of bedding planes, joints, fractures, and solution cavities. Additional information on the hydrogeology of the K-1407 area is contained in Haymore et al. (1988) and Geraghty & Miller (1989).

3.0 K-1407-B POND

The K-1407-B Pond is located immediately south of the K-1700 stream (Mitchell Creek) in the northeastern portion of the K-25 Site (Figure 3). This unit was a 2.3 million gallon surface impoundment that served as a settling pond for precipitates from neutralized metals, cleaning solutions, uranium decontamination solutions, and neutralized coal pile runoff. As stated previously, the pond has been drained and sludge removal activities have been completed at this unit.

3.1 MONITOR-WELL NETWORK

The monitor-well network for the K-1407-B Pond consist of five unconsolidated zone wells designated UNW-1 through UNW-5 (Figure 3). The wells were installed in October of 1985 under the supervision of Geraghty & Miller. Lithologic logs and well construction diagrams are contained in Appendix A and Appendix B, respectively.

3.2 1990 GROUND-WATER DATA

A false-positive ground-water assessment for K-1407-B Pond was conducted from November 1987 through December 1988 in response to statistically significant increases in specific conductance at one downgradient well and total organic halogens (TOX) at another. The false-positive assessment was approved by the TDHE on March 10, 1989. Also approved was a change from assessment monitoring to a modified detection program (Appendix E). This modified detection program was designed to avoid false-positive indications from specific conductance increases, which were demonstrated to be caused by nonhazardous constituents, and from TOX increases, which were demonstrated to be attributable to sources other than the regulated unit.

The modified detection monitoring program at the K-1407-B Pond requires semiannual monitoring of metal concentrations in addition to the interim status detection

monitoring parameters (Table 1). The 1990 monitoring program also included analysis of organic constituents and selected radiochemical parameters as well as the required modified detection monitoring parameters. This level of monitoring, which exceeds regulatory requirements, was conducted to provide information to the K-25 Environmental Restoration Program.

A listing of the 1990 ground-water quality data for the K-1407-B Pond is contained in Appendix C. The semiannual sampling was conducted in March and September during 1990.

3.3 GROUND-WATER SURFACE ELEVATIONS

Ground-water surface elevations for the two 1990 semi-annual sampling events at K-1407-B Pond are listed in Table 2 and illustrated on Figures 3 and 4. There were no significant changes in the ground-water elevations, and UNW-1 remains the upgradient well for the unit.

Historically, the water level in well UNW-5 was consistently higher than the water surface elevation of the K-1407-B Pond; the water-level elevation at UNW-5 has not changed significantly with the draining of the pond. These conditions indicate that the well is indeed upgradient of the pond. However, ground-water quality at UNW-5 has been adversely affected by organic constituents. As discussed in the false-positive justification, these conditions strongly support the premise that organic contamination near K-1407-B Pond originates at sources other than the regulated unit. Data produced at locations upgradient from the pond under the Environmental Restoration Program also support this premise and are being used to identify the source or sources of the contamination.

3.4 STATISTICAL ANALYSES

Statistical analyses of indicator parameters and individual metals were conducted for the March and September sampling events. In accordance with the approved modified detection program, specific conductance was analyzed statistically on a within-well basis only and statistical analysis of TOX was not conducted. Any metal that exceeded a primary or secondary drinking water standard was analyzed statistically against its background pool. All statistical analyses were conducted using the Student's t-test at a 0.01 level of significance. As described in the false-positive assessment report (Haymore et al. 1988), UNW-5 was considered a downgradient well for statistical purposes (even though Figures 3 and 4 show it is clearly an upgradient well), because its inclusion in the upgradient pool may mask statistically significant parameters in the true downgradient wells.

The results of statistical analyses performed under the modified detection program for the K-1407-B Pond during 1990 are listed in Tables 3 and 4 and the letter reports provided in Appendix D. The statistical results for the upgradient well, UNW-1, are discussed separately in Section 3.4.1.

For the March sampling event, UNW-5 exhibited concentrations of manganese that were statistically significant when compared to concentrations in the upgradient pool. Historically, manganese concentrations at UNW-5 have been statistically significant when compared to the upgradient pool. The concentration of manganese in the local ground water is highly variable both spatially and temporally because of geologic, chemical, and seasonal effects. Therefore, the manganese concentration is considered to reflect natural ground-water conditions. Additionally, as previously discussed, well UNW-5 is actually located hydraulically upgradient of K-1407-B Pond. Further response to the manganese

concentrations is not required under the modified detection program because manganese is not a hazardous constituent.

For the September sampling event, UNW-5 again exhibited a statistically significant concentration of manganese when compared to the upgradient pool. Additionally, UNW-3 and UNW-4 exhibited statistically significant concentrations of cadmium both on a within-well basis and an upgradient versus downgradient comparison basis. As required by interim status regulations [TN1200-1-11-.05(6)(d)3(ii)] and the modified detection program, the two wells were resampled on January 26, 1991. These samples are currently undergoing laboratory analysis to determine if the September results may have been caused by sampling or laboratory error. If the resampling confirms that statistically significant levels of cadmium are present above drinking water standards, TDHE will be notified within 7 days and the unit will be returned to assessment monitoring.

3.4.1 Upgradient Well

Upgradient well UNW-1 exhibited statistically significant increases in specific conductance for both the March and September sampling events. Manganese also exhibited a statistically significant increase for the March sampling event. As has been discussed in previous annual reports (Forstrom 1990) the manganese concentration fluctuations are considered to reflect the variability of the natural ground-water conditions.

The increase in specific conductance at UNW-1 has been hypothesized to be due to natural fluctuations in ground-water quality or indicative of approaching contaminants from an upgradient source (Forstrom 1989, 1990). The 1989 Annual Report discusses a trend of increasing specific conductance in UNW-1 since December 1987 which may be indicative of approaching contamination. This trend continued in 1990 with the highest recorded specific conductance at UNW-1 reported during the March 1990 sampling event;

however, specific conductance showed a decline for the first time since 1987 during the September sampling event (Figure 5).

The change in water chemistry at UNW-1 is not considered detrimental to the use of the well for providing representative upgradient ground-water quality for the K-1407-B Pond; therefore, no changes to the monitoring system are necessary.

4.0 K-1407-C POND

The K-1407-C Pond is located on the north side of the K-1700 stream in the northeastern portion of the plant. This unit was a 1.3 million gallon surface impoundment that was used for the disposal of corrosive and nonhazardous wastes. As stated previously, the pond has been drained and sludge removal activities have been completed at this unit.

4.1 MONITORING SYSTEM

The monitor-well network for K-1407-C Pond consists of six unconsolidated zone wells designated UNW-6 through UNW-11 (Figures 3 and 4). These wells were installed in October of 1985 under the supervision of Geraghty & Miller. Lithologic logs and construction diagrams for these wells are contained in Appendix A and Appendix B, respectively.

4.2 1990 GROUND-WATER DATA

The false-positive assessment program for K-1407-C Pond was first initiated during November 1987 in response to statistically significant increases in specific conductance at several downgradient wells. The false-positive assessment was approved by the TDHE on July 11, 1988. Also approved was a change from assessment monitoring to a modified detection monitoring program (Appendix E). The modified detection monitoring program was designed to avoid false-positive indications from specific conductance increases that were demonstrated to be caused by nonhazardous constituents.

The modified detection monitoring program for K-1407-C Pond requires the semiannual monitoring of metal concentrations in addition to the interim status detection

monitoring parameters (Table 1). As at K-1407-B Pond, organic constituents and selected radiochemical parameters are also monitored at K-1407-C Pond.

4.3 GROUND-WATER SURFACE ELEVATIONS

Ground-water surface elevations for the two 1990 sampling events at K-1407-C Pond are listed in Table 5 and illustrated on Figures 3 and 4. Water levels showed a decline in all monitor wells from the March to September sampling events. The water-level decline ranged from 1 ft at UNW-7 to nearly 7 ft at UNW-6. Monitor well UNW-6 has historically exhibited the greatest water-level fluctuations. Despite these fluctuations in water levels, UNW-6 remains the upgradient well for K-1407-C Pond; therefore, no response to the ground-water surface elevations is required.

4.4 STATISTICAL ANALYSES

Statistical analyses of indicator parameters and individual metals were conducted for both 1990 sampling events at K-1407-C Pond. In accordance with the approved modified detection monitoring program, specific conductance was statistically analyzed on a within-well basis only. Any metal that exceeded a primary or secondary drinking water standard was statistically analyzed against its background pool. All statistical analyses were conducted using the Student's t-test at a 0.01 level of significance.

The results of statistical analyses performed under the modified detection program for K-1407-C Pond during 1990 are listed in Tables 6 and 7 and the letter reports provided in Appendix D. The statistical results for the upgradient well, UNW-6, are discussed separately in Section 4.4.1.

There were no statistically significant results on a within-well basis for any of the wells during the March and September sampling events. For the March sampling event, manganese concentrations were statistically significant on an upgradient versus

downgradient basis in wells UNW-7, UNW-9, and UNW-10. Statistically significant results were also obtained on an upgradient versus downgradient basis for pH in well UNW-8. As discussed previously, the manganese concentrations are considered to be a reflection of the natural geologic, chemical, and seasonal ground-water conditions and further response to this nonhazardous constituent is not required under the modified detection monitoring program. In accordance with TN1200-1-11-.05(6)(d)3(ii) and the modified detection monitoring program, UNW-8 was resampled on June 27, 1990 and the sample analyzed for pH to confirm the March sampling results.

The results of the confirmation sampling at UNW-8 are provided in Table 4. The pH results are no longer statistically significant (Appendix E), indicating a possible sampling error, analytical error, or a temporal fluctuation of the natural ground-water quality. On the basis of the results of the confirmation sampling, no further action is required under TDHE regulations or the modified detection monitoring program.

For the September sampling, manganese concentrations were once again statistically significant on an upgradient versus downgradient basis in well UNW-9. For the reasons stated above, no further response to this constituent is required under the modified detection monitoring program.

4.4.1 Upgradient Well

Historically the upgradient well UNW-6 has exhibited statistically significant concentrations of various metals; however, during 1990 there were no metal concentrations exhibiting statistically significant increases and none exceeded drinking water standards. Monitor well UNW-6 continues to provide a valid representation of upgradient ground-water quality; therefore, no changes to the monitoring system are necessary.

5.0 CONCLUSIONS

Two interim status units require ground-water monitoring at the K-25 Site. TDHE regulations require the annual reporting of annual/semiannual ground-water sampling data, results of statistical analyses, and an evaluation of ground-water surface elevations for interim status units in detection monitoring. The K-1407-B and K-1407-C Ponds have both been drained and the sludges removed from the units.

The TDHE has approved a modified detection monitoring program for the two units. The modified detection program was designed to avoid false-positive indications from specific conductance increases attributable to nonhazardous constituents at both units and from TOX increases attributable to other sources at the K-1407-B Pond.

The results of statistical analysis of monitored parameters at the K-1407-B Pond indicated significant concentrations of manganese at monitor well UNW-5 for both the March and September sampling events. However, the manganese concentrations are considered to be a reflection of the natural ground-water quality. Wells UNW-3 and UNW-4 exhibited statistically significant concentrations of cadmium for the September sampling event. As required by interim status regulations, the two wells were resampled and the samples are undergoing laboratory analysis for confirmation of the September sampling results. Statistically significant increases in specific conductance at the upgradient well, UNW-1, were also reported for the March and September sampling events. There has been a trend of increasing specific conductance at this well since 1987 and it has been hypothesized to be indicative of approaching contaminants from an upgradient source (Forstrom 1990).

The results of statistical analysis of monitored parameters at the K-1407-C Pond indicated significant concentrations of manganese at wells UNW-7, UNW-9, and UNW-10 for the March sampling event and at UNW-9 for the September sampling

event. Statistically significant results were also obtained for pH in well UNW-8 for the March sampling event. The well was resampled and the pH results were no longer statistically significant, suggesting the March result may have been a sampling error, analytical error, or a natural fluctuation of the ground-water quality.

Although some statistically significant results were obtained during the 1990 sampling programs at the K-1407-B and K-1407-C Ponds, these were due to nonhazardous constituents or can be explained by sampling or analytical error, or by the presence of upgradient sources. Resampling of UNW-3 and UNW-4 at K-1407-B Pond for confirmation of statistically significant concentrations of cadmium has been conducted and the samples are undergoing laboratory analysis. If statistically significant concentrations of cadmium are confirmed, the TDHE will be notified within the required 7-day time period.

At this time no further response or changes to the modified detection monitoring program at the K-1407-B and K-1407-C Ponds are required or recommended.

6.0 REFERENCES

Forstrom, J.M. 1989. 1988 Annual Groundwater Report K-1407-B and K-1407-C Interim Status Units, Oak Ridge Gaseous Diffusion Plant. Martin Marietta Energy Systems, Inc. K/HS-257.

Forstrom, J.M. 1990. 1989 Annual Groundwater Report K-1407-B and K-1407-C Interim Status Units, Oak Ridge Gaseous Diffusion Plant. Martin Marietta Energy Systems, Inc. K/HS-287.

Geraghty & Miller, Inc. 1989. Revised Hydrogeology of the Oak Ridge Gaseous Diffusion Plant. Prepared for Martin Marietta Energy Systems, Inc. K/SUB/85-22224/12.

Haymore, S.L., S.R. Williams, and J.W. Zolyniak. 1988. K-1407-B and K-1407-C Surface Impoundment False-Positive Groundwater Assessment. Oak Ridge Gaseous Diffusion Plan. Martin Marietta Energy Systems, Inc. K/HS-214.

TABLES

Table 1. Parameters Monitored under the Interim Status Modified Detection Programs at K-1407-B and K-1407-C Ponds

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

Indicator Parameters

pH	Total organic carbon
Specific conductance	Total organic halogens

Metals

Aluminum	Iron	Selenium
Antimony	Lead	Silicon
Arsenic	Lithium	Silver
Barium	Magnesium	Sodium
Beryllium	Manganese	Strontium
Boron	Mercury	Thallium
Cadmium	Molybdenum	Thorium
Calcium	Nickel	Titanium
Chromium	Niobium	Vanadium
Cobalt	Phosphorus	Zinc
Copper	Potassium	Zirconium

Water Quality Parameters

Chloride	Phenols	Sulfate

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Table 2. Water-Level Elevations at K-1407-B Pond, 1990

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

Date	UNW-1	UNW-2	UNW-3	UNW-4	UNW-5
March 3 - 14	763.97	751.07	746.14	751.65	759.65
September 22 - 26	763.32	750.73	749.51	751.07	759.65

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* All measurements: feet, mean sea level.

Table 3. Statistically Significant Parameters at K-1407-B Pond, March 1990

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

Analyte	Background Average	March 1990 Result	Background Standard Deviation	Drinking Water Standard
Within Well				
UNW-1				
Specific conductance (µmhos/cm)	448.30	1423.60	34.5319	N/A
Manganese (mg/L)	5.78	23.00	1.1432	0.05

Analyte	Upgradient Average	Downgradient Result	Upgradient Standard Deviation	Drinking Water Standard
Upgradient vs Downgradient				
UNW-5				
Manganese (mg/L)	5.78	19.00 (19,19)*	1.1432	0.05

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* Analysis was duplicated, individual results in parentheses.

Table 4. Statistically Significant Parameters at K-1407-B Pond, September 1990

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

Analyte	Background Average	September 1990 Result	Background Standard Deviation	Drinking Water Standard
Within Well				
UNW-1				
Specific conductance (μmhos/cm)	448.30	844.20	34.5319	N/A
UNW-3				
Cadmium (mg/L)	0.0036	0.0130	0.0013	0.01
UNW-4				
Cadmium (mg/L)	0.0041	0.0270 (0.028, 0.026)*	0.0025	0.01

Analyte	Upgradient Average	Downgradient Result	Upgradient Standard Deviation	Drinking Water Standard
Upgradient vs Downgradient				
UNW-3				
Cadmium (mg/L)	0.0034	0.0130	0.0009	0.01
UNW-4				
Cadmium (mg/L)	0.0034	0.0270 (0.028, 0.026)*	0.0009	0.01
UNW-5				
Manganese (mg/L)	5.78	20.0	1.1432	0.05

14FEB91 Ba

* Analysis was duplicated, individual results in parentheses.

Table 5. Water-Level Elevations at K-1407-C Pond, 1990

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

Date	UNW-6	UNW-7	UNW-8	UNW-9	UNW-10	UNW-11
March 3 - 14	764.12	754.93	754.33	754.61	753.54	755.92
September 22 - 26	757.17	753.93	753.08	753.49	751.79	752.83

14FEB91 Ba

* All measurements: feet, mean sea level.

Table 6. Statistically Significant Parameters at K-1407-C Pond, March 1990

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

Analyte	Background Average	September 1990 Result	Background Standard Deviation	Drinking Water Standard
Within Well				
None				

Analyte	Upgradient Average	Downgradient Result	Upgradient Standard Deviation	Drinking Water Standard
Upgradient vs Downgradient				
UNW-7				
Manganese (mg/L)	0.93	6.55 (6.4, 6.7)*	1.3489	0.05
UNW-8				
pH	7.57	5.84	0.2589	N/A
UNW-9				
Manganese (mg/L)	0.93	23.00	1.3489	0.05
UNW-10				
Manganese (mg/L)	0.93	9.00	1.3489	0.05

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* Analysis was duplicated, individual results in parentheses.

Table 7. Statistically Significant Parameters at K-1407-C Pond, September 1990

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

Analyte	Background Average	September 1990 Result	Background Standard Deviation	Drinking Water Standard
Within Well				
None.				

Analyte	Upgradient Average	Downgradient Result	Upgradient Standard Deviation	Drinking Water Standard
Upgradient vs Downgradient				
UNW-9				
Manganese (mg/L)	0.9288	17.0	1.3489	0.05

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Table 8. Results of Confirmation Sampling at K-1407-C Pond, June 27, 1990

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

Well	Analyte	Result
UNW-8	pH	5.9
		6.5
		6.5
		6.5
		6.7
		6.5
		6.5
		6.5
		6.6

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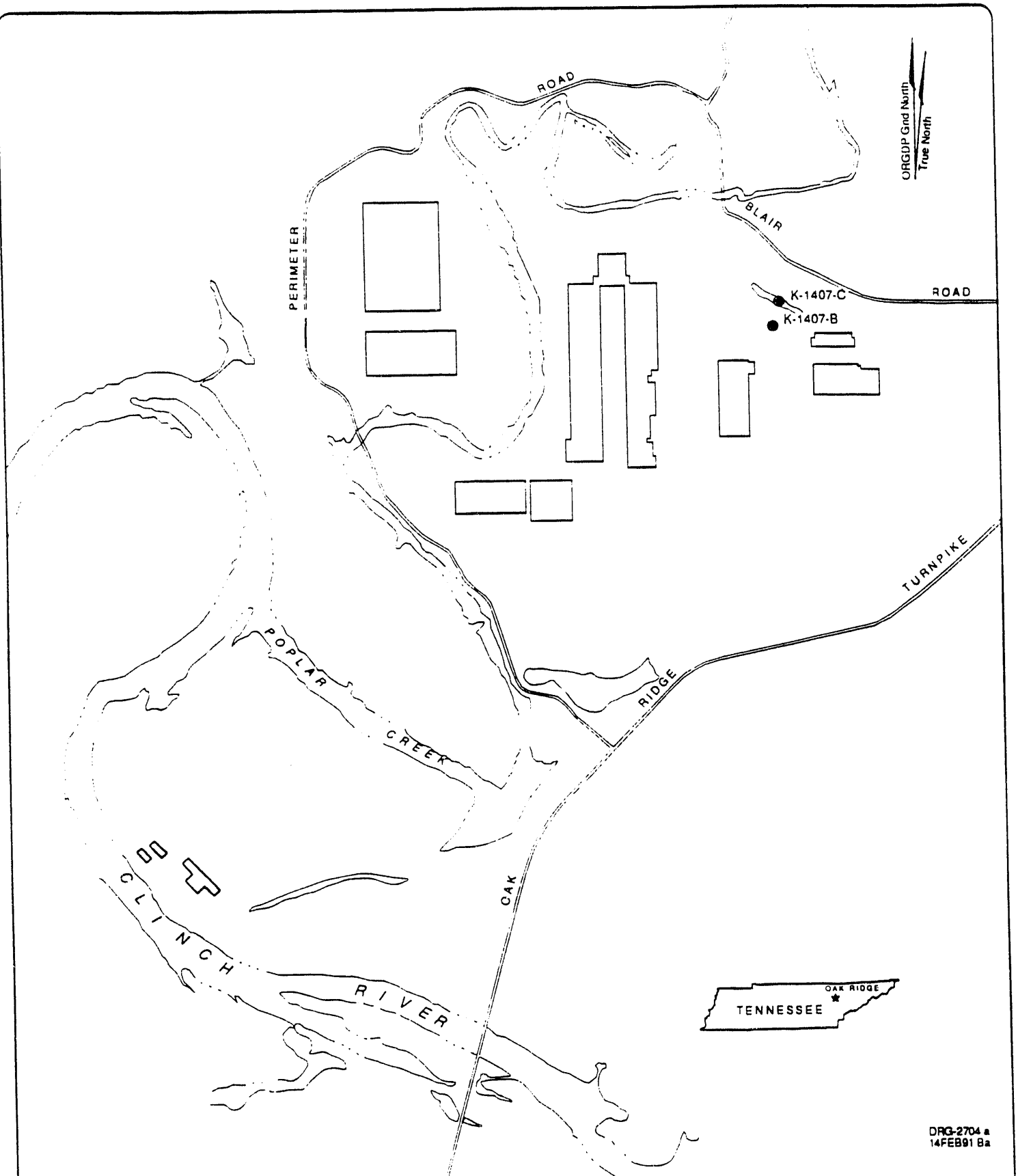
FIGURES



SCALE 0 1800 ft

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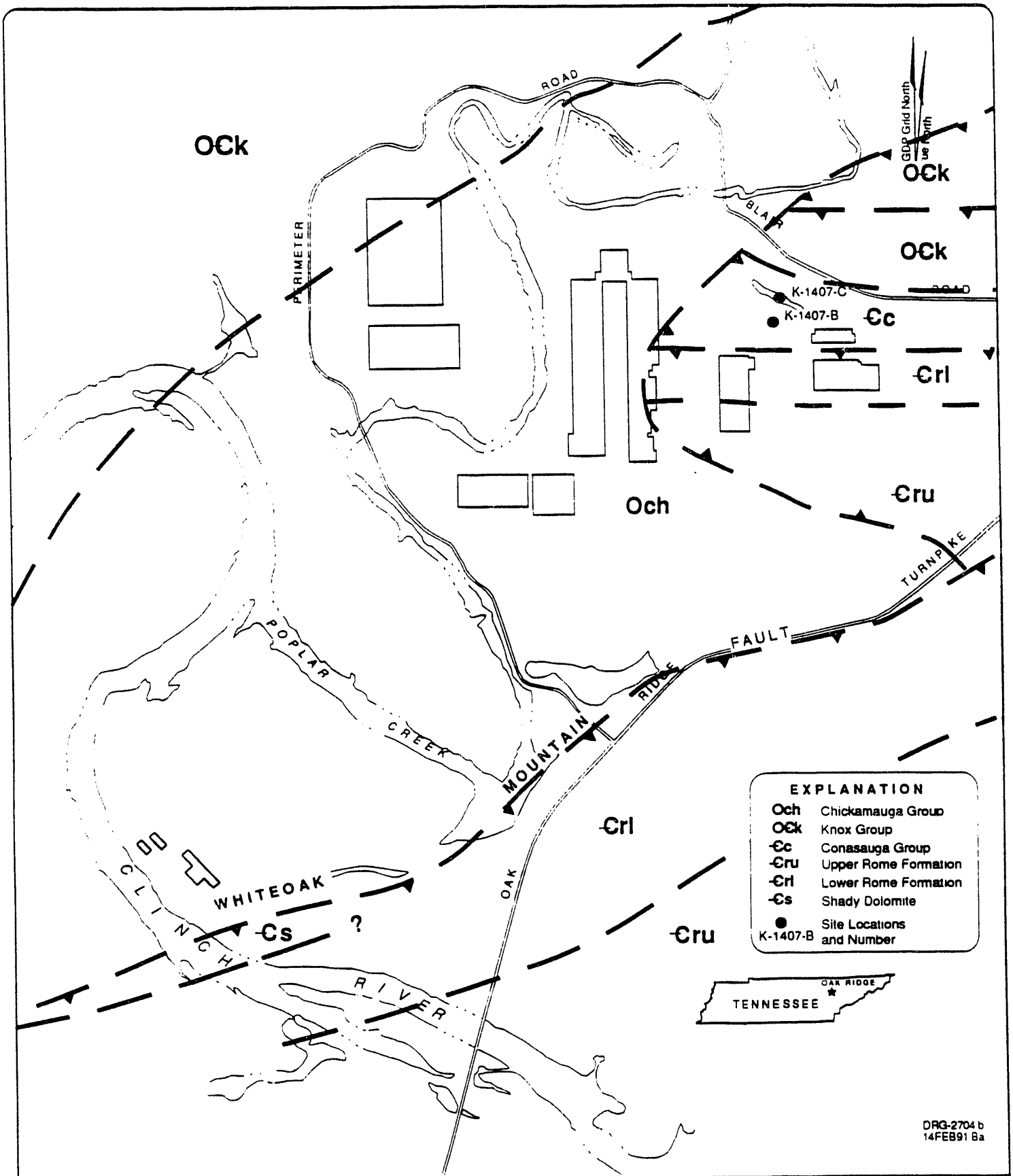
Environmental Services

Location of K-1407-B and K-1407-C Ponds

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

FIGURE

1



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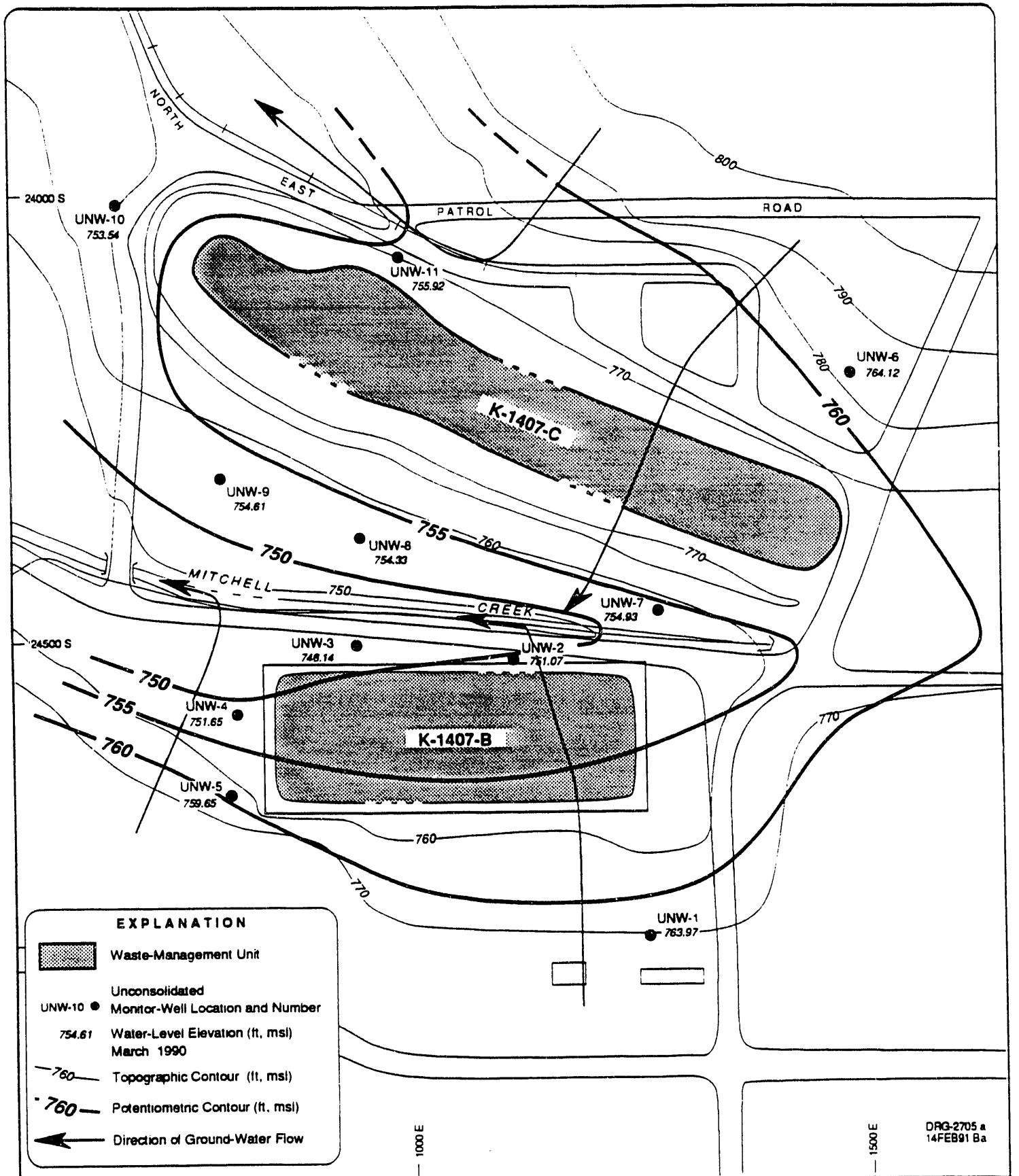
Environmental Services

Generalized Bedrock Geology

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

FIGURE

2



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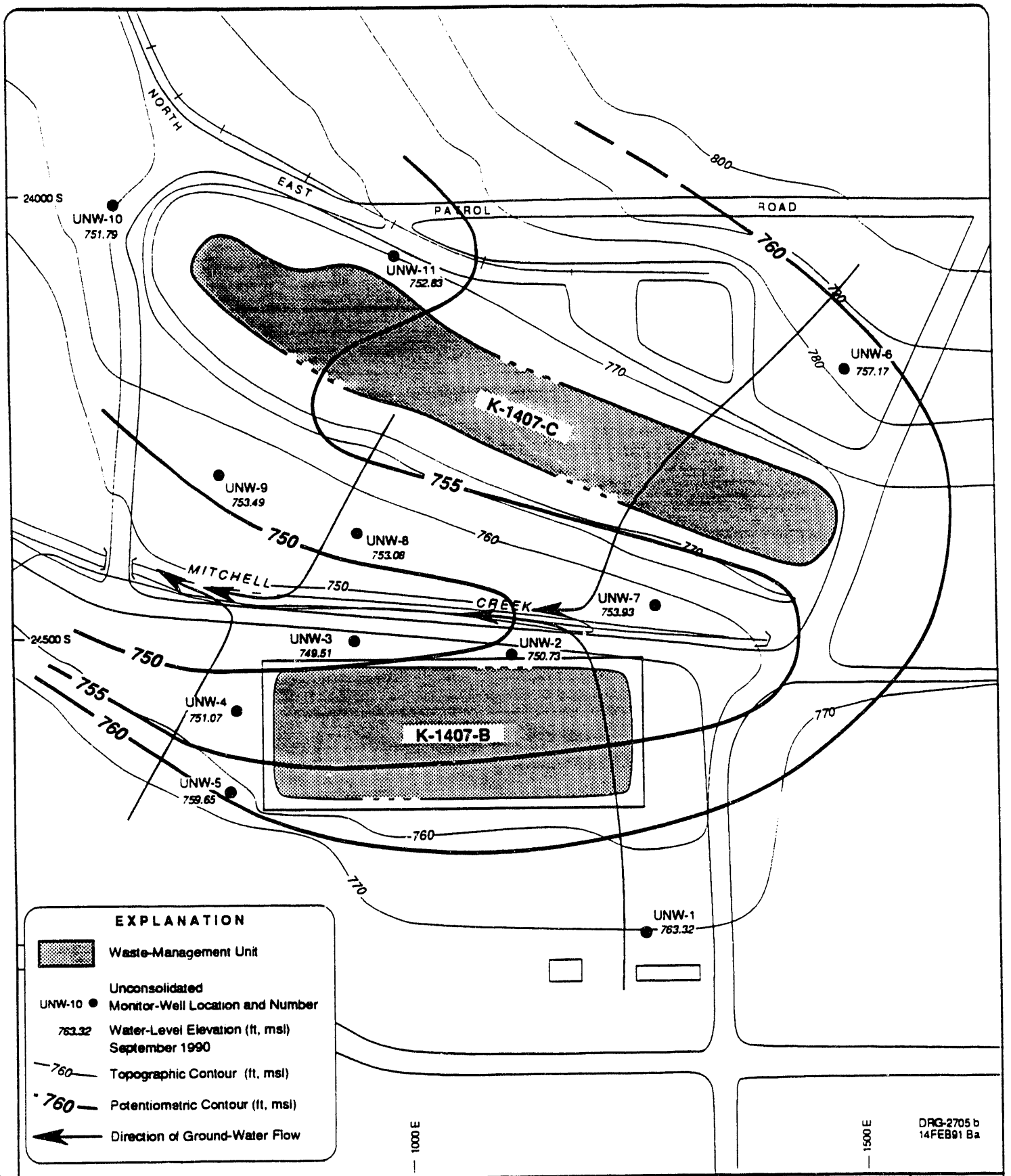
Monitor Wells and Inferred Ground-Water Flow Paths at K-1407-B and K-1407-C Ponds, March 1990

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

FIGURE 3



SCALE 0 150 ft

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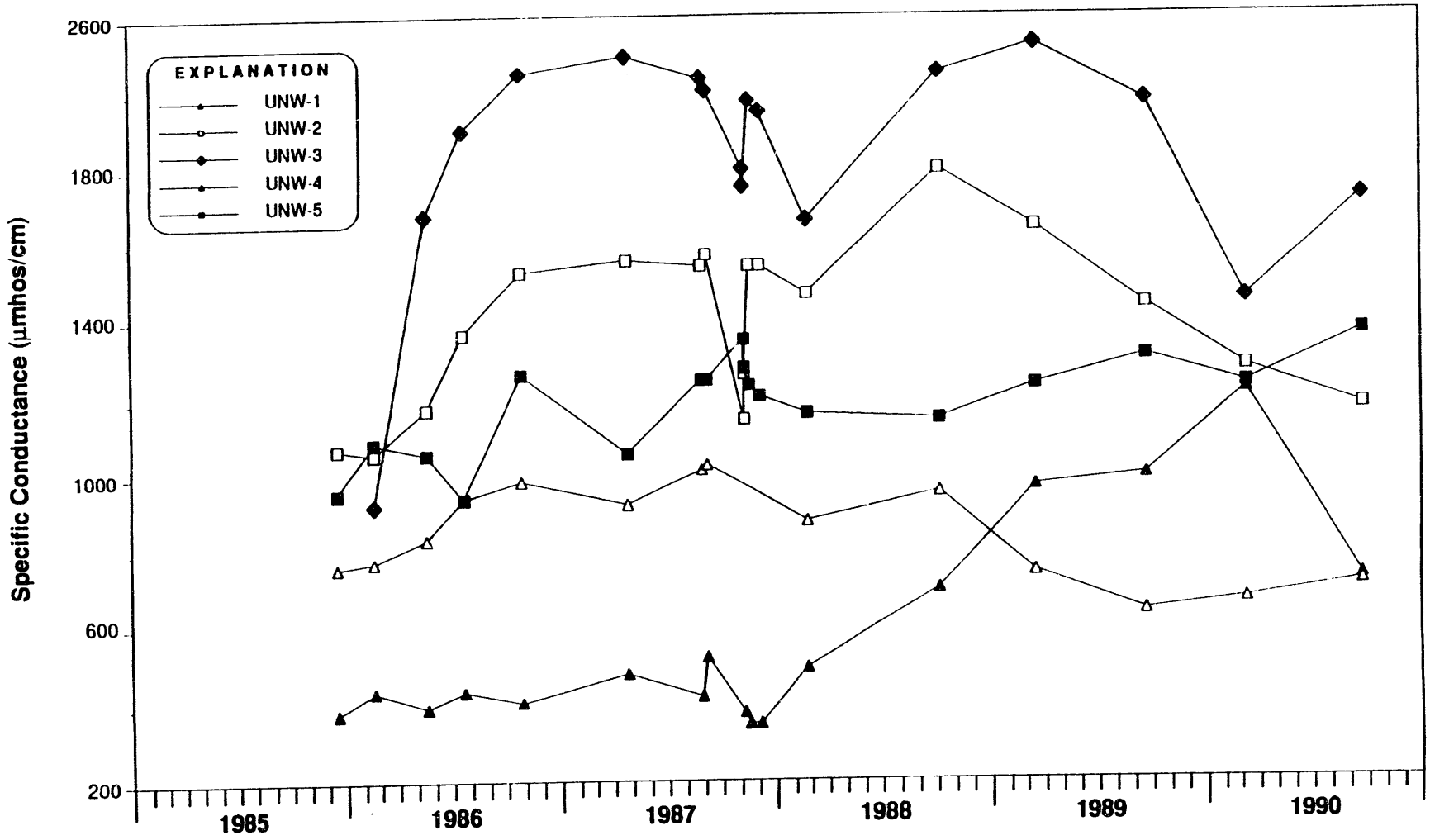
Monitor Wells and Inferred Ground-Water Flow Paths at K-1407-B and K-1407-C Ponds, September 1990

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

FIGURE

4



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GERAGHTY & MILLER, INC.
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Specific Conductance of Ground Water at the K-1407-B Pond

Energy Systems, Inc. K-25 Site Oak Ridge, Tennessee

FIGURE

5

APPENDIX A

Lithologic Logs

GERAGHTY & MILLER, INC.
Ground-Water Consultants

LITHOLOGIC LOG

BORING NO. **UNW-1**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-B	SOUTH 24,839.34 EAST 1,258.57	775.05 ft msl	20.0 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
A. Laase	5 feet	Cuttings	10-25-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
R. Gossage	Geotek	Hollow-Stem Auger	Mobile B-53
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0		CLAY (100%), red.	
10			
20			Refusal at 20 ft
30			
40			
50			
60			
70			
80			
90			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

LITHOLOGIC LOG

BORING NO. **UNW-2**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-B	SOUTH 24,523.20 EAST 1,115.48	755.29 ft msl	12.3 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
A. Laase	5 feet	Cuttings	10-23-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
R. Gossage	Geotek	Hollow-Stem Auger	Mobile B-53
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0		CLAY (100%), red.	
10		10.0' - 12.3' Gray and tan.	Refusal at 12.3 ft
20			
30			
40			
50			
60			
70			
80			
90			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

LITHOLOGIC LOG

BORING NO. **UNW-3**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-B	SOUTH 24,512.62 EAST 945.13	754.29 ft msl	11.5 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
A. Laase	5 feet	Cuttings	10-23-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
R. Gossage	Geotek	Hollow-Stem Auger	Mobile B-53
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0		CLAY (100%), gray and tan.	
10			Refusal at 11.5 ft
20			
30			
40			
50			
60			
70			
80			
90			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

LITHOLOGIC LOG

BORING NO. **UNW-4**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-B	SOUTH 24,575.84 EAST 799.64	757.73 ft msl	17.0 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
A. Laase	5 feet	Cuttings	10-25-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
R. Gossage	Geotek	Hollow-Stem Auger	Mobile B-53
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0			
		FILL (100%) rock.	
		CLAY (100%), red.	
10			
		15.0' - 17.0' Clay, red and brown, hard.	Refusal at 17 ft
20			
30			
40			
50			
60			
70			
80			
90			

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LITHOLOGIC LOG

BORING NO. **UNW-5**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-B	SOUTH 24,670.00 EAST 798.62	758.11 ft msl	14.0 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
A. Laase	5 feet	Cuttings	10-29-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
R. Gossage	Geotek	Hollow-Stem Auger	Mobile B-53
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0			
		SHALE, (100%), weathered, maroon and clay.	
10		CLAY, (100%), gray.	Refusal at 14 ft
		SHALE, (100%)	
20			
30			
40			
50			
60			
70			
80			
90			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

LITHOLOGIC LOG

BORING NO. **UNW-6**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-C	SOUTH 24,228.00 EAST 1,467.20	787.04 ft msl	39.0 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
A. Laase	5 feet	Cuttings	10-24-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
R. Gossage	Geotek	Hollow-Stem Auger	Mobile B-53
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0		CLAY, (100%), red.	
10			
20			
30			
		35.0' - 39.0' Clay, red, plastic.	Refusal at 39 ft
40			
50			
60			
70			
80			
90			

GERAGHTY & MILLER, INC.
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LITHOLOGIC LOG

BORING NO. **UNW-7**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-B	SOUTH 24,471.92 EAST 1,269.62	757.38 ft msl	11.0 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
A. Laase	5 feet	Cuttings	10-25-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
R. Gossage	Geotek	Hollow-Stem Auger	Mobile B-53
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0			
		CLAY, (100%), red.	
10		10.0' - 11.0' Clay, red and brown.	Refusal at 11 ft
20			
30			
40			
50			
60			
70			
80			
90			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

LITHOLOGIC LOG

BORING NO. **UNW-8**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-C	SOUTH 24,386.21 EAST 942.81	756.47 ft msl	16.5 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
G. Weiss	5 feet	Cuttings	10-30-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
J. Cason	Alsay, Inc.	Hollow-Stem Auger	Diedrich D-50
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0		CLAY, (100%), olive green and red mottled, low plasticity.	
10		10.0' - 16.5' Clay, olive-green with weathered shale and red, moderately plastic clay.	Refusal at 16.5 ft
20			
30			
40			
50			
60			
70			
80			
90			

GERAGHTY & MILLER, INC.
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LITHOLOGIC LOG

BORING NO. **UNW-9**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-C	SOUTH 24,311.57 EAST 793.53	756.32 ft msl	13.0 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
G. Weiss	5 feet	Cuttings	10-31-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
J. Cason	Alsay, Inc.	Hollow-Stem Auger	Diedrich D-50
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0			
		CLAY, (100%), brown, moderately plastic.	
10		10.0' - 13.0' Mud, brown, soupy, with high-plasticity brown and red clay.	Refusal at 13 ft
20			
30			
40			
50			
60			
70			
80			
90			

GERAGHTY & MILLER, INC.
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LITHOLOGIC LOG

BORING NO. **UNW-10**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-C	SOUTH 24,003.18 EAST 691.80	759.37 ft msl	15.1 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
G. Weiss	5 feet	Cuttings	10-30-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
J. Cason	Alsay, Inc.	Hollow-Stem Auger	Diedrich D-50
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0		CLAY, (100%), brown, low plasticity, with fragments of brown and red, weathered shale.	
10		10.0' - 15.1' Clay, brown, moderately high plasticity, with fragments of maroon, weathered shale.	Refusal at 15.1 ft
20			
30			
40			
50			
60			
70			
80			
90			

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LITHOLOGIC LOG

BORING NO. **UNW-11**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	TOTAL DEPTH
K-25 Plant, K-1407-C	SOUTH 24,042.92 EAST 1,012.92	774.34 ft msl	27.6 ft
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLE TYPE**	**DATE WELL COMPLETED**
J. Archer	5 feet	Cuttings	10-29-85
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
J. Cason	Alsay, Inc.	Hollow-Stem Auger	Diedrich D-50
PURPOSE OF BORING	**GEOPHYSICAL CONTRACTOR**	**GEOPHYSICAL LOGS**	
Monitor Well	None	None	

DEPTH IN FEET	GRAPHIC LOG	DESCRIPTION	COMMENTS
0		CLAY, (100%), red, with abundant chert fragments.	No recovery from 10 ft to 27.6 ft, sampler lost in hole.
10			
20			Refusal at 27.6 ft
30			
40			
50			
60			
70			
80			
90			

APPENDIX B

Well Construction Diagrams

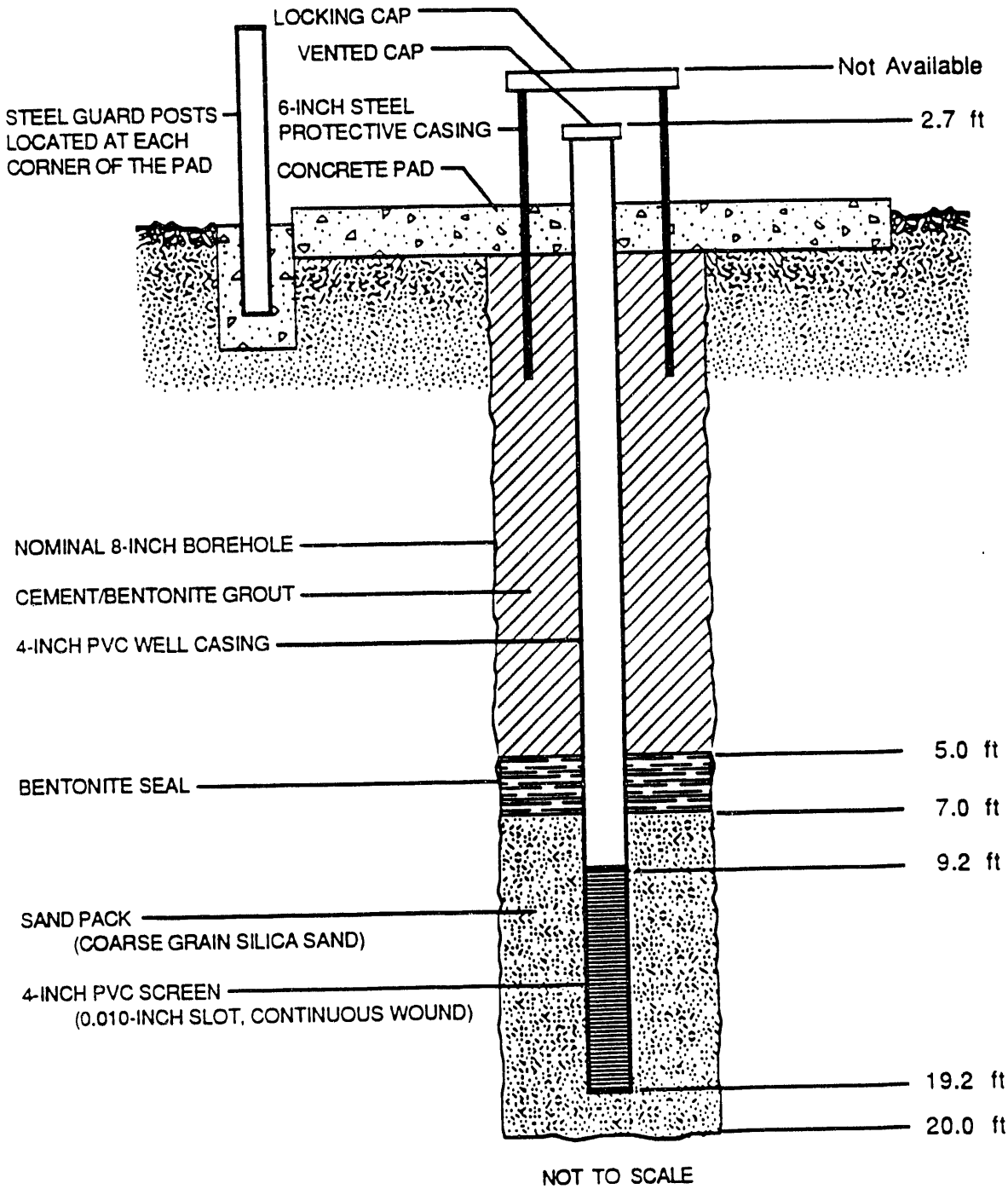
GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-1**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-B	SOUTH 24,839.34 EAST 1,258.57	775.05 ft msl	777.72 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
A. Laase	Geotek	Hollow-Stem Auger	Mobile B-53
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-25-85	Unconsolidated Zone



NOT TO SCALE

NOTE: All Depth Measurements in Feet Above/Below Ground Surface

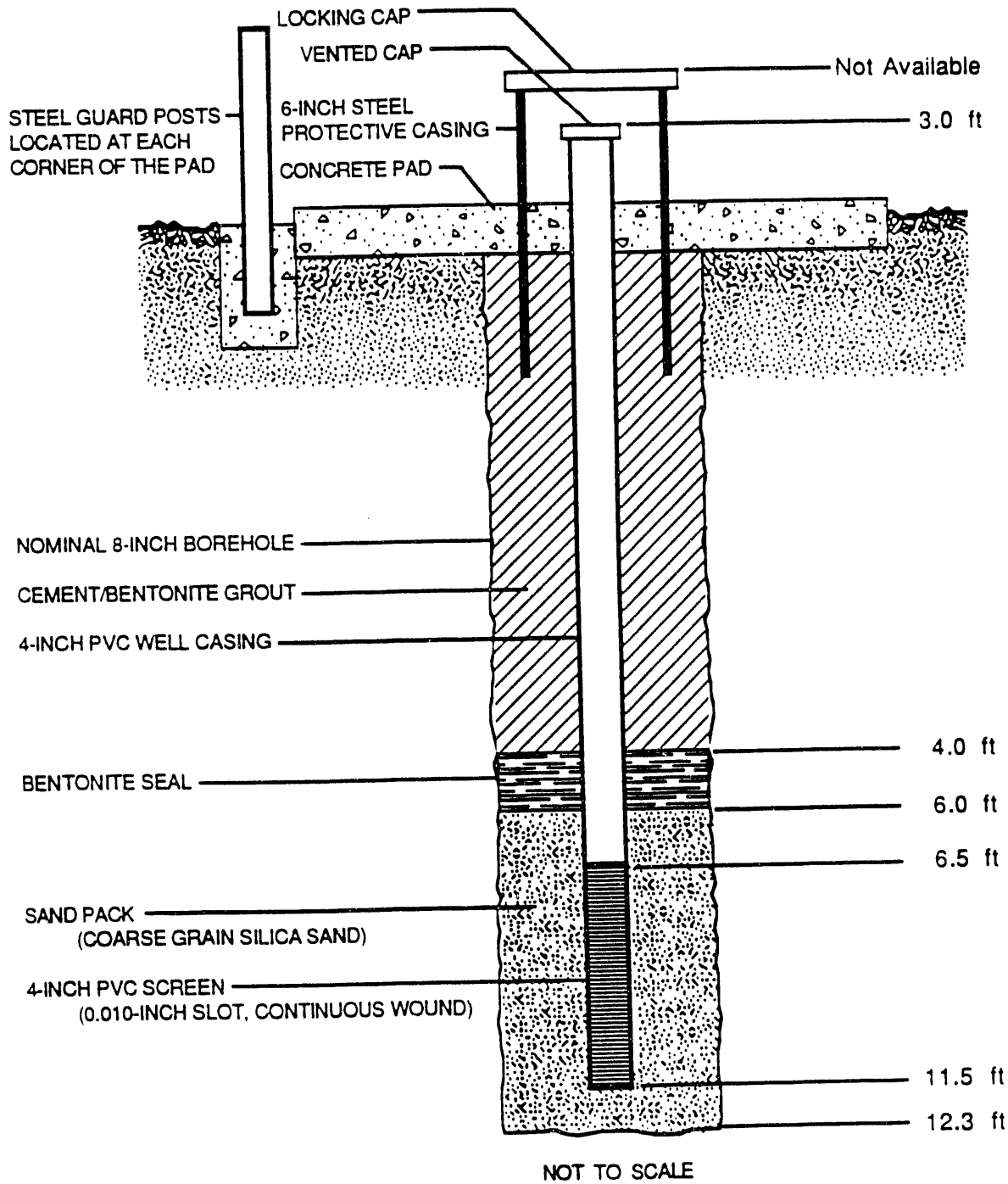
GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-2**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-B	SOUTH 24,523.20 EAST 1,115.48	755.29 ft msl	758.24 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
A. Laase	Geotek	Hollow-Stem Auger	Mobile B-53
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-23-85	Unconsolidated Zone



NOT TO SCALE

NOTE: All Depth Measurements in Feet Above/Below Ground Surface

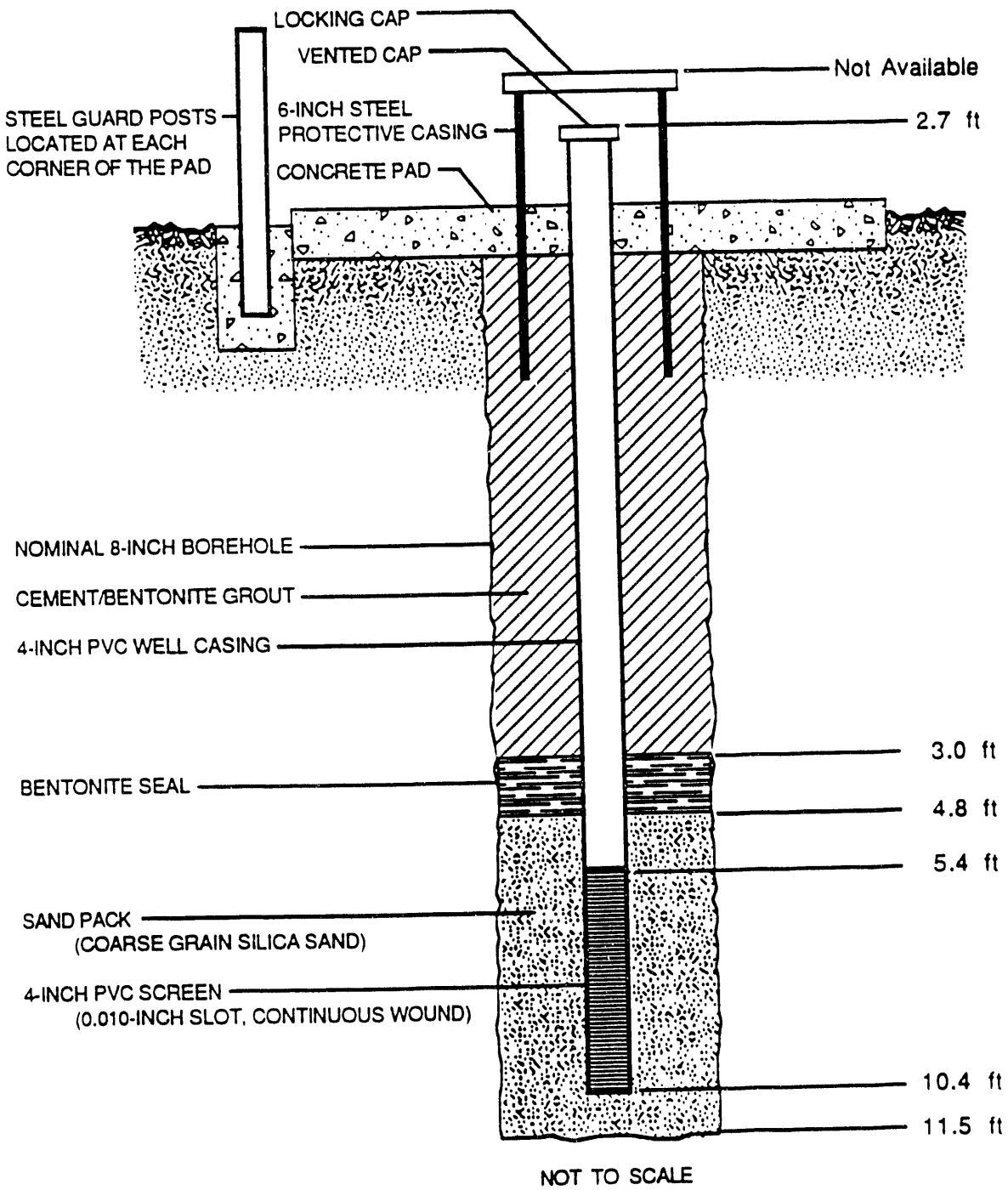
GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-3**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-B	SOUTH 24,512.62 EAST 945.13	754.29 ft msl	757.01 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
A. Laase	Geotek	Hollow-Stem Auger	Mobile B-53
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-23-85	Unconsolidated Zone



NOT TO SCALE

NOTE: All Depth Measurements in Feet Above/Below Ground Surface

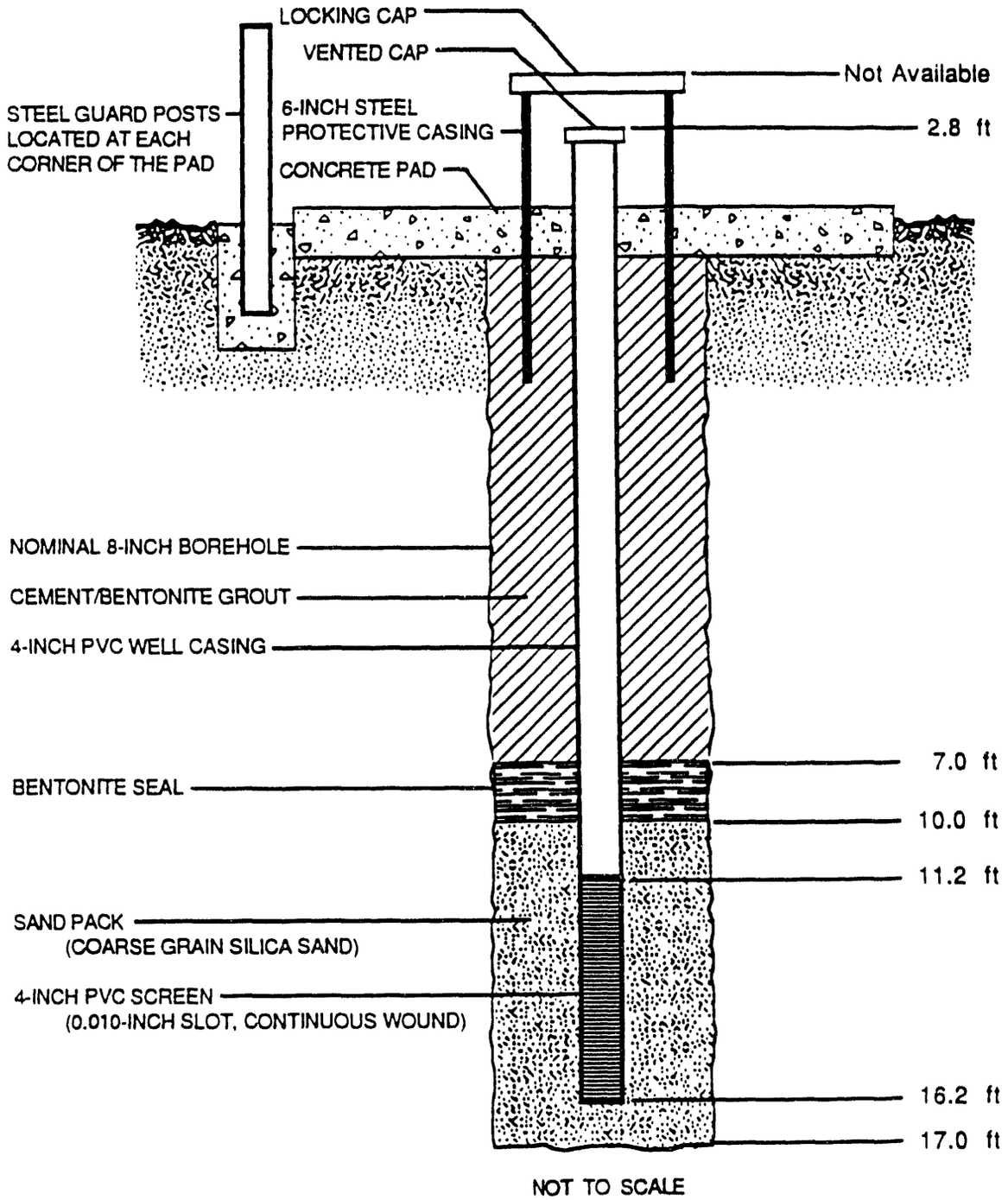
GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-4**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-B	SOUTH 24,575.84 EAST 799.64	757.73 ft msl	760.57 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
A. Laase	Geotek	Hollow-Stem Auger	Mobile B-53
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-25-85	Unconsolidated Zone



NOT TO SCALE

NOTE: All Depth Measurements in Feet Above/Below Ground Surface

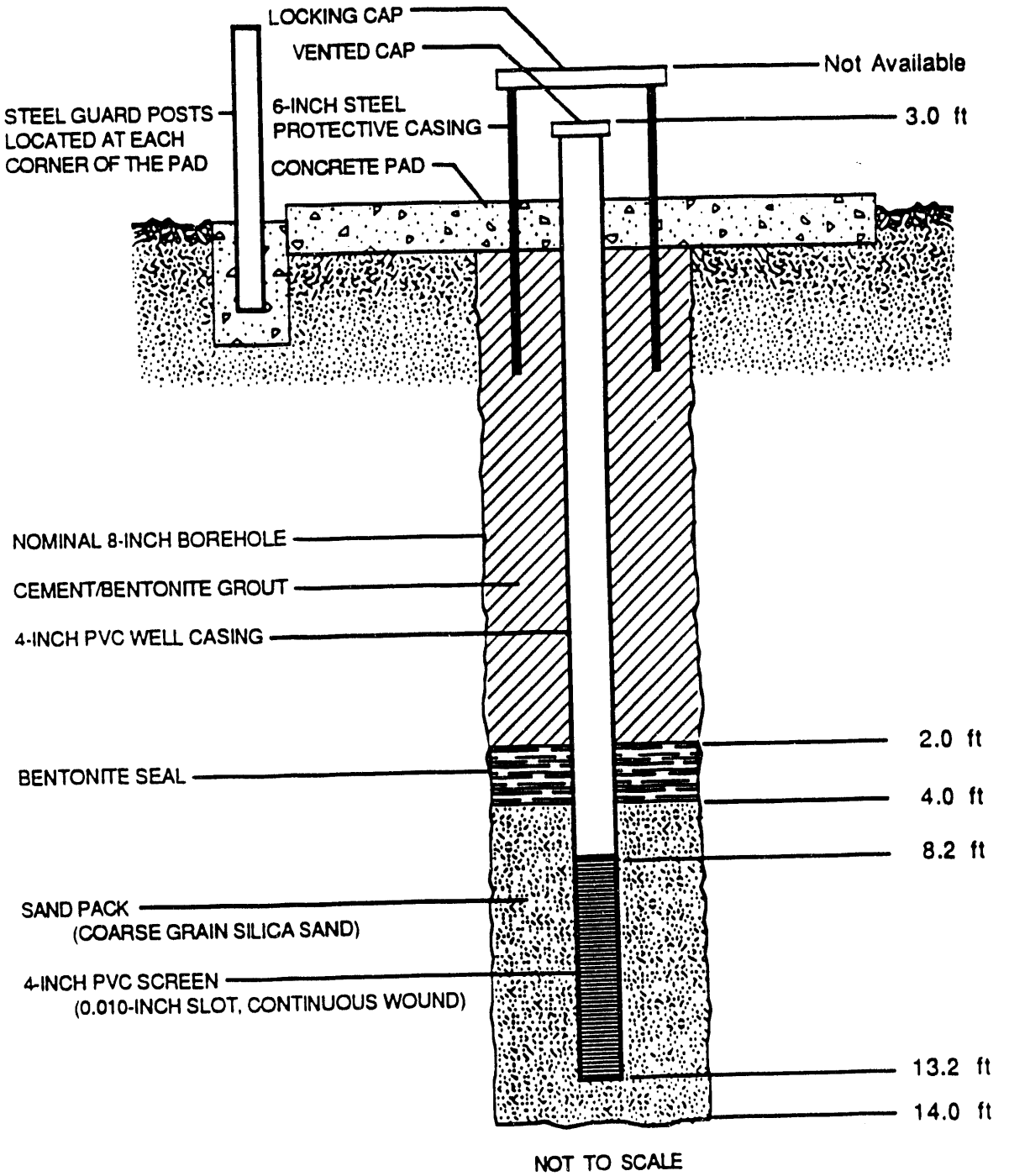
GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-5**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-B	SOUTH 24,670.00 EAST 798.62	758.11 ft msl	761.15 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
A. Laase	Geotek	Hollow-Stem Auger	Mobile B-53
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-29-85	Unconsolidated Zone



NOT TO SCALE

NOTE: All Depth Measurements in Feet Above/Below Ground Surface

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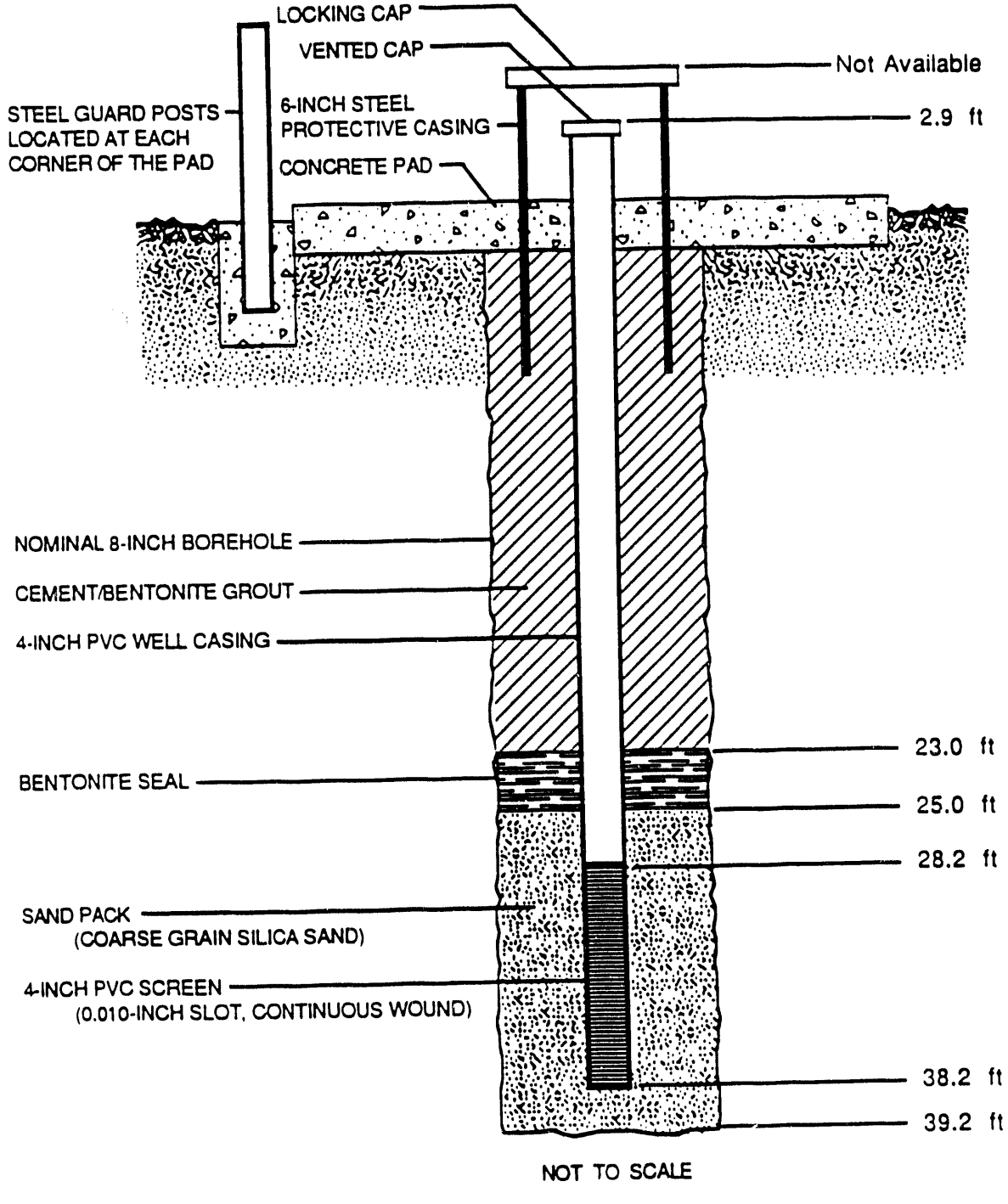
WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-6**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-C	SOUTH 24,228.00 EAST 1,467.20	787.04 ft msl	789.92 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
A. Laase	Geotek	Hollow-Stem Auger	Mobile B-53
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-24-85	Unconsolidated Zone



NOT TO SCALE

NOTE: All Depth Measurements in Feet Above/Below Ground Surface

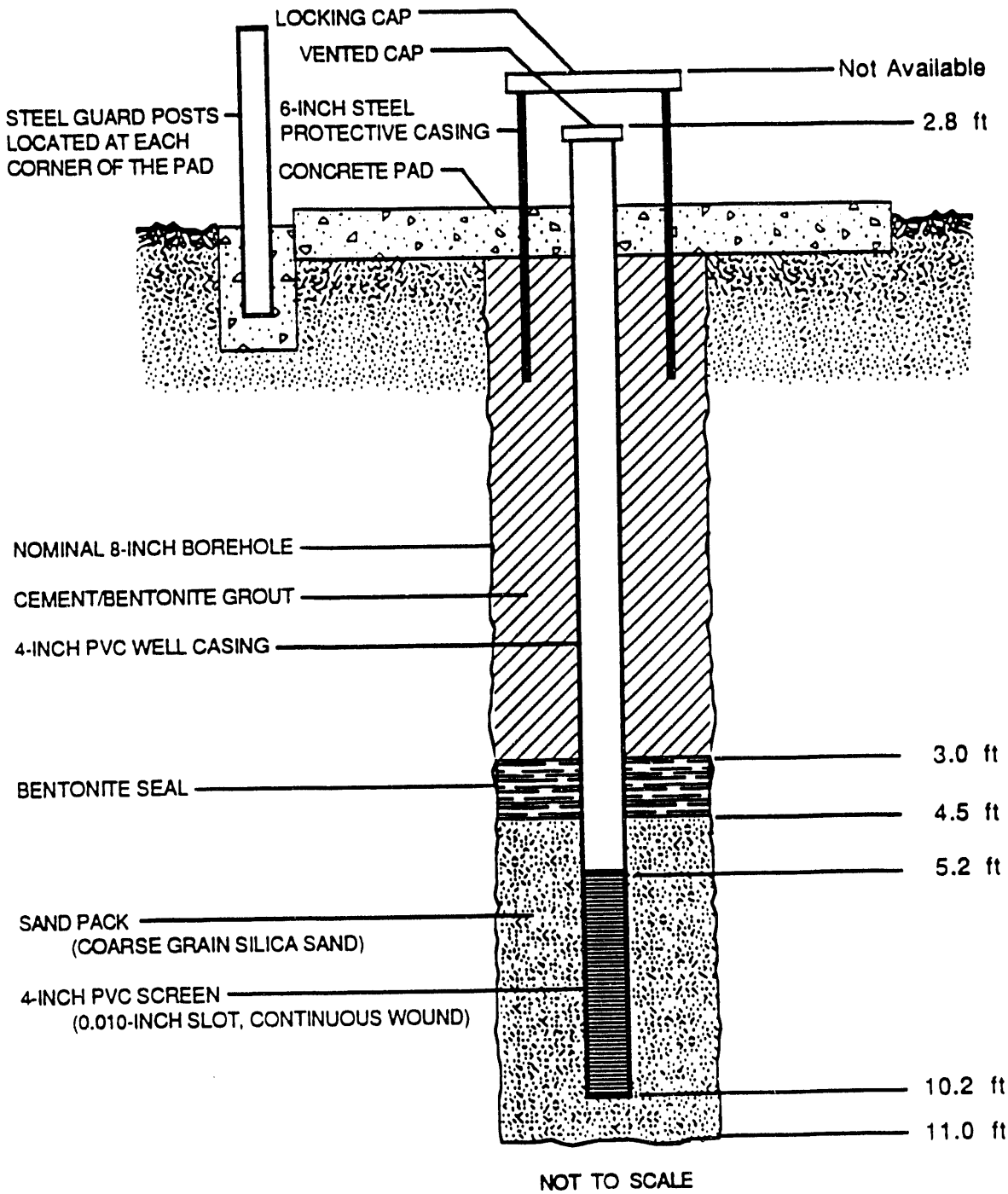
GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-7**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-B	SOUTH 24,471.92 EAST 1,269.62	757.38 ft msl	760.18 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
A. Laase	Geotek	Hollow-Stem Auger	Mobile B-53
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-25-85	Unconsolidated Zone



NOT TO SCALE

NOTE: All Depth Measurements in Feet Above/Below Ground Surface

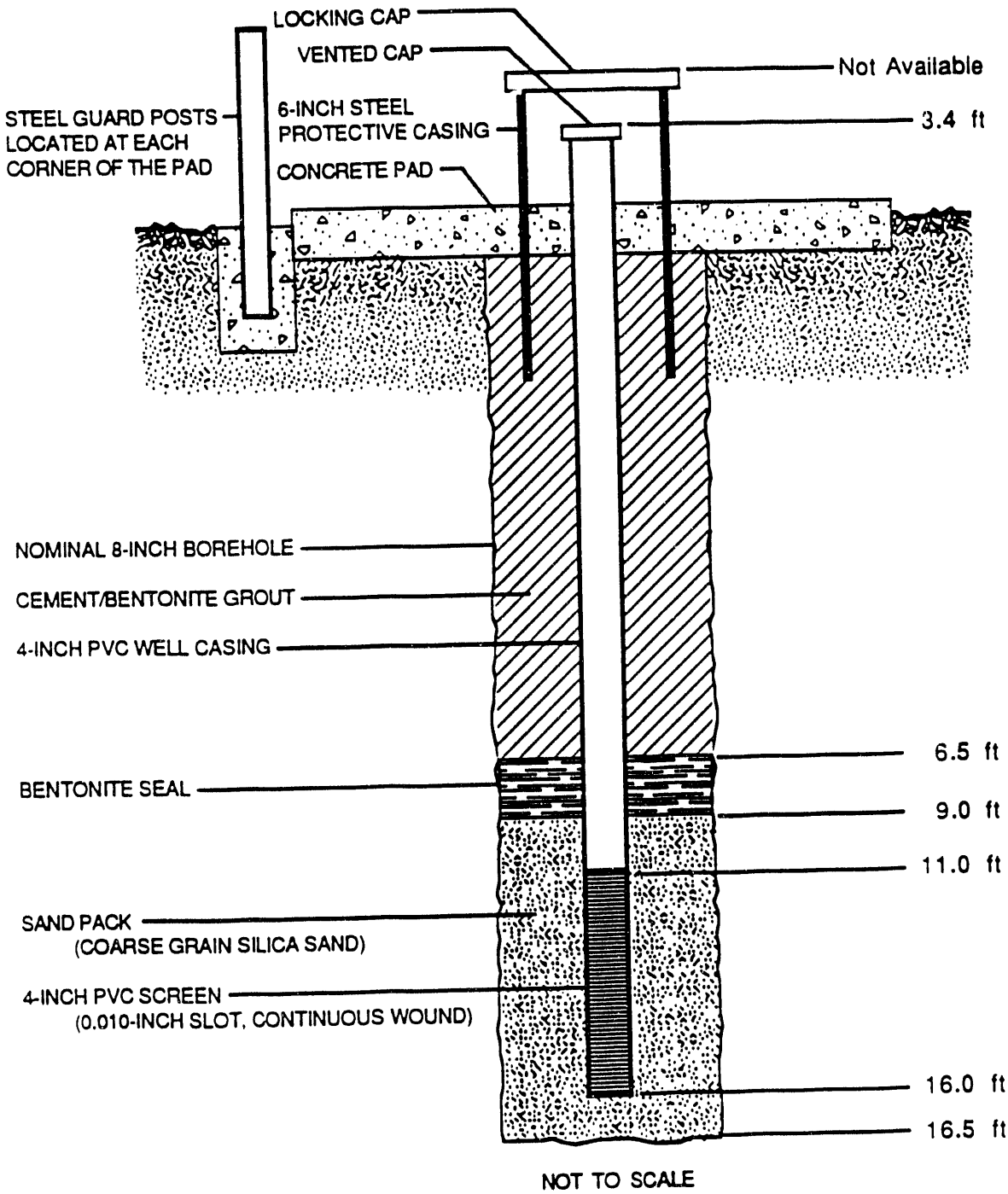
GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-8**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-C	SOUTH 24,386.21 EAST 942.81	756.47 ft msl	759.83 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
G. Weiss	Alsay, Inc.	Hollow-Stem Auger	Diedrich D-50
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-30-85	Unconsolidated Zone



NOTE: All Depth Measurements in Feet Above/Below Ground Surface

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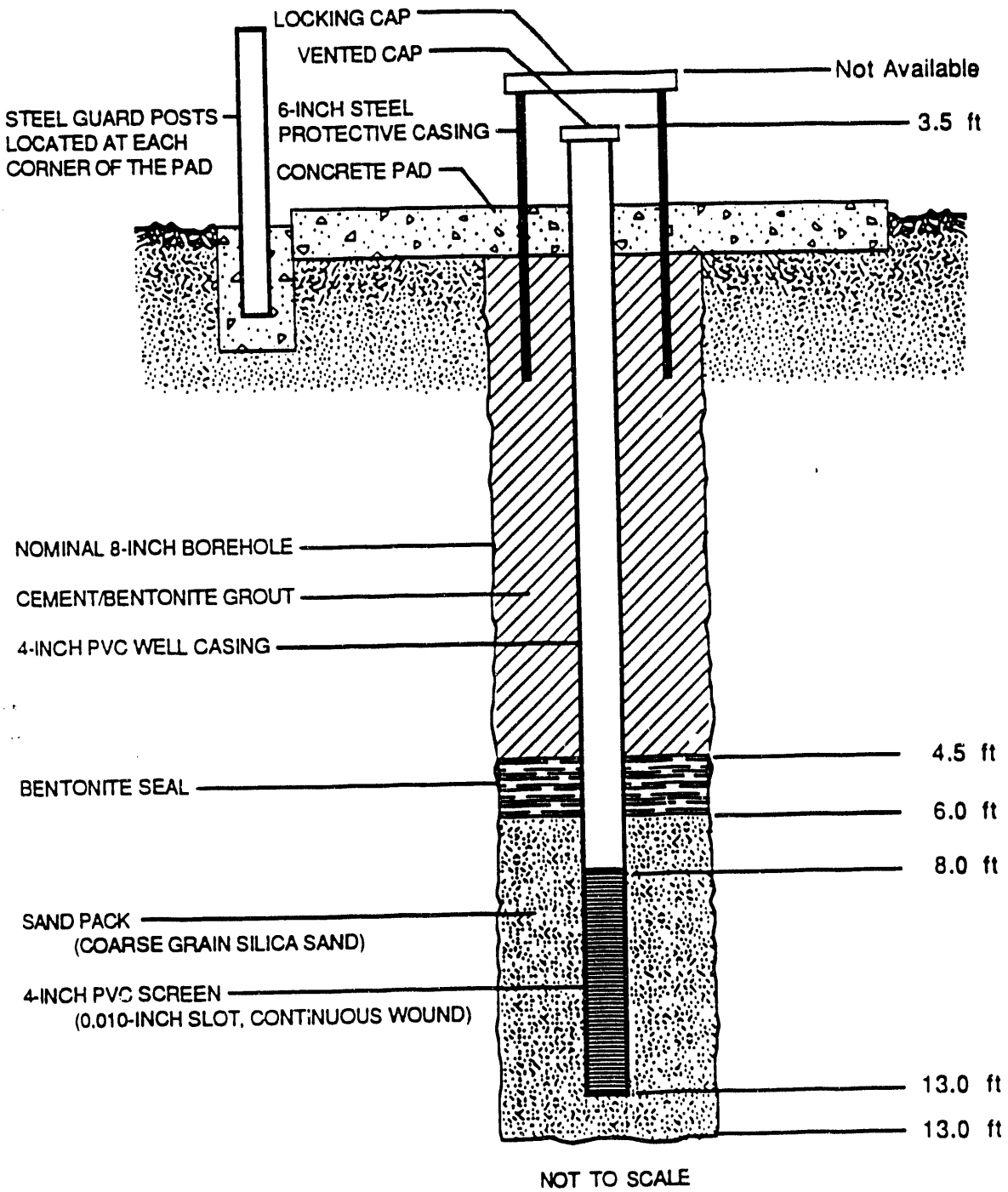
Ground-Water Consultants

WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-9**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-C	SOUTH 24,311.57 EAST 793.53	756.32 ft msl	759.78 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
G. Weiss	Alsay, Inc.	Hollow-Stem Auger	Diedrich D-50
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-31-85	Unconsolidated Zone



NOTE: All Depth Measurements in Feet Above/Below Ground Surface

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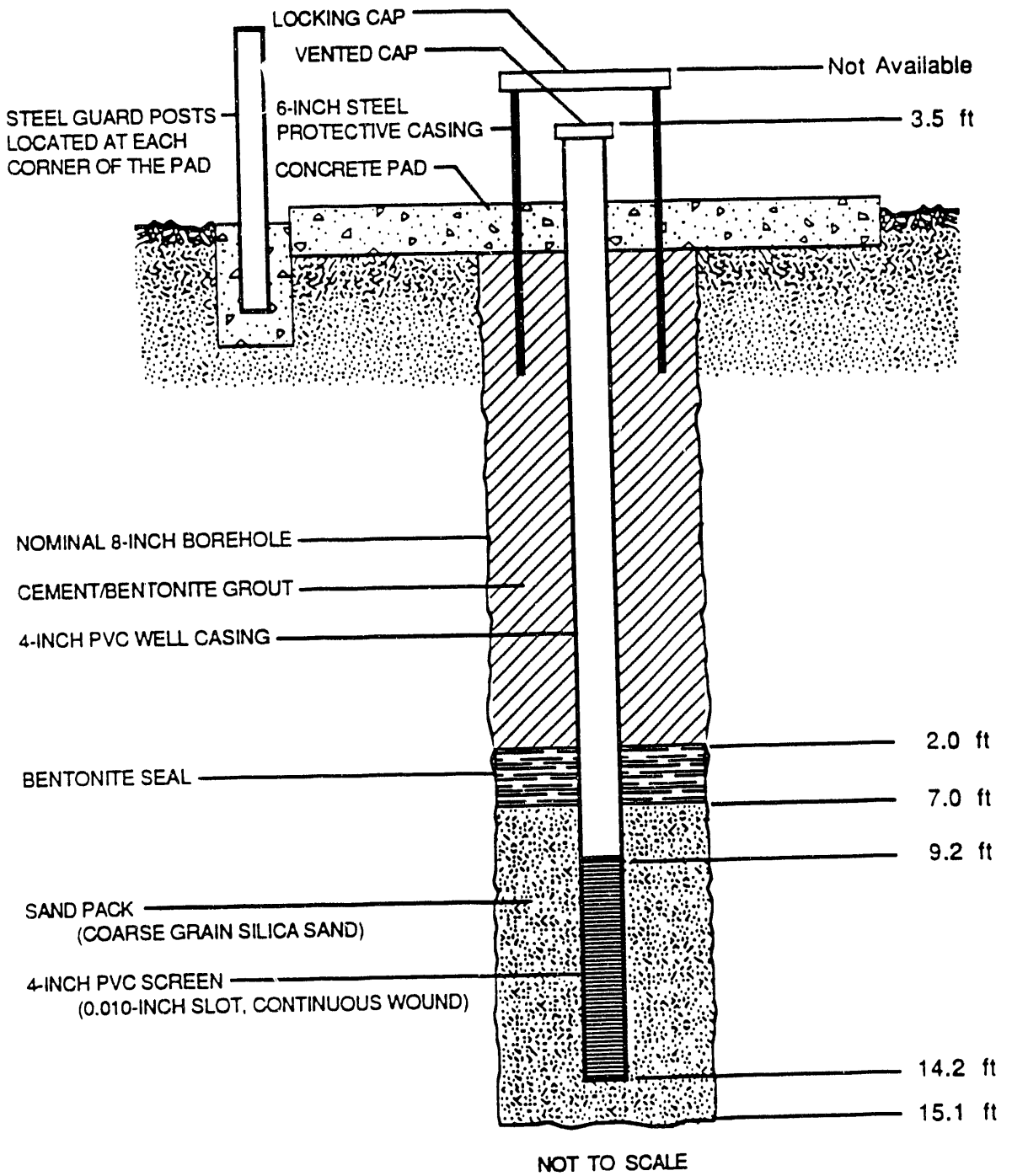
WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-10**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1407-C	SOUTH 24,003.18 EAST 691.80	759.37 ft msl	762.87 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
G. Weiss	Alsay, Inc.	Hollow-Stem Auger	Diedrich D-50
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-30-85	Unconsolidated Zone



NOT TO SCALE

NOTE: All Depth Measurements in Feet Above/Below Ground Surface

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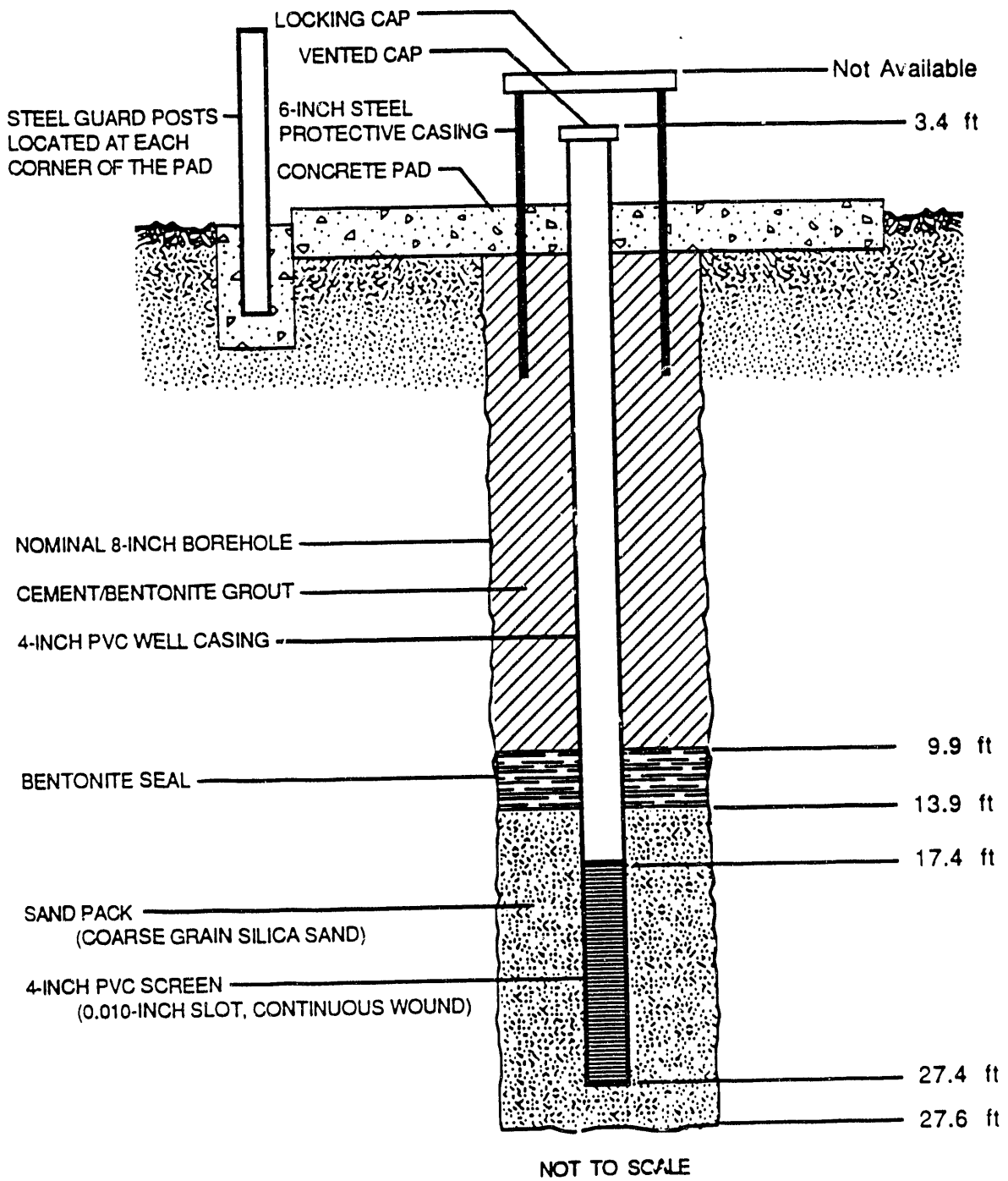
WELL-CONSTRUCTION DIAGRAM

BORING NO. **UNW-11**

PROJECT ORGDP Monitor-Well Installation Program - Phase I

LOCATION	K-25 PLANT COORDINATES	SURFACE ELEVATION	MEASURING POINT ELEVATION
K-25 Plant, K-1[illegible]7-C	SOUTH 24,042.92 EAST 1,012.92	774.34 ft msl	777.75 ft msl
GEOLOGIST	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**RIG TYPE**
J. Archer	Alsay, Inc.	Hollow-Stem Auger	Diedrich D-50
DEVELOPMENT METHOD	**VOLUME EVACUATED**	**DATE WELL COMPLETED**	**FORMATION MONITORED**
Air Lift	Not Available	10-29-85	Unconsolidated Zone



NOT TO SCALE

NOTE: All Depth Measurements in Feet Above/Below Ground Surface

APPENDIX C

1990 Ground-Water Quality Data for K-1407-B and K-1407-C Ponds

Ground-Water Quality Results, 1990

Quarter		K-1407-B UNW-1		K-1407-B UNW-2		K-1407-B UNW-3		K-1407-B UNW-4			K-1407-B UNW-5			K-1407-C UNW-6
Analyte		1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr
Metals	(mg/L)													
Aluminum		0.77	0.11	0.32	0.17	0.79	0.31	0.83	0.26	0.12	0.088	0.1	0.13	0.96
Aluminum (filtered)		0.042	0.057	0.075	0.092	0.085	0.086	0.057	0.11	0.063	0.049	0.049	0.11	0.02
Antimony		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Antimony (filtered)		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Arsenic		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.012	0.011	0.012	<0.005
Arsenic (filtered)		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.012	0.012	0.0092	<0.005
Barium		0.35	0.24	0.07	0.067	0.077	0.063	0.051	0.035	0.04	0.36	0.36	0.41	0.018
Barium (filtered)		0.3	0.28	0.072	0.065	0.044	0.048	0.098	0.026	0.029	0.37	0.37	0.41	0.015
Beryllium		<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Beryllium (filtered)		<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Boron		0.042	0.028	0.013	0.036	0.056	0.095	0.013	0.02	0.018	0.031	0.028	0.014	0.022
Boron (filtered)		0.032	0.017	0.021	0.025	0.055	0.065	0.037	0.012	0.015	0.024	0.028	0.01	<0.004
Cadmium		0.007	0.0052	<0.003	<0.003	<0.003	0.013	<0.003	0.028	0.026	<0.003	0.0033	<0.003	<0.003
Cadmium (filtered)		<0.003	0.0033	<0.003	<0.003	<0.003	<0.003	<0.003	0.011	0.01	0.0039	0.0051	0.0034	<0.003
Calcium		170	93	210	170	240	200	140	120	110	180	180	180	42
Calcium (filtered)		150	110	220	170	240	200	120	120	120	180	180	180	40
Chromium		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (filtered)		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt		0.038	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0073	0.0093	0.006	<0.005
Cobalt (filtered)		0.023	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0062	0.0053	0.0074	<0.005
Copper		0.0061	0.015	<0.004	0.017	<0.004	0.024	0.0051	0.012	0.028	0.02	<0.004	0.0097	<0.004
Copper (filtered)		0.0053	0.016	<0.004	0.029	<0.004	0.023	0.0078	0.02	0.024	<0.004	<0.004	0.013	<0.004
Iron		9.3	3.2	0.26	0.042	1.3	0.34	0.82	1.5	2.2	20	20	20	1.6
Iron (filtered)		2.6	5.7	<0.004	<0.004	0.051	<0.004	0.029	<0.004	<0.004	21	21	20	0.0049
Lead		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0051	<0.004	<0.004	0.0087	0.0086	<0.004	0.0059
Lead		<0.05		<0.05		<0.05		<0.05			<0.05	<0.05		<0.05
Lead (filtered)		<0.004	<0.004	<0.004	<0.004	0.0077	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Lead (filtered)		<0.05		<0.05		<0.05		<0.05			<0.05	<0.05		<0.05
Lithium		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0054	0.0051	0.0051	<0.004	<0.004	<0.004	<0.004
Lithium (filtered)		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.005	0.0061	0.0053	<0.004	<0.004	<0.004	<0.004
Magnesium		45	29	23	18	34	31	14	12	12	22	22	23	6.4
Magnesium (filtered)		43	35	23	18	34	31	12	13	12	22	22	23	5.9
Manganese		23	4.7	0.1	0.23	7.2	5.5	0.3	0.37	0.38	19	19	20	0.05
Manganese (filtered)		16	9.5	0.097	0.2	7.1	5.8	0.25	0.28	0.31	19	19	20	0.023
Mercury		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury (filtered)		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00021	<0.0002
Molybdenum		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum (filtered)		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel		0.015	<0.01	0.011	<0.01	0.021	<0.01	<0.01	<0.01	0.013	<0.01	<0.01	<0.01	<0.01
Nickel (filtered)		<0.01	<0.01	0.016	0.012	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Niobium		<0.007	<0.007	0.014	<0.007	0.0076	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Niobium (filtered)		<0.007	<0.007	0.016	<0.007	0.014	<0.007	<0.007	<0.007	<0.007	<0.007	0.0084	<0.007	<0.007
Phosphorous		<0.2	<0.2	0.72	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.67
Phosphorous (filtered)		<0.2	<0.2	0.21	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.22
Potassium		3.1	2.7	2.7	3	3.4	4	2.5	2.4	2.5	1.6	1.6	2.2	2.2
Potassium (filtered)		2.6	2.8	2.6	3.1	3.4	3.9	2.2	2.6	2.5	1.6	1.5	2.3	2
Selenium		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Selenium (filtered)		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Ground-Water Quality Results, 1990

Quarter		K-1407-C UNW-6		K-1407-C UNW-7			K-1407-C UNW-8		K-1407-C UNW-9		K-1407-C UNW-10		K-1407-C UNW-11	
Analyte		3rd Qtr	3rd Qtr D	1st Qtr	1st Qtr D	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr
Metals	(mg/L)													
Aluminum		0.27	0.61	0.057	0.083	0.032	0.25	0.21	0.72	0.12	0.14	0.41	0.084	0.2
Aluminum (filtered)		0.058	0.064	0.074	0.048	<0.02	0.032	0.02	0.058	<0.02	0.074	0.026	0.024	<0.02
Antimony		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Antimony (filtered)		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Arsenic		<0.005	<0.005	0.0057	0.0067	0.0054	<0.005	0.0056	<0.005	0.0061	0.0068	0.0078	<0.005	<0.005
Arsenic (filtered)		<0.005	<0.005	<0.005	<0.005	0.0056	0.0053	<0.005	0.0058	<0.005	0.0051	0.0054	<0.005	<0.005
Barium		0.012	0.022	0.11	0.12	0.12	0.051	0.051	0.072	0.059	0.15	0.2	0.089	0.056
Barium (filtered)		0.027	0.019	0.11	0.12	0.12	0.047	0.05	0.066	0.057	0.15	0.18	0.31	0.046
Beryllium		<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.00034	<0.0003	<0.0003	<0.0003
Beryllium (filtered)		<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.00034	<0.0003	<0.0003	<0.0003
Boron		<0.004	0.019	0.021	0.027	0.037	0.0069	0.0079	0.016	0.012	0.019	0.014	0.013	0.0078
Boron (filtered)		<0.004	<0.004	0.022	0.022	0.034	0.013	0.0077	<0.004	0.013	0.028	0.015	0.0077	0.014
Cadmium		<0.003	<0.003	<0.003	<0.003	<0.003	0.0055	<0.003	0.0047	<0.003	<0.003	<0.003	<0.003	<0.003
Cadmium (filtered)		<0.003	<0.003	0.0052	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0055	<0.003	<0.003	<0.003
Calcium		20	59	93	95	86	41	40	120	93	160	140	17	33
Calcium (filtered)		47	58	94	95	86	40	41	120	86	160	140	22	38
Chromium		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (filtered)		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt		<0.005	<0.005	<0.005	0.0058	0.0058	<0.005	<0.005	0.072	0.053	<0.005	<0.005	<0.005	<0.005
Cobalt (filtered)		<0.005	<0.005	0.0061	0.0073	0.0086	<0.005	<0.005	0.072	0.054	0.0055	<0.005	<0.005	<0.005
Copper		<0.004	<0.004	<0.004	<0.004	0.0077	<0.004	0.0097	<0.004	0.0078	<0.004	0.0067	<0.004	0.012
Copper (filtered)		<0.004	0.0059	<0.004	<0.004	0.0056	<0.004	<0.004	<0.004	0.0047	<0.004	0.0059	0.0064	<0.004
Iron		0.4	0.62	0.99	0.97	1.5	0.28	0.22	13	8.7	8.2	17	0.075	0.34
Iron (filtered)		0.095	<0.004	0.85	0.87	1.6	0.05	0.04	13	9.3	7.5	12	0.019	0.008
Lead		0.0097	0.0042	<0.004	<0.004	<0.004	<0.004	<0.004	0.0047	<0.004	<0.004	<0.004	0.0041	<0.004
Lead				<0.05	<0.05		<0.05		<0.05		<0.05		<0.05	
Lead (filtered)		<0.004	<0.004	0.0075	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.011	<0.004	0.0086	<0.004
Lead (filtered)				<0.05	<0.05		<0.05		<0.05		<0.05		<0.05	
Lithium		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Lithium (filtered)		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Magnesium		2	7.5	17	17	13	4.3	3.5	17	12	21	18	2.6	4.2
Magnesium (filtered)		5.5	7.4	17	17	13	4.1	3.4	17	11	22	18	2.8	4.5
Manganese		0.023	0.022	6.4	6.7	6.3	0.099	0.049	23	17	9	5	0.017	0.099
Manganese (filtered)		0.038	0.0064	6.4	6.5	6.5	0.084	0.06	22	17	9.2	5.9	0.026	0.022
Mercury		0.0002	0.00021	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury (filtered)		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum (filtered)		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel		<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel (filtered)		<0.01	<0.01	<0.01	0.01	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Niobium		0.01	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Niobium (filtered)		0.01	<0.007	<0.007	0.0098	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	0.0087
Phosphorous		<0.2	<0.2	0.46	0.38	<0.2	0.35	<0.2	1.5	<0.2	<0.2	<0.2	0.32	<0.2
Phosphorous (filtered)		<0.2	<0.2	<0.2	0.55	<0.2	0.39	<0.2	0.89	<0.2	<0.2	<0.2	<0.2	<0.2
Potassium		1.7	2	2.8	2.8	3.4	5	5.3	4.8	5.1	2.1	3.4	2.1	2.6
Potassium (filtered)		1.9	1.9	2.9	2.8	3.4	4.6	5.1	4.5	4.5	2.1	2.9	2.1	2.5
Selenium		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Selenium (filtered)		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Ground-Water Quality Results, 1990

Quarter / Analyte		K-1407-B UNW-1		K-1407-B UNW-2		K-1407-B UNW-3		K-1407-B UNW-4			K-1407-B UNW-5			K-1407-C UNW-6
		1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr
Metals	(mg/L)													
Silicon		3 8	2 4	5 3	5.3	6 6	5.7	9	7 4	6 8	6	6	6 7	4 3
Silicon (filtered)		2 4	2.5	4 9	5.5	5 2	5.7	7	1 4	6.9	5 9	5 9	6 4	3 5
Silver		<0.006	<0.006	<0 006	<0.006	<0.006	<0 006	<0 006	<0.006	<0.006	<0.006	<0.006	<0 006	<0 006
Silver (filtered)		<0.006	<0.006	0.0068	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Sodium		22	12	88	78	150	140	17	20	19	28	27	31	1.2
Sodium (filtered)		19	15	87	76	150	150	19	20	19	27	28	33	1.7
Strontium		0 42	0 23	0 34	0 29	0.48	0.45	0 28	0 27	0 26	0 47	0 47	0 52	0 053
Strontium (filtered)		0.36	0.29	0.35	0.29	0 47	0.43	0 25	0.27	0.27	0.47	0.48	0.53	0 049
Thallium		<0.01	0.05<D	<0.01	0.05<D	<0 01	0.05<D	<0 01	0.05D	0.05<D	<0.01	<0.01	0 05<D	<0.01
Thallium (filtered)		<0.01	0.05<D	<0.01	<0.05	<0.01	<0.05	<0.01	0.05<D	<0.05	<0.01	<0.01	0.05<D	<0.01
Thorium		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thorium (filtered)		<0.2	<0.2	<0.2	<0.2	<0 2	<0.2	<0 2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Titanium		0.017	<0.003	0 0073	<0.003	0.015	<0.003	0.018	<0.003	<0.003	0.0037	0.0037	<0.003	0.017
Titanium (filtered)		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0051	<0 003	0.0054
Vanadium		<0.005	<0.005	<0 005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vanadium (filtered)		<0.005	<0 005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0 005
Zinc		0.021	0.036	0.0013	0.038	0.001	0.39	0 014	0.055	0 036	0.015	0.0019	0.0097	0.01
Zinc (filtered)		0.0032	0.024	<0.001	0.038	<0.001	0.042	0.0026	0.015	0.014	<0.001	0 0038	0.015	0 0044
Zirconium		<0.005	<0 005	<0 005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zirconium (filtered)		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Anions	(mg/L)													
Chloride IC		345	134	204	254	476	480	52	59	59	377	355	434	3
Fluoride by Specific Ion Electrode		0.2	0.2	0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	0.2	0.2	<0.1	<0 1
Nitrate		<1	<1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	2
Sulfate		31	18	258	407	437	408	42	50	50	19	19	20	6
Radiochemical	(pCi/L)													
Alpha Activity		0.83	1.72	21.1	45.1	11.4	3 84	1.6	-0 13	1.46	0.01	2.4	0 85	1 08
Alpha Activity (filtered)			1.17		21.26		3.53		0.67	1.56			0.59	
Beta Activity		3.8	4.13	9.42E	1137.55	34.9	21.98	4.4	5.81	4.78	3.8	5.8	5.25	7 71
Beta Activity (filtered)			4.84		748.96		20.83		7.7	6.26			4.38	
Cesium-137					28.1E									
Cesium-137 (filtered)					-5.93E									
Gamma Activity														
Protactinium-234M					2470E									
Protactinium-234M (filtered)					-1790E									
Strontium-90					-5.24									
Strontium-90 (filtered)					-6.92									
Technetium-99					424E									
Technetium-99 (filtered)					538E									
Thorium-234					593E									
Thorium-234 (filtered)					-193E									
Uranium 235					0									
Uranium 235 (filtered)					0.41									
Uranium 238					0									
Uranium 238 (filtered)					0.82									
Uranium Fluorometric	(mg/L)	<0.001	<0.001	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0 001
Uranium Fluorometric (filtered)		<0.001	<0.001	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0 001
Uranium-234					-33.4									
Uranium-234 (filtered)					-0.41									

Ground-Water Quality Results, 1990

Quarter		K-1407-C UNW-6		K-1407-C UNW-7			K-1407-C UNW-8		K-1407-C UNW-9		K-1407-C UNW-10		K-1407-C UNW-11	
Analyte		3rd Qtr	3rd Qtr D	1st Qtr	1st Qtr D	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr
Metals	(mg/L)													
Silicon		3.7	4.8	2.8	2.9	3.5	8.2	7.4	4.6	3.9	3	4	3.5	4.7
Silicon (filtered)		3.6	4.3	2.9	2.9	3.4	7.7	7.1	3.5	3.6	3	3.4	3.5	4.5
Silver		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Silver (filtered)		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Sodium		0.63	1.5	180	190	150	5.6	4.8	81	86	12	20	4	3.2
Sodium (filtered)		1.4	1.9	190	180	150	5.4	4.4	80	81	12	18	4.1	2.7
Strontium		0.023	0.072	0.18/38.79	0.18/23.31	0.18	0.079	0.077	0.21	0.18	0.24	0.26	0.03	0.056
Strontium (filtered)		0.057	0.071	0.18	0.19	0.18	0.076	0.079	0.2	0.17	0.25	0.26	0.036	0.06
Thallium		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium (filtered)		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thorium (filtered)		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Titanium		0.0035	0.0071	0.0055	0.0046	<0.003	0.011	<0.003	0.015	<0.003	0.0069	0.0055	0.0042	0.017
Titanium (filtered)		<0.003	<0.003	0.0064	0.0082	<0.003	0.011	<0.003	0.012	<0.003	0.0087	<0.003	0.0061	0.011
Vanadium		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vanadium (filtered)		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc		0.016	0.0059	0.006	<0.001	0.0084	0.033	0.011	0.0077	0.0078	0.008	0.0046	0.02	0.045
Zinc (filtered)		0.031	0.0026	<0.001	0.0029	0.014	0.016	0.013	0.0061	0.0068	0.0025	0.0027	0.0025	0.016
Zirconium		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zirconium (filtered)		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Anions	(mg/L)													
Chloride IC		2	2	154	142	119	51	51	132	83	5	31	5	4
Fluoride by Specific Ion Electrode		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Nitrate		2	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	7	6
Sulfate		3	4	118	101	101	7	6	200	195	76	16	6	6
Radiochemical	(pCi/L)													
Alpha Activity		1.48	1.58	0.82	0.68	3.16	-0.08	1.59	1.95	2.44	1.17	3.03	1	2.85
Alpha Activity (filtered)		-0.37	0.1			2.12		5.58		2.12		1.51		0.25
Beta Activity		4.89	13.64	41.61	55.76	42.31	12.8	15.27	13.15	21.1	6.26	9.77	29.84	11.87
Beta Activity (filtered)		4.79	4.33			38.81		12.48		17.79		7.55		21.02
Cesium-137				2.851E	3.34									
Cesium-137 (filtered)														
Gamma Activity				0NA	0NA									
Protactinium-234M														
Protactinium-234M (filtered)														
Strontium-90														
Strontium-90 (filtered)														
Technetium-99				-4.02E	40									
Technetium-99 (filtered)														
Thorium-234														
Thorium-234 (filtered)														
Uranium 235														
Uranium 235 (filtered)														
Uranium 238														
Uranium 238 (filtered)														
Uranium Fluorometric	(mg/L)	<0.001	<0.001	0.006	0.005	0.003	0.002	<0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001
Uranium Fluorometric (filtered)		<0.001	<0.001	0.005	0.005	0.002	<0.001	0.002	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
Uranium-234														
Uranium-234 (filtered)														

Ground-Water Quality Results, 1990

Quarter / Analyte		K-1407-B UNW-1		K-1407-B UNW-2		K-1407-B UNW-3		K-1407-B UNW-4			K-1407-B UNW-5			K-1407-C UNW-6
		1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr
Field Parameters														
Depth	(feet)	13.75	14.4	7.17	7.51	10.87	7.5	8.92	9.5	9.5	1.5	1.5	1.5	25.8
Temperature	Deg °C)	14.2	20.1	15.7	24.7	14.3	23.7	17.7	20.3	20.1	15.4	15.3	21.8	13.3
Temperature - I		14.3	26.6	13.5	24.1	13.9	26.3	17.7	19.1	19.1	15.9	14.1	20.0	13.7
Purge Start Time	ninutes)	1151	1610	1015	1200	1132	1345	1328	1024	1024	1455	1455	1304	1307
Purge Stop Time		1155	1620	1020	1330	1135	1355	1330	1026	1026	1502	1502	1312	1312
Dissolved Oxygen	(ppm)	2.4/1.5	1.3	3.5/6.0	2.8	2.7/2.9	0.5	1.0/6.1	1.4	1.4	1.8/2.0	1.6/3.2	1.3	
Dissolved Oxygen - I			0.4		8.2		0.8		3.3	3.4			0.9	
Redox	(MV)	244	95	238	288	114	234	213	221	220	-54	-58	-74	194
Redox - I		328	264	237	239	199	296	157	195	197	29	15	-55	128
Volatile Organic Compounds	(mg/L)													
Acetone		0.013B	<0.01	<0.5	<0.5	<0.5	<0.5	0.005JBD	<0.02		<0.2	<0.2	<0.2	0.005BJ
Benzene		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Bromodichloromethane		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Bromoform		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Bromomethane		<0.01	<0.01	<0.5	<0.5	<0.5	<0.5	<0.02	<0.02	<0.02	<0.2	<0.2	<0.2	<0.01
2-Butanone		<0.01	<0.01	<0.5	<0.5	<0.5	<0.5	<0.02	<0.02	<0.02	<0.2	<0.2	<0.2	<0.01
Carbon Disulfide		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Carbon Tetrachloride		<0.005	<0.005	0.044	<0.25	0.026	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Chlorobenzene		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Chloroethane		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.02	<0.02	<0.02	<0.2	<0.2	<0.2	<0.01
Chloroform		<0.01	<0.01	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Chloromethane		<0.01	<0.01	<0.5	<0.5	<0.5	<0.5	<0.02	<0.02	<0.02	<0.2	<0.2	<0.2	<0.01
Chlorotrifluoroethene													0.048D	
Dibromochloromethane		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
1,1-Dichloroethane		<0.005	<0.005	0.81D	0.36D	0.88D	0.85D	0.005JD	0.005JD		0.14D	0.15D	0.15D	<0.005
1,1-Dichloroethene		<0.005	<0.005	0.51D	0.25D	0.54D	0.52D	0.008JD	0.007JD		0.16D	0.16D	0.16D	<0.005
1,2-Dichloroethane		<0.005	<0.005	0.918	<0.25	0.016	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
1,2-Dichloroethene (total)		0.013	0.013	0.98D	0.74D	0.05	1.9D	0.26D	0.38D	0.39D	3D	3D	3.7D	<0.005
1,2-Dichloropropane		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
cis-1,3-Dichloropropene		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
trans-1,3-Dichloropropene		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Ethylbenzene		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Methylene chloride		<0.005	<0.005	<0.25	0.039JD	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Tetrachloroethane							0.087							
1,1,2,2-Tetrachloroethane		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
1,1,1-Trichloroethane		<0.005	0.0005JB	0.36D	0.15JBD	0.18	0.086JBD	<0.01	<0.01	<0.01	<0.1	<0.1	0.024JBD	<0.005
1,1,2-Trichloroethane		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Tetrachloroethene		0.003J	<0.005	0.93D	0.63D	0.48D	0.38D	0.007JD	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005
Toluene		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	0.01JD	<0.005
Trichloroethene		0.017	0.012	4.5D	2.6D	9.1D	7.7D	0.12D	0.053D	0.054D	2.2D	2.3D	1.9D	0.005
Vinyl Acetate		<0.01	<0.01	<0.5	<0.5	<0.5	<0.5	<0.02	<0.02	<0.02	<0.2	<0.2	<0.2	<0.01
Vinyl Chloride		0.008J	0.005J	<0.5	0.057JD	0.35E	0.17JD	0.072D	0.052D	0.053D	0.53D	0.55D	0.38D	<0.01
Xylene (total)		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.005

Ground-Water Quality Results, 1990

Quarter / Analyte		K-1407-C UNW-6		K-1407-C UNW-7			K-1407-C UNW-8		K-1407-C UNW-9		K-1407-C UNW-10		K-1407-C UNW-11	
		3rd Qtr	3rd Qtr D	1st Qtr	1st Qtr D	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr
Field Parameters														
Depth	(feet)	32.75	32.75	5.25	5.25	6.25	5.5	6.75	5.17	6.29	9.33	11.08	21.83	21.92
Temperature	Deg °C)	21.0	20.5	10.8	11.2	19.0	15.9	17.3	15.4	18.8	11.0	17.0	15.0	25.1
Temperature - 1		19.3	16.1	11.4	11.4	13.7	14.6	17.0	13.7	18.7	12.2	17.8	15.4	17.2
Purge Start Time	ninutes)	1215	1215	1110	1110	900	1005	1025	840	1155	1247	1240	1340	1320
Purge Stop Time		1220	1220	1119	1119	908	1010	1030	845	1201	1257	1248	1343	1323
Dissolved Oxygen	(ppm)	6.3	6.1			0.8		9.3		3.2		1.1		7.2
Dissolved Oxygen - 1		6.9	6.8			1.8		1.4		1.8		1		6.2
Redox	(MV)	269	273	50	45	1	177	162	30	21	-37.4	-88	356	135
Redox - 1		214	216	116	113	12	24	109	236	53	11.6	-70	285	42
Volatile Organic Compounds	(mg/L)													
Acetone		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.013B	<0.01
Benzene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bromodichloromethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bromoform		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bromomethane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Butanone		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Carbon Disulfide		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Carbon Tetrachloride		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chlorobenzene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chloroethane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chloromethane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorotrifluoroethene														
Dibromochloromethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloroethene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dichloroethene (total)		<0.005	0.001J	0.007	0.006	0.007	0.005	0.005	0.013	0.013	<0.005	<0.005	<0.005	<0.005
1,2-Dichloropropane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cis-1,3-Dichloropropene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
trans-1,3-Dichloropropene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ethylbenzene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methylene chloride		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tetrachloroethane														
1,1,2,2-Tetrachloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1,1-Trichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1,2-Trichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tetrachloroethene		<0.005	0.0007J	<0.005	<0.005	<0.005	<0.005	0.0008J	<0.005	<0.005	<0.005	<0.005	0.002J	<0.005
Toluene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichloroethene		0.0008J	0.005	<0.005	<0.005	<0.005	0.015	0.012	<0.005	<0.005	<0.005	<0.005	0.005J	0.004J
Vinyl Acetate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vinyl Chloride		<0.01	<0.01	<0.01	<0.01	0.004J	<0.01	<0.01	<0.01	0.003J	<0.01	<0.01	<0.01	<0.01
Xylene (total)		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Ground-Water Quality Results, 1990

Quarter		K-1407-B UNW-1		K-1407-B UNW-2		K-1407-B UNW-3		K-1407-B UNW-4			K-1407-B UNW-5			K-1407-C UNW-6
Analyte		1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr
Semivolatiles	(mg/L)													
Acenaphthene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzoic acid		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzyl alcohol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Bromophenyl phenylether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Butylbenzylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
di-n-Butylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Chloroaniline		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
bis(2-Chloroethoxy)methane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
bis(2-Chloroethyl)ether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
bis(2-Chloroisopropyl)ether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Chloro-3-methylphenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Chloronaphthalene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Chlorophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Chlorophenyl phenylether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene			0.01B		0.46BD		0.49BD		0.022BD	0.022BD			0.2BD	
Cyclohexane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzofuran		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,3-Dichlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,4-Dichlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
3,3'-Dichlorobenzidine		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2,4-Dichlorophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Diethylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4-Dimethylphenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dimethylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,6-Dinitro-2-methylphenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2,4-Dinitrophenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2,4-Dinitrotoluene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,6-Dinitrotoluene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
bis(2-Ethylhexyl)phthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorocyclopentadiene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachloroethane			0.015J		0.009J				0.01J	0.008J			0.03J	
Hexane, 3-Methoxy-		<0.01	<0.01	<0.5	<0.5	<0.5	<0.5	<0.02	<0.02	<0.02	<0.2	<0.2	<0.2	<0.01
2-Hexanone		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene					0.015J									
1-Iodo-2,3-Epoxypropane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Isophorone		<0.01	<0.01	<0.5	<0.5	<0.5	<0.5	<0.02	<0.02	<0.02	<0.2	<0.2	<0.2	<0.01
4-Methyl-2-pentanone		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Methylnaphthalene														

Quarter / Analyte		K-1407-C UNW-6		K-1407-C UNW-7			K-1407-C UNW-8		K-1407-C UNW-9		K-1407-C UNW-10		K-1407-C UNW-11	
		3rd Qtr	3rd Qtr D	1st Qtr	1st Qtr D	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr
Semivolatiles	(mg/L)													
Acenaphthene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzoic acid		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzyl alcohol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Bromophenyl phenylether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Butylbenzylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
di-n-Butylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Chloroaniline		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
bis(2-Chloroethoxy)methane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
bis(2-Chloroethyl)ether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
bis(2-Chloroisopropyl)ether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Chloro-3-methylphenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Chloronaphthalene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Chlorophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Chlorophenyl-phenylether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyclohexane		0.012B	0.012B			0.009B		0.01B		0.01B		0.01B		0.011B
Dibenz(a,h)anthracene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzofuran		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,3-Dichlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,4 Dichlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
3,3'-Dichlorobenzidine		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2,4-Dichlorophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Diethylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4-Dimethylphenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dimethylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,6-Dinitro-2-methylphenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2,4-Dinitrophenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2,4-Dinitrotoluene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,6-Dinitrotoluene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
bis(2-Ethylhexyl)phthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorocyclopentadiene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachloroethane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexane, 3-Methoxy-						0.05J								
2-Hexanone		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Iodo-2,3-Epoxypropane														
Isophorone		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Methyl-2-pentanone		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Methylnaphthalene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Ground-Water Quality Results, 1990

Quarter / Analyte		K-1407-B UNW-1		K-1407-B UNW-2		K-1407-B UNW-3		K-1407-B UNW-4			K-1407-B UNW-5			K-1407 C UNW-6
		1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr	3rd Qtr	3rd Qtr D	1st Qtr
Semivolatiles	(mg/L)													
2-Methylphenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Methylphenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Nitroaniline		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
3-Nitroaniline		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4-Nitroaniline		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-Nitrophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Nitrophenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
n-Nitroso-di-n-propylamine		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
n-Nitrosodiphenylamine		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
di-n-Octylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pentachlorophenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenol		<0.01	<0.01	0.026B	<0.01	<0.01	<0.01	0.01B	<0.01	<0.01	<0.01	<0.01	<0.01	0.013B
Phenols - Total			<0.03		<0.03		<0.03		<0.03	<0.03			<0.03	<0.03
Pyrene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Styrene		<0.005	<0.005	<0.25	<0.25	<0.25	<0.25	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	0.005
1,2,4-Trichlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4,5-Trichlorophenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2,4,6-Trichlorophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tentatively Identified Compound	(mg/L)													
Freon 113							0.21D						2.2D	
Freon 123			0.012		0.067D								0.25D	
Unknown			0.021J				0.097B			0.014J			0.036J	
							0.008B						0.036J	
							0.028						0.037J	
							0.03							
							0.028							
Unknown Hydrocarbon								0.013D/0.039D						
Miscellaneous														
Dissolved Solids	(mg/L)	980	456	982	860	1360	1218	484	488	496	984	1014	1018	174
pH Average		6.9	6.6	7.0	6.7	7.0	6.6	7.2	6.9	6.9	6.7	6.7	6.5	7.1
pH - I		8.5	6.6	8.8	7.3	7	6.8	7.2	7.3	7.3	5.7	5.9	6.4	7.1
Specific Conductance Average	(µmhos/cm	1424	844	1505	1375	1718	2029	772	829	832	1441	1140	1611	331
Specific Conductance - I		738	1786	1407	915	202	1561	764	740	744	1611	1571	1247	385
Suspended Solids	(mg/L)	234	15	9	13	27	148	37	<1	<1	37	31	10	13
Total Organic Carbon (TOC)	(mg/L)	2	2	1	2	2	3	1	1	2	3	3	4	<1
		3	3	1	2	2	3	1	1	2	3	3	4	<1
		2	3	1	2	1	3	1	2	2	3	3	4	<1
		2	3	1	2	1	3	1	2	2	3	3	4	<1
Total Organic Halide (TOX)	(mg/L)	0.016		1.69	1.177	3.768	7.822	0.279	0.21	0.115	1.79	1.484	1.99	0.031
		<0.01		2.146	1.603	2.384	6.202	0.27	0.22	0.173	1.633	1.21	2.467	0.019
		0.021		2.171	2.134	2.362	7.631	0.261	0.211	0.184	1.983	1.543	2.211	0.022
		0.017		2.698	1.836	2.384	8.422	0.358	0.241	0.077	0.96	1.087	2.026	0.014
Turbidity	(NTU)	34	25	7.8	8.3	22	12	28	0.6	0.55	110	95	115	34

Ground-Water Quality Results, 1990

Quarter		K-1407-C UNW-6		K-1407-C UNW-7			K-1407-C UNW-8		K-1407-C UNW-9		K-1407-C UNW-10		K-1407-C UNW-11	
Analyte		3rd Qtr	3rd Qtr D	1st Qtr	1st Qtr D	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr	1st Qtr	3rd Qtr
Semivolatiles	(mg/L)													
2-Methylphenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Methylphenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Nitroaniline		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
3-Nitroaniline		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4-Nitroaniline		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-Nitrophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4-Nitrophenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
n-Nitroso-di-n-propylamine		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
n-Nitrosodiphenylamine		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
di-n-Octylphthalate		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pentachlorophenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenol		<0.01	<0.01	<0.01	<0.01	<0.01	0.006J	<0.01	<0.01	<0.01	<0.01	<0.01	0.005JB	<0.01
Phenols - Total		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Pyrene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Styrene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2,4-Trichlorobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4,5-Trichlorophenol		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2,4,6-Trichlorophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tentatively Identified Compound	(mg/L)													
Freon 113								0.005						
Freon 123								0.073B		0.02B		0.019B		0.11B
Unknown		0.06J	0.078B			0.039J				0.17		0.19		0.14
		0.056J	0.018B			0.14J				0.017		0.008		0.022
						0.017J								0.01
						0.015J								
						0.062J								
						0.033J								
						0.036J								
						0.031J								
Unknown Hydrocarbon														
Miscellaneous														
Dissolved Solids	(mg/L)	142	160	810	828	688	190	254	714	642	572	538	108	130
pH Average		6.7	6.9	6.7	6.7	6.5	5.8	6.0	6.3	6.1	6.9	6.7	6.7	6.2
pH - I		7.1	6.8	6.4	6.4	6.3	5.7	5.8	6	5.6	6.4	6.4	7.6	6.7
Specific Conductance Average	(µmhos/cm	232	300	1411	1397	1217	314	337	1135	1034	932	902	151	175
Specific Conductance - I		73	73	1548	1580	1137	344	353	1140	938	981	926	209	237
Suspended Solids	(mg/L)	13	9	3	2	1	5	105	24	28	19	18	2	23
Total Organic Carbon (TOC)	(mg/L)	<1	<1	3	3	4	<1	<1	2	2	3	4	<1	1
		<1	<1	3	3	4	1	<1	2	2	3	3	<1	1
		<1	<1	3	3	4	<1	<1	2	2	4	4	<1	1
		<1	<1	3	2	3	<1	<1	2	2	4	4	<1	1
Total Organic Halide (TOX)	(mg/L)	<0.01	<0.01	0.011	<0.01	0.012	0.07	0.013	0.019	0.015	<0.01	<0.01	<0.01	<0.01
		<0.01	<0.01	<0.01	<0.01	0.033	0.038	<0.01	0.041	0.032	0.012	<0.01	<0.01	<0.01
		<0.01	0.014	<0.01	0.014	0.014	<0.01	0.017	<0.01	0.036	<0.01	<0.01	<0.01	<0.01
		0.013	0.014	<0.01	0.015	0.011	0.015	0.013	<0.01	0.021	<0.01	0.01	<0.01	<0.01
Turbidity	(NTU)	50	24	11	11	2.9	5.9	96	40	76	50	70	28	19

APPENDIX D

1990 Statistical Analyses for K-1407-B and K-1407-C Ponds

MARTIN MARIETTA

Internal Correspondence

MARTIN MARIETTA ENERGY SYSTEMS, INC.

June 25, 1990

Gale Hodgson

Results of Statistical Analysis for Semi-Annual Samples at K-1407-B and K-1407-C Ponds

Statistical analysis is complete for semi-annual samples collected from K-1407-B Pond and K-1407-C Pond in the first quarter of 1990.

For K-1407-B Pond, within-well and upgradient versus downgradient t-tests are conducted for TOC and pH. TOX is not tested and only within-well tests are conducted for conductivity in accordance with the modified detection program. Within-well and upgradient versus downgradient tests are also conducted for any metal when a result is above either a primary or secondary drinking water standard.

For K-1407-C Pond, within-well and upgradient versus downgradient t-tests are conducted for TOC, pH, and TOX. Within-well tests are conducted for conductivity. Within-well and upgradient versus downgradient tests are conducted on any metal when a result was above a primary or secondary drinking water standard.

All tests, except pH, are constructed to detect a significant increase. The test for pH is designed to detect either a significant increase or decrease. In order to be conservative, the detection limit is used as the result when a result is reported as less than detection limit. Duplicates for a well are averaged when conducting the tests, but individual results are compared with the drinking water standard.

The only significant t-test of an indicator analyte at K-1407-B Pond is the within well test for conductivity at UNW-1. Additionally, manganese at UNW-1 and UNW-5 is above the drinking water standard and the t-tests are statistically significant for these wells.

At K-1407-C Pond, the upgradient versus downgradient test for pH at UNW-8 indicates a statistically significant lower pH result than the background upgradient result. Also, manganese at UNW-7, UNW-9, and UNW-10 is above the drinking water standard and the t-tests are statistically significant.

A complete listing of the significant tests including background averages, first quarter results, and standard deviations of the background averages is attached.

Please call with any questions.

Sherry R Williams

Sherry R. Williams
K-1006, MS-7272, (4-0693)

cc: J. M. Forstrom

K-1407-B Pond
Significant T-tests for Indicators and Metals Exceeding Drinking Water Standards

Within Well

Analyte	Background Average	QTR 1, 1990 Result	Background Std. Deviation	Drinking Water Standard
UNW-1				
Conductivity (umho/cm)	448.30	1423.60	34.5319	N/A
Manganese (mg/l)	5.78	23.00	1.1432	.05

Upgradient vs. Downgradient

Analyte	Background Average	QTR 1, 1990 Result	Background Std. Deviation	Drinking Water Standard
UNW-5				
Manganese (mg/l)	5.78	19.00 (19,19)*	1.1432	.05

* - Analysis was duplicated, individual results in parentheses

K-1407-C Pond
Significant T-tests for Indicators and Metals Exceeding Drinking Water Standards

Within Well

No significant tests.

Upgradient vs. Downgradient

Analyte	Background Average	QTR 1, 1990 Result	Background Std. Deviation	Drinking Water Standard
UNW-7				
Manganese (mg/l)	.93	6.55 (6.4,6.7)*	1.3489	.05
UNW-8				
pH	7.57	5.84	.2589	N/A
UNW-9				
Manganese (mg/l)	.93	23.00	1.3489	.05
UNW-10				
Manganese (mg/l)	.93	9.00	1.3489	.05

* - Analysis was duplicated, individual results in parentheses.

MARTIN MARIETTA

Internal Correspondence

MARTIN MARIETTA ENERGY SYSTEMS, INC.

July 23, 1990

Gale Hodgson

Evaluation of UNW-8 Resample for pH

The resample of UNW-8 for pH has been statistically evaluated, and pH for this sample is not statistically different from the background average of the upgradient well at a .01 level of significance. The pH of the resample was measured eight times with an average of 6.54. The upgradient background average is 7.57 with a standard deviation of .2589.

Please call with any questions.

Sherry Williams

Sherry Williams
K-1006, MS-7272, (4-0693)

c: J. M. Forstrom

MARTIN MARIETTA

Internal Correspondence

MARTIN MARIETTA ENERGY SYSTEMS, INC.

January 23, 1991

Lisa Shipe

Results of Statistical Analysis for Semi-Annual Samples at K-1407-B and K-1407-C Ponds

Statistical analysis is complete for semi-annual samples collected from K-1407-B Pond and K-1407-C Pond in the third quarter of 1990.

For K-1407-B Pond, within well and upgradient versus downgradient t-tests are conducted for TOC and pH. TOX is not tested and only within well tests are conducted for conductivity in accordance with the modified detection program. Also, within well and upgradient versus downgradient tests are conducted for any metal when a result is above either a primary or secondary drinking water standard.

For K-1407-C Pond, within well and upgradient versus downgradient t-tests are conducted for TOC, pH, and TOX. Within well tests are conducted for conductivity. Within well and upgradient versus downgradient tests are conducted on any metal when a result was above a primary or secondary drinking water standard.

All tests, except pH, are constructed to detect a significant increase. The test for pH is designed to detect either a significant increase or decrease. In order to be conservative, the detection limit is used as the result when a result is reported as less than detection limit. Duplicates for a well are averaged when conducting the tests, but individual results are compared with the drinking water standard.

At K-1407-B Pond, the only significant t-test of an indicator analyte is the within well test for conductivity at UNW-1. Additionally, cadmium is above the drinking water standard of .01 mg/L in UNW-3 and UNW-4 and the within well and upgradient versus downgradient tests are statistically significant. Also, manganese in UNW-5 is above the drinking water standard of .05 mg/L and the upgradient versus downgradient t-test is statistically significant.

At K-1407-C Pond, manganese in UNW-9 is above the drinking water standard of .05 mg/L and the upgradient versus downgradient t-test is statistically significant.

A complete listing of the significant tests including background averages, third quarter results, and standard deviations of the background averages is attached.

Please call with any questions.

Sherry R. Williams

Sherry R. Williams
K-1401, MS-7383, (4-0693)

c: J. M. Forstrom
J. W. Zolyniak

K-1407-B Pond
Significant T-tests for Indicators and Metals Exceeding Drinking Water Standards

Within Well

Well	Analyte	Background Average	Qtr 3, 1990 Result	Background Std. Deviation	Drinking Water Standard	Units
UNW-1	Conductivity	448.30	844.20	34.5319	N/A	umho/cm
UNW-3	Cadmium	.0036	.0130	.0013	.01	mg/L
UNW-4	Cadmium	.0041	.0270	.0025	.01	mg/L

Upgradient vs. Downgradient

Well	Analyte	Background Average	Qtr 3, 1990 Result	Background Std. Deviation	Drinking Water Standard	Units
UNW-3	Cadmium	.0034	.0130	.0009	.01	mg/L
UNW-4	Cadmium	.0034	.0270	.0009	.01	mg/L
UNW-5	Manganese	5.78	20.0	1.1432	.05	mg/L

Note: The third quarter result for Cadmium in UNW-4 is an average of the original sample and a duplicate. The individual results were .028 and .026.

K-1407-C Pond
Significant T-tests for Indicators and Metals Exceeding Drinking Water Standards

Within Well

None.

Upgradient vs. Downgradient

Well	Analyte	Background Average	Qtr 3, 1990 Result	Background Std. Deviation	Drinking Water Standard	Units
UNW-9	Manganese	.9288	17.0	1.3489	.05	mg/L

APPENDIX E

Modified Detection Monitoring Program Approval for K-1407-B and K-1407-C Ponds

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
CUSTOMS HOUSE
701 BROADWAY
NASHVILLE, TENNESSEE 37219-5403

CERTIFIED MAIL #P 169 141 659
RETURN RECEIPT REQUESTED

March 10, 1989

Mr. Ronald O. Hultgren
Director, Enriching Operations
U.S. Department of Energy
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831-8651

RE: Request for Approval for the False-Positive Groundwater Assessment and Implementation of a Modified Detection Program for the K-1407-B Holding Pond - ORGDP
EPA I.D. No. TN0 89 009 0004

Dear Mr. Hultgren:

The Division of Solid Waste Management has recently been in communication with technical staff with the Department of Energy (DOE) and Martin Marietta Energy Systems, Inc. (MMES) regarding the false-positive groundwater assessment proposal for the K-1407-B Holding Pond at the K-25 Plant in Oak Ridge, Tennessee. Discussion of the proposal has been conducted both by telephone and during a meeting held at the K-25 Plant on February 1, 1989. The meeting was arranged per a letter from DOE (dated January 11, 1989) transmitted to the Division requesting approval of the false-positive groundwater assessment and the modified detection program. During the meeting, which was attended by Walker Howell of the Division, Mike Smith and Gary Bodenstein of DOE, and Jon Forstrom and Jack Zolyniak of MMES, the specific points of the justification for the false-positive groundwater assessment, as well as the proposed modified detection program, were reviewed and discussed. Afterward, a tour of the K-1407-B Holding Pond was conducted to permit the Division a first-hand overview of the location of the impoundment, the positioning of the monitoring wells and the relationship of the numerous SWMU's which are positioned hydraulically upgradient of the facility.

Based on the presentation of factors utilized to justify the false-positive groundwater assessment for K-1407-B Holding Pond, along with other current data which may support those factors, (i.e., the pertinent portions of the K-1407-B Holding Pond post-closure permit application, revised December 1988), the false-positive groundwater proposal and the modified detection program, are hereby approved. The approval, in essence, precludes the necessity for any changes to the content of the post-closure permit application, insofar as its detection monitoring portion is concerned.

D 0842

MAR 16 1989

Please be advised, however, that the approval is based upon the current compilation of data relative to the K-1407-B Pond. Subsequent information (generated through the implementation of the RFI program for the B-pond area) may have a bearing on the justification of the false-positive groundwater assessment and permit modification(s) may be necessary.

If you should have any questions regarding this correspondence, please feel free to contact me at (615) 741-3424.

Sincerely,

Walker F. Howell

Walker F. Howell, Geologist
DOE Unit
Division of Solid Waste Management

WFH/F2029059

cc: Suzy Riddle, EPA Region IV
Dave Hopkins, EPA Region IV
Mike Smith, DOE-ORO
Gary Bodenstein, DOE-ORO
Jon Forstrom, K-25
Files

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
CUSTOMS HOUSE
701 BROADWAY
NASHVILLE, TENNESSEE 37219-5403

CERTIFIED MAIL #P 169-141 650
RETURN RECEIPT REQUESTED

July 11, 1988

Mr. Ronald O. Hultgren
Director, Enriching Operations Division
U.S. Department of Energy
P.O. Box 2003
Oak Ridge, TN 37831

RE: U.S. Department of Energy, ORGDP K-1407-C
Pond Clean Closure Proposal/Continued Monitoring Programs

Dear Mr. Hultgren:

The Division of Solid Waste Management (the "Division") has reviewed previously submitted documents, "K-1407-B and K-1407-C Surface Impoundment False-Positive Groundwater Assessment" (May 6, 1988) and "K-1407-C Groundwater Assessment and Clean Closure Justification" (June 6, 1988). The former of the two documents was completed, at the Division's suggestion, in an attempt to substantiate the claim (after the first determination) that contamination in the K-1407-C pond downgradient wells was being falsely indicated. Sampling and analysis conducted during the 30-day false-positive assessment period in November 1987 (along with the resulting statistical comparisons) suggest several important factors supporting the claim that the K-1407-C impoundment has not adversely impacted the underlying groundwater. Some of the more significant factors include:

(1) Conductivity levels in the downgradient wells show trends of being attributable to concentrations of nonhazardous metals (e.g., calcium, magnesium, etc.).

(2) Hazardous constituents (e.g., barium and arsenic) present in downgradient wells and shown to be statistically significant are below drinking water standards (chromium was present in downgradient well UNW-9 in concentrations above drinking water standards, but was not statistically significant).

(3) Concentrations of certain hazardous constituents (e.g., barium and lead) were above drinking water standards in the upgradient well UNW-6 and lead was statistically significant (within-well test). No assessment period averages for lead or barium in the downgradient wells demonstrated statistically significant levels or exceeded drinking water standards.

Therefore, based in part on the apparent legitimacy of the false-positive claim (including those pertinent factors referenced above), and upon the proper design of the detection monitoring system, the Division concurs with your proposal to proceed with clean closure of K-1407-C pond. It should be noted, however, that such an agreement is provided support by DOE's proposal to continue a modified detection monitoring program as outlined in "K-1407-C Groundwater Assessment and Clean Closure Justification." Under that proposal, the Division will require that, in addition to the within-well statistical comparison to be performed for conductivity, both a within-well and an upgradient versus downgradient well statistical comparison for analyzed metals also be performed. Metals may be sampled/analyzed during the semi-annual/annual frequency (2 times a year). This, incidentally, conflicts with the quarterly frequency referenced on page 56, part 8.2 in the false-positive groundwater assessment report.

If, during the closure period, analysis indicates a statistically significant comparison has occurred for a hazardous constituent, then DOE will be required to submit to the Division a post closure permit application establishing a corrective action program designed to bring the facility into compliance with applicable groundwater requirements.

If you should have any questions regarding this correspondence, please feel free to contact this office at (615) 741-3424.

Sincerely,

Dale Ozier FOR

Walker F. Howell
Geologist, DOE Unit
Division of Solid Waste Management

WFH/F2058188

cc: Earl Leming, WPC-TDHE
Johathan Forstrom, DOE
Mike Smith, DOE

MODIFIED DETECTION PROGRAM FOR C-POND

Sampling Frequency - Semi-annual/Annual

Parameters

Semi-annual - Indicators, Metals

Annual - Indicators, WQ Parameters, Metals

Statistics

Indicators - Within-well and up vs. down, except conductivity (within-well only)

Metals - If exceed primary or secondary drinking water standard, within-well and up vs. down. If below standard, no statistical analysis.

Notifications - According to regulations.

VERIFICATION MONITORING

Duration - Minimum of 3 years following closure certification.

Analyses - Same parameters, frequencies, and statistical analyses as Modified Detection Program.

Notifications - Following confirmation sampling and analysis, within 7 days to the TDHE Commissioner.

Termination - Following 6 consecutive sampling periods (3 years) of data below standards or at background concentrations and trend analyses indicate concentrations are constant, decreasing, or varying with background variations and TDHE provides concurrence.

METALS FOR C-POND MODIFIED DETECTION AND VERIFICATION PROGRAMS

Metal	EPA Procedure
Aluminum	EPA-200.7
Antimony	EPA-200.7
Arsenic	EPA-206.2
Barium	EPA-200.7
Beryllium	EPA-200.7
Boron	EPA-200.7
Cadmium	EPA-200.7
Calcium	EPA-200.7
Chromium	EPA-200.7
Cobalt	EPA-200.7
Copper	EPA-200.7
Iron	EPA-200.7
Lead	EPA-200.7
Lead	EPA-239.2
Lithium	EPA-200.7
Magnesium	EPA-200.7
Manganese	EPA-200.7
Mercury	EPA-245.1
Molybdenum	EPA-200.7
Nickel	EPA-200.7
Niobium	EPA-200.7
Phosphorus	EPA-200.7
Potassium	EPA-200.7
Selenium	EPA-270.2
Silicon	EPA-200.7
Silver	EPA-200.7
Sodium	EPA-200.7
Strontium	EPA-200.7
Thallium	EPA-279.2
Thorium	EPA-200.7
Titanium	EPA-200.7
Vanadium	EPA-200.7
Zinc	EPA-200.7
Zirconium	EPA-200.7

END

DATE FILMED

7/19/93