Y/TS-760

Y-12

**OAK RIDGE
Y-12
PLANT**

CALENDAR YEARS 1989
AND 1990 MONITORING WELL
INSTALLATION PROGRAM
FOR THE DEPARTMENT OF ENERGY
Y-12 PLANT
OAK RIDGE, TENNESSEE

MARTIN MARIETTA

October 1991

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

Prepared by
ERCE
Under Purchase Order 21B-99005V
for
Environmental Management Department
Health, Safety, Environment, and
Accountability Division

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Y/TS--760

DE92 002552

CALENDAR YEARS 1989 AND 1990
MONITORING WELL INSTALLATION PROGRAM
Y-12 PLANT, OAK RIDGE, TENNESSEE

Prepared by

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725 Pellissippi Parkway
P.O. Box 22879
Knoxville, Tennessee 37933-0879
Under Purchase Order 21B-99005V

October 1991

for

Environmental Management Department
Health, Safety, Environment,
and Accountability Division

Oak Ridge Y-12 Plant
Oak Ridge, Tennessee 37831
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC
for the
U. S. DEPARTMENT OF ENERGY
Under Contract No. DE-AC05-84OR21400

MASTER

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1.0 INTRODUCTION

This report documents the well-construction activities at the Y-12 Plant in Oak Ridge, Tennessee during 1989 and 1990. The well-construction program consisted of installing seventy-five monitoring wells. Geologists from ERCE (formally the Engineering, Design and Geosciences Group) and Martin Marietta Energy Systems (Energy Systems), supervised and documented well-construction activities and monitored for health and safety concerns. Sixty-seven monitoring wells were installed under the supervision of an ERCE geologist from March 1989 to September 1990. Beginning in September 1990, Energy Systems supervised drilling activities for eight monitoring wells, the last of which was completed in December 1990.

2.0 GENERAL GEOLOGY

The Y-12 Plant is located in Bear Creek Valley and on immediately adjacent portions of Pine Ridge to the north and Chestnut Ridge to the south. The area is located on the leading edge of the White Oak Mountain thrust sheet, which is within the Valley and Ridge Province of the Appalachian Orogenic Belt. The stratigraphy of the valley and adjacent ridges consists of sediments of the Cambrian through Ordovician age. The stratigraphic units, from oldest to youngest, are the Early Cambrian Rome Formation, Middle and Late Cambrian Conasuaga Group, and the Late Cambrian and Early Ordovician Knox Group. The Rome Formation crops out on Pine Ridge, the Conasuaga Group underlies Bear Creek Valley, and the Knox Group underlies Chestnut Ridge. From oldest to youngest, the Conasuaga Group can be differentiated into six formations: the Pumpkin Valley Shale, the Rutledge Limestone, the Rogersville Shale, the Maryville Limestone, the Nolichucky Shale, and the Maynardville Limestone. The Copper Ridge Dolomite crops out on Chestnut Ridge adjacent to the Y-12 Plant and is the basal unit of the Knox Group. The strike of the strata varies locally from N47°E to N67°E, and the dip of the rocks near the surface is 35° to 50° to the southeast (King and Haase, 1987). For detailed discussions of the geology and stratigraphy of the area, the reader is referred to King and Haase (1987), DeBuchananne

and Richardson (1956), and Rothschild and others (1984). A Geologic Map of the area is presented in Figure 2-1, and a Geologic Cross-Section is shown in Figure 2-2.

3.0 WELL INSTALLATION

3.1 Location

Well drilling activities at the Y-12 Plant occurred at several different sites in Bear Creek Valley and on Chestnut Ridge. The sites located on Chestnut Ridge included the United Nuclear Site, the Sanitary Landfill Expansion, and the Chestnut Ridge Security Pits (See Figure 3-1). Drilling sites located in Bear Creek Valley included the Y-12 Plant area, S-3 Ponds, Y-12 Plant Fuel Station, Oil Landfarm, Burial Grounds, Salvage Yard, Lysimeter Demonstration Site, Rust Spoil Area, and New Hope Pond (Figure 3.1). Additionally, exit pathway monitoring wells were installed in the Maynardville Limestone. Table 3-1 lists the wells that were installed at each site. Detailed well location maps are presented in Appendix I and lithologic logs are included in Appendix II.

3.2 Drilling Contractors

Highland Drilling Company installed 59 of the 75 wells completed in 1989 and 1990. Fifteen wells were installed by Charlie Young Drilling, a subcontractor to Highland Drilling. One well was drilled by Geologic Associates Technical Services, a division of ERCE.

Three air-rotary rigs, an auger rig, and a backhoe with an attached auger tool were used to install the wells. Highland Drilling operated two of the air-rotary rigs (an Ingersoll-Rand RD-10 and an Ingersoll-Rand XL-750) and the backhoe with an attached auger tool. The backhoe equipped with the auger allowed access to areas that could not be reached with a conventional auger rig. Charlie Young Drilling operated a Driltech D40K air rotary rig and Geologic Associates Technical Services operated a CME-55 auger rig.

FIGURE 2-1.
GENERALIZED GEOLOGIC MAP
IN THE VICINITY OF THE Y-12
PLANT (AFTER McMASTER 1963)

FIGURE 2-2.
GEOLOGIC CROSS - SECTION
IN THE VICINITY OF THE Y-12 PLANT
(MODIFIED AFTER GERAGHTY & MILLER,
1988)

14 50000

14 50000

14 50000

CHE
SEC

FIGURE 3.1

SITES INCLUDED IN THE 1989 AND 1990
DRILLING PROGRAM AT THE Y-12 PLANT

TABLE 3-1. MONITORING WELL LOCATIONS

SITE	LOCATION	WELLS
Y-12 PLANT FUEL STATION (BLDG 9754-2)	Y-12 PLANT AREA	GW-183, GW-658, GW-659
SALVAGE YARD	Y-12 PLANT AREA	GW-190
BLDGS. 9201-1 & 9204-2	Y-12 PLANT AREA	GW-193, GW-204, GW-656 GW-657, GW-707, GW-708
UNITED NUCLEAR SITE	CHESTNUT RIDGE	GW-302, GW-339
LYSIMETER DEMONSTRATION SITE	BEAR CREEK VALLEY	GW-533, GW-534, GW-538 GW-630
SANITARY LANDFILL EXPANSION	CHESTNUT RIDGE	GW-539, GW-540, GW-541 GW-542, GW-543, GW-544 GW-545, GW-546
OIL LANDFARM	BEAR CREEK VALLEY	GW-601, GW-602, GW-636 GW-637, GW-638, GW-644 GW-645, GW-646, GW-647
CHESTNUT RIDGE SECURITY PITS	CHESTNUT RIDGE	GW-607, GW-608, GW-609 GW-610, GW-611, GW-612
S-3 PONDS	BEAR CREEK VALLEY	GW-613, GW-614, GW-615 GW-616, GW-617, GW-618 GW-619, GW-620, GW-649
BEAR CREEK BURIAL GROUNDS	BEAR CREEK VALLEY	GW-621, GW-622, GW-623 GW-624, GW-625, GW-626 GW-627, GW-628, GW-629 GW-639, GW-640, GW-641 GW-642, GW-643, GW-651 GW-652, GW-653, GW-654 GW-655
NEW HOPE POND	BEAR CREEK VALLEY	GW-603, GW-604
RUST SPOIL AREA	BEAR CREEK VALLEY	GW-648
MAYNARDVILLE LIMESTONE STUDY	BEAR CREEK VALLEY	GW-683, GW-684, GW-685 GW-703, GW-704

3.3 Installation Methods

Fifty of the seventy five monitoring wells were completed in bedrock. The remaining twenty five wells were completed in the unconsolidated zone. Wells completed in the bedrock ranged in depth from 19.1 to 356.0 feet, while wells completed in the unconsolidated zone ranged in depth from 12.0 to 84.5 feet. All wells completed in bedrock were drilled by the air rotary method. Wells completed in the unconsolidated zone were augered, except for wells GW-657 and GW-708 which were drilled with an air rotary rig. Well construction diagrams for all wells completed in the 1989 and 1990 drilling program are presented in Appendix III.

3.3.1 Bedrock Monitoring Wells

Wells completed in bedrock generally were isolated from the overlying unconsolidated soil material through the use of surface casing. This casing consisted of either 10-inch diameter threaded steel installed in a 14-inch diameter borehole or 12-inch diameter welded steel installed in a 15-inch diameter borehole.

The screened intervals of bedrock wells were constructed in the following manner. The well casing consisted of 4-inch diameter stainless steel casing with flush-joint threads attached to a 10 to 20-foot section of 0.01-inch continuous wound stainless steel screen. The well casings were installed into nominal 10-inch diameter boreholes. Stainless steel centralizers were affixed to the well casing above the top of the screen and at varying distances up hole (depending upon depth and hole conditions) in order to insure plumbness of the well casing. Once the well casing was installed in the borehole, a filter pack of silica sand was introduced around the screen to a height of approximately two feet above the screen. In bedrock wells, the sand was tremied with water from an approved water source. In shallow bedrock wells, sand was commonly poured from the surface with caution to prevent bridging of the sand pack. A bentonite seal was then installed on top of the sand pack by pouring bentonite pellets to a height of at least two feet above the sand pack. If necessary, water was added to hydrate the bentonite pellets. The remainder of the annular space above the bentonite seal was filled with grout using a tremie pipe.

Several monitoring wells installed into the bedrock were constructed with open intervals, that is, without screens. After the installation of the surface casing, a nominal 10-inch diameter borehole was drilled to the top of the zone to be monitored into which nominal 7-inch diameter black steel casing was inserted and pressure grouted. The interval to be monitored was then drilled to a nominal 6-inch diameter.

3.3.2 Unconsolidated-Zone Monitoring Wells

Unconsolidated-zone monitor wells generally were constructed in the same manner as the screened bedrock wells, except that surface casing was not necessary, and, in many cases, the well screens were 5 feet in length. Boreholes for the unconsolidated-zone wells were generally drilled to a nominal 10-inch diameter.

3.4 Grouting Procedures

Grouting procedures were utilized to seal the annular space between well casings and the borehole wall above the monitoring interval. The cement grout consisted of a mixture of Class A, Type 1 Cement mixed with 1 to 2% bentonite by weight. In unconsolidated zone wells and screened bedrock wells, the well casing was grouted by placing the cement slurry through a tremie pipe, the bottom of which was initially located near the top of the bentonite seal. As grout was tremied into the annular space, the tremie pipe was raised.

Surface and intermediate casings were pressure grouted into place. The calculated volume of cement required to fill the annulus was pumped into the casing and then a cement plug was either pushed or pumped down the casing, forcing the cement out of the casing through a float shoe and into the annular space. The cement was allowed to cure a minimum of twelve hours before drilling operations continued.

Lost-circulation zones were occasionally encountered in both unconsolidated material and in bedrock within the Knox Group and Maynardville Limestone. Grout additives such as Flowseal™ and bentonite gel were mixed with the cement in order to seal off these zones. Flowseal™ added bulk to the slurry, whereas bentonite increased the viscosity.

4.0 WELL DEVELOPMENT

A water level measurement was taken and the well volume calculated for each well prior to development. One well volume was defined as the volume of standing water in the well casing and screen plus 30% of the volume of the sand pack (i.e., the approximate porosity of the sand). A minimum of five well volumes were evacuated from each well. Dissolved solids and pH of the produced water were measured periodically during development. The color and visual turbidity of the water were also recorded. The well was considered developed if the dissolved solids, pH, color, and turbidity had stabilized after 5 well volumes. Two of the wells, GW-625 and GW-628, were not developed due to the presence of Dense, Non-Aqueous Phase Liquids (DNAPLs) in the well.

The majority of the wells were developed by swabbing. Swabbing was accomplished by inserting 2 3/8-inch diameter steel tubing equipped with a bottom check valve to the bottom of the casing or open interval. The swab was then moved repeatedly up and down the length of the tubing to evacuate water to the surface where the volume removed was measured.

Removal of more than five well volumes was often necessary in open interval wells, wells screened in clay-filled cavities or fractures, and in some wells completed in the unconsolidated zone where turbidity was high. A summary of monitoring-well development data is presented in Table 4-1 and the monitoring well development forms are presented in Appendix IV.

5.0 QUALITY ASSURANCE

During the 1989 and 1990 drilling program at the Y-12 Plant, quality control procedures were stringently followed to assure that wells were installed to specifications prepared by Geraghty and Miller, Inc. (1985), and procedures outlined by Energy Systems (1990). Drilling operations, well-construction, and well development were documented by

geologists from Energy Systems and ERCE. An Energy Systems geologist provided quality control for eight monitoring wells (GW-683, GW-684, GW-685, GW-703, GW-704, GW-657, GW-707, and GW-708). Quality control for the remaining sixty seven monitoring wells installed during 1989 and 1990 was provided by geologists from ERCE.

Prior to drilling, the drill rig, tooling, and well-casing materials were decontaminated by steam-cleaning. During drilling, the drill rig was periodically checked for hydraulic oil leaks with repairs being made immediately, if discovered.

6.0 HEALTH AND SAFETY

A Health and Safety Plan (ERCE, 1988) specified protection protocols and action levels for implementation of protection procedures. All on-site personnel involved with the well drilling program attended a 40-hour hazardous-waste training course and annual updates. All personnel were enrolled in an annual medical monitoring program. ERCE geologists acting as site health and safety officers followed the plan during drilling, well construction, and well development for sixty seven monitoring wells. Energy Systems geologists acted as site health and safety officers for eight of the monitoring wells. On-site health and safety operations consisted of monitoring radiation and volatile organic levels.

Based on a review of the hazard potential at any specific site prior to drilling operations, safety level D was selected for most of the sites. In areas where the presence of DNAPLs and/or polychlorinated biphenyls (PCBs) were known or suspected, safety level C was selected.

Instrumentation used to assist in evaluating potential site hazards included a Photovac TIP^{II} and a Century Organic Vapor Analyzer (OVA 128GC) to monitor organic volatile concentrations. Radioactivity was monitored with a Ludlum Model 3 portable radiation meter.

TABLE 4-1. SUMMARY OF MONITORING WELL DEVELOPMENT DATA

WELL NO.	DEVELOPMENT METHOD	GALLONS EVACUATED	pH INITIAL	pH FINAL	DISSOLVED SOLIDS	
					INITIAL	FINAL
183	SUBMERSIBLE PUMP	153	7.2	7.1	530	480
190	SUBMERSIBLE PUMP	40	8.2	8.2	140	140
193	SUBMERSIBLE PUMP	35	8.0	7.8	760	710
204	SUBMERSIBLE PUMP	33	8.1	8.0	545	550
302	SWAB	225	8.5	8.3	670	580
339	SWAB	250	11.2	8.5	1110	370
533	SWAB	234	8.0	7.5	140	60
534	SWAB	335	7.9	7.8	406	415
538	SWAB	305	7.5	7.8	340	359
539	SWAB	540	8.2	8.4	340	390
540	SWAB	540	11.3	8.3	>1000	320
541	SWAB	660	10.7	13.3	1040	180
542	SWAB	655	8.7	8.4	430	310
543	SWAB	240	9.5	10.6	960	820
544	SWAB	515	10.7	9.2	1410	840
545	SWAB	175	12.1	11.5	>1000	>1000
546	SWAB	860	8.2	8.0	420	340
601	SWAB	2445	8.5	7.9	740	730
602	SWAB	276	12.3	8.4	890	800
603	SWAB	410	8.3	8.1	700	570
604	SWAB	330	9.5	7.8	630	480
607	SWAB	1155	12.0	10.0	>1000	230
608	SWAB	3250	9.3	8.2	390	300
609	SWAB	545	11.1	8.4	750	380
610	SWAB	140	12.1	8.5	2300	360
611	SWAB	82	9.7	9.6	630	430
612	SWAB	1060	9.4	9.1	360	350

TABLE 4-1. SUMMARY OF MONITORING WELL DEVELOPMENT DATA (continued)						
WELL NO.	DEVELOPMENT METHOD	GALLONS EVACUATED	pH INITIAL	pH FINAL	DISSOLVED SOLIDS	
					INITIAL	FINAL
613	SWAB	295	7.9	7.5	290	240
614	SWAB	450	8.7	7.9	410	410
615	SWAB	1110	6.5	6.2	2200	2000
616	SWAB	1290	10.2	9.7	2350	2000
617	SWAB	54	7.4	7.3	230	110
618	SWAB	230	7.9	7.1	990	400
619	SWAB	235	10.1	9.2	150	110
620	SWAB	215	10.2	8.6	370	160
621	SWAB	2240	8.4	8.2	460	440
622	SWAB	103	8.4	8.3	370	370
623	AIR LIFT	983	12.2	9.5	5500	1100
624	SWAB	111	7.8	7.7	380	350
625	DID NOT DEVELOP DUE TO THE PRESENCE OF DNAPL*					
626	SWAB	282	9.1	8.5	170	170
627	SWAB	2040	8.5	8.5	1290	1150
628	DID NOT DEVELOP DUE TO THE PRESENCE OF DNAPL*					
629	SWAB	275	8.8	8.8	800	820
630	SWAB	123	8.6	8.4	380	355
636	SWAB	375	10.1	9.3	450	440
637	SWAB	77	9.4	8.4	390	540
638	SWAB	48	8.1	7.7	940	985
639	SWAB	645	9.9	9.8	90	403
640	SWAB	170	8.1	8.0	100	35
641	SWAB	75	8.0	7.4	47	12
642	SWAB	120	8.7	7.0	45	26
643	SWAB	210	8.8	6.9	500	310
644	SWAB	120	7.8	6.7	450	270

* DNAPL - Dense Non-Aqueous Phase Liquid

TABLE 4-1. SUMMARY OF MONITORING WELL DEVELOPMENT DATA (continued)						
WELL NO.	DEVELOPMENT METHOD	GALLONS EVACUATED	pH INITIAL	pH FINAL	DISSOLVED SOLIDS	
					INITIAL	FINAL
645	SWAB	60	8.3	8.4	510	490
646	SWAB	215	11.7	7.8	2000	790
647	SWAB	205	12.2	8.1	6700	670
648	SWAB	335	8.2	7.2	490	390
649	SWAB	150	7.9	7.8	340	250
651	SWAB	205	11.7	8.3	1700	470
652	SWAB	150	8.4	7.7	550	530
653	SWAB	120	8.4	7.8	150	90
654	SWAB	145	7.6	7.6	350	340
655	SWAB	180	11.9	8.6	1500	220
656	AIR LIFT	54	8.3	8.0	930	860
657	SWAB	82	8.1	7.9	500*	560*
658	AIR LIFT	61	8.0	7.9	460	660
659	AIR LIFT	53	8.5	7.9	500	690
683	SWAB	780	7.4	6.8	450	400
684	SWAB	700	10.2	8.5	1120	510
685	SWAB	840	6.9	6.8	550	440
703	SWAB	1145	9.0	7.7	420	230
704	SWAB	2320	7.3	7.2	470	440
707	SWAB	69	8.0	7.6	440*	570*
708	SWAB	70	7.7	7.7	550*	560*

* Specific Conductance

7.0 Special Notes on Drilling, Installation, and Development

During the drilling, installation, and development of the seventy-five monitoring wells installed in 1989 and 1990 at the Y-12 Plant, the following special conditions were noted on the well logs and/or the activity/progress forms for the listed wells:

- GW-183 - A fairly strong hydrocarbon odor was detected during drilling from 6 to 20 feet.
- GW-193 - A strong hydrocarbon odor was detected during drilling and development.
- GW-204 - The well was a very poor producer during development. The development water had a hydrocarbon and septic smell.
- GW-601 - A petroliferous odor was detected at a depth of 275 feet during drilling. Photovac readings ranged from 15 to 18 ppm.
- GW-602 - The development water had a sulfur smell.
- GW-607 - A slight organic odor was detected during drilling from the surface to 70 feet. Photovac readings ranged from 6 to 10 ppm.
- GW-608 - The first attempt to drill GW-608 had to be abandoned after twisting off a drill bit and one joint of drill steel. Attempts to retrieve the twisted-off steel were unsuccessful. The abandoned boring was grouted from total depth to the surface, thereby encapsulating the drill bit and drill steel.
- GW-623 - A poor producing well. Considerable difficulty was encountered in defining the best zone to complete. Well was completed with 2-inch diameter stainless steel screen and casing. Refer to the 14 page activity/progress report for

details. A slight petroliferous odor and an oil sheen were detected during development.

GW-625 - PCB-contaminated DNAPL was encountered during drilling from 274 to 275 feet. Therefore, the well was not developed. Refer to Haase and King (1990) for a detailed discussion.

GW-627 - The development water had a very slight odor of diesel fuel.

GW-628 - PCB-contaminated DNAPL was encountered during drilling from 212 to 213 feet and from 269 to 270 feet. Therefore, the well was not developed. Refer to Haase and King (1990) for a detailed discussion.

GW-629 - PCB-contaminated DNAPL was suspected during drilling. Refer to Haase and King (1990) for a detailed discussion.

GW-645 - The loss of circulation at 34 feet required the use of drilling foam. The foam used was Quick Foam supplied by Baroid, Houston, Texas. It contained isopropyl alcohol, ethyl alcohol, and alcohol ether sulfate.

GW-647 - The first attempt to drill GW-647 was abandoned at 43 feet due to caving from 13 to 20 feet. A hydrogen sulfide smell was detected during drilling at 91 feet.

GW-657 - A strong sewage odor was detected during development.

GW-658 - A petroleum odor was detected during drilling at one foot. A strong petroliferous odor was detected during development and an oil film was observed on the surface of the produced water.

- GW-659 - A petroleum odor was detected during drilling at one foot. An oil film was observed on the surface of the produced water.
- GW-683 - A strong petroliferous odor was detected during drilling in the interval from 137 to 149 feet.
- GW-707 - A slight sewage odor was detected during development.
- GW-708 - A strong petroleum (gasoline) odor was detected during drilling from 5 to 11 feet.

During the drilling of GW-645, GW-646, GW-647 and GW-648, hydraulic oil leaks occurred on the drill rig. None of the leaks contaminated these wells.

8.0 REFERENCES

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APPENDIX I
MONITORING WELL LOCATION MAPS

DARRON

GW-

BOX
F-105

GW-644

EK
RIAL

GW-637
GROUND

GW-638 GW-636

CREEK

GW-647

GW-601

GW-645

GW-646

GW-602

RIDGE

KEY

Ⓢ GROUND WATER
WELLS DRILLED
1989 & 1990.

SCALE: 1"=400'				DR	T.D.G.	CHK	M.E.	REV
1989 & 1990 Y-12 BOREHOLE LOCATION MAP								
PREPARED FOR: MARTIN MARIETTA ENERGY SYSTEM								
SHEET 1 OF 2								
PROJ. 03558835						DATE: 8 APRIL 199

— KE

Ⓜ GROUND WATER
WELLS DRILL
1989 & 1990

SCALE: 1"=400'				DR	T.D.G.	CHK	M.E.	REV
<p>1989 & 1990 Y-12 BOREHOLE LOCATION MAP</p>								
<p>PREPARED FOR: MARTIN MARIETTA ENERGY SYSTEMS</p>								
<p>SHEET 2 OF 2</p>								
PROJ. 0558835						DATE: 8 APRIL 199

KNOB

ASH
AREA

APPENDIX II
LITHOLOGIC LOGS

ERC/EDGe
Environmental
and Energy
Services Co.

WELL No. GW-183

PAGE 1 OF 1

Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Near Building 9754-2

DRILLER: James C. Draper

HELPER: Gregg Shillings

DRILL: DrilTech D40k

DATE: START: 8/1/89

FINISH: 8/2/89

LOGGED BY: Michael L. Ebers

NOTES: 12" Auger from 0.0 to 0.5'

THICKNESS OF SOIL: 20'

DEPTH DRILLED IN ROCK: 10.6'

TOTAL DEPTH OF WELL: 30.6'

[illegible]

ERC/EDGe
Environmental
and Energy
Services Co.

WELL No. GW-190

PAGE 1 OF 1

Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Rust Scrap Yard

DRILLER: James C. Draper

HELPER: Gregg Shillings

DRILL: DrilTech D40K

DATE: START: 7/31/89

FINISH: 8/1/89

LOGGED BY: Michael L. Ebers

NOTES: Auger boring drilled 30' west encountered strong organic odors
and 500+ ppm on OVA at 3' from well bore at 8.0'.

THICKNESS OF SOIL: 8.0'

DEPTH DRILLED IN ROCK: 18.2'

TOTAL DEPTH OF WELL: 26.2'

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WELL No. GW-193

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Near Building 9201-1
 DRILLER: James C. Draper
 HELPER: Gregg Shilling
 DRILL: DrillTech D40k

DATE: START: 8/3/89
 FINISH: 8/4/89

LOGGED BY: Michael J. Ebers

NOTES: Checked for water at 17' had 6' water in 40 minutes

THICKNESS OF SOIL: 2.5'

DEPTH DRILLED IN ROCK: 15.95'

TOTAL DEPTH OF WELL: 18.45'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION	HYDROCARBONS
FROM	TO			
0.0	0.5		Asphalt	None
0.5	1.0		Gravel Fill	None
1.0	2.5		Clay, reddish-brown, crumbly, with chert	None
2.5	5.0		Limestone, light gray, hard drilling, dry	None
5.0	6.5		*Limestone, hard drilling, soft at 6.0 -	
			7.0' possibly with some water	
9.0	12.0		Cavity, mud filled with water	
12.0	18.45		Limestone, hard drilling	Strong
				hydrocarbon odor
	18.45		Total Depth	when checking
				for water at 17'
				20 to 30 ppm on
				OVA
			* Detailed Lithologic Log not available from	
			5.0' to 18.45' due to the use of a	
			containment box	

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WELL No. GW-20-

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Building 9204-2

DRILLER: Donald Key

HELPER: Scott Gilbert

DRILL: Backhoe with Auger Tool

DATE: START: 8/30/89

FINISH: 9/30/89

LOGGED BY: Christopher M. Wallen

NOTES: Bottom of excavation at 4.1'. Encountered water at 5.6'.
Penetrated bottom of first water bearing zone at 15.0'.

THICKNESS OF SOIL: 10.0'

DEPTH DRILLED IN ROCK: 7.5'

TOTAL DEPTH OF WELL: 17.5'

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WELL No. GW-301

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: United Nuclear
 DRILLER: J.C. Draper
 HELPER: Greg Shillings
 DRILL: DrillTech D&K

DATE: START: 11/2/89
 FINISH: 11/10/89

LOGGED BY: David B. Wright

NOTES: Surface casing set at top of weathered bedrock; problems with caving.
This geologist recommends all other wells drilled at United Nuclear site
to scratch top of bedrock

THICKNESS OF SOIL: 63'

DEPTH DRILLED IN ROCK: 73'

TOTAL DEPTH OF WELL: 136'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Top soil
0.5	20		Clay, reddish-brown, slightly silty, weathered, chert fragments, scattered
20	45		Clay, reddish-brown, slightly silty, weathered chert fragments, scattered, moist at 23' as we approach 45' clay becoming browner
45	63		Clay, brown to reddish-brown with weathered chert fragments
63	66		Dolostone, olive gray, fine to medium crystalline, chert black, flinty
66	70		Dolostone, olive gray, fine to medium crystalline
70	75		Clay filled cavity @ 70'-73' went to clay, brown, dolostone olive gray, and chert
75	80		Clay, dolostone and chert, clay reddish-brown, dolostone and chert weathered
80	85		Clay, dolostone and chert, dolostone, olive gray
85	90		86-88 cavity, clay, dolostone and chert, clay, reddish-brown to brown, dolostone and chert weathered
90	95		Clay, chert and dolostone, clay, reddish-brown, chert, black flinty, dolostone, olive gray
95	100		Clay, dolostone, chert, clay, brown, dolostone, olive gray,

WELL LOG

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WELL No. GW-339

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: United Nuclear
 DRILLER: J.C. Draper
 HELPER: Greg Shillings
 DRILL: DrillTech D40K

DATE: START: 11/20/89
 FINISH: 12/4/89

LOGGED BY: David B. Wright

NOTES: _____

THICKNESS OF SOIL: & weathered rock: 91' top of weathered rock @ 45'

DEPTH DRILLED IN ROCK: 69'

TOTAL DEPTH OF WELL: 114'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	1.0		Top soil
1.0	45.0		Clay, reddish-brown, slightly silty chert fragments, weathered
45.0	50.0		Dolostone, olive gray, medium crystalline
50.0	54.0		Dolostone, olive gray, fine to medium crystalline, minor chert
54.0	63.0	no samples	Clay, filled cavity drilled in 1.5 min.
63.0	67.0		Clay, reddish-brown, dolomite, olive gray, medium crystalline
67.0	78.0	no samples	Clay, filled cavity drilled in 1.0 min.
78.0	82.0		Dolostone, olive gray, medium crystalline
82.0	91.0	no samples	Clay filled cavity drilled in 45 sec.
91.0	97.0	TD Pilot Hole	Dolostone, olive gray to dark olive gray, fine to coarsely crystalline, chert opaque to black, flinty
97.0	105.0		Few cuttings, dolostone, olive gray, medium crystalline
105.0	109.0		Dolostone, olive gray, fine to coarsely crystalline, minor staining
109.0	114.0		Dolostone, olive gray, fine to coarsely crystalline, chert, opaque to black, flinty, few cuttings, staining and vugs evident I think H ₂ O hit at 107' - 108.5'
	114.0		Total Depth

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WELL No. GW-533

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Lysimeter Installation Site

DRILLER: Steve Brown

HELPER: Greg Shillings

DRILL: Drilltech D40K

DATE: START: 5/2/90

FINISH: 5/2/90

LOGGED BY: Jeff Carter

NOTES: Stabilizer + Sub + Bit = 24.1 ft. Table height = 1.9 ft.

Cuttings were monitored as drilling progressed but no samples were retained

THICKNESS OF SOIL: 23.0'

DEPTH DRILLED IN ROCK: 7.1'

TOTAL DEPTH OF WELL: 30.1'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	8.0		Clay, dark brown to red brown, very silty, moist
8.0	10.0		Silt, medium brown to tan, highly argillaceous with scattered highly weathered shale fragments, dry
10.0	13.1		Clay, dark brown, very silty, scattered highly weathered shale fragments, moist
13.1	18.1		Silt, medium brown to tan, highly argillaceous, scattered highly weathered shale fragments, dry
18.1	20.0		Clay, chocolate brown to dark brown, very silty, with scattered shale fragments, moist
20.0	23.0		Clay, tan to medium brown, slight olive green tint, very silty, abundant highly weathered shale fragments, dry
23.0	24.2		Shale, olive green to medium gray, weathering to tan to olive brown silty clay, very slightly moist to dry
24.2	27.2		Shale, dark brown, highly weathered, (dusting stopped) apparently wet
27.2	28.0		Shale, olive green to drak gray, weathering to brown clay, very silty, slightly moist (resumed dusting)
28.0	30.1		Clay, very dark brown with abundant highly weathered shale fragments, very wet
	30.1		Total Depth, water @ 26.1 ft after 30 minutes

Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Lysimeter Installation Site
 DRILLER: Mark Baker
 HELPER: Billy Ray Strader
 DRILL: Ingersol Rand XL-750

DATE: START: 3/28/89
 FINISH: 4/03/89
 LOGGED BY: C. Allison Hodges

NOTES No samples were collected.

THICKNESS OF SOIL: 16.0'
 DEPTH DRILLED IN ROCK: 31.0'
 TOTAL DEPTH OF WELL: 47.0'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	10.0		Silty clay, mottled, light brown and moderate brown, also contains roots, and bark, clay is slightly damp.
10.0	16.0		Clay with some silt, mottled, moderate yellowish orange and moderate yellowish brown, clay soft, moist.
16.0	20.0		Shale, laminated, medium gray and medium bluish gray, highly weathered, dry.
20.0	21.0		Shale, medium bluish gray, competent with some clay, medium gray very moist. Hard drilling.
21.0	22.0		Silty clay, medium gray, also contains shale fragments, dark greenish gray, saturated. Cavity at 21.0', produced some water but not enough to set well.
22.0	22.5		Shale, light bluish gray, competent, dry, hard drilling.
22.5	23.0		Cavity, clay filled, medium gray, damp, no free water.
23.5	26.0		Shale, light bluish gray, dry, hard drilling.
26.0	27.5		Clay, dark yellowish orange, contains shale fragments, medium bluish gray, clay is firm and wet.
27.5	30.5		Shale, light bluish gray, dry, hard drilling.
30.5	31.0		Silty clay, olive gray, also contains shale fragments, medium gray, moist.

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Y-12 CHARACTERIZATION WELL LOG

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Lysimeter Installation Site
Mark Baker
 DRILLER:
 HELPER: Billy Ray Strader
 DRILL: Ingersol Rand XL-750

DATE: START: 3/22/89
4/03/89
 FINISH:
 LOGGED BY: C. Allison Hodges

NOTES _____

THICKNESS OF SOIL: 20.0'
 DEPTH DRILLED IN ROCK: 22.5'
 TOTAL DEPTH OF WELL: 42.5'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	5.0		Silty clay, mottled, dark yellowish brown and light brown, dry, clay is soft.
5.0	10.0		Silty clay, grayish orange, slight shaley, clay is hard and brittle.
10.0	17.0		Silty clay, mottled, moderate yellowish brown and moderate brown and moderate brown, slight damp, clay is firm.
17.0	18.5		Clay, dark yellowish brown, clay is firm and damp. Also contains shale, brownish gray, highly weathered, brittle.
18.5	19.0		Shale, light gray, highly weathered, brittle.
19.0	20.0		Silty clay, brownish gray, with shale, medium gray, highly weathered, brittle.
20.0	24.0		Shale, brownish gray and olive gray, small powdered fragments dry.
24.0	31.0		Shale, medium light gray and medium bluish gray, highly weathered, laminated, larger fragments.
31.0	32.0		Shale, medium light gray, laminated, competent, and clay, grayish brown, firm, wet. Hit a cavity at 31.0 feet.
32.0	37.0		Silty clay, greenish gray, also contains shale, medium light gray, saturated water is gray with an oily/shaley sheen produced from the shale.

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Y-12 CHARACTERIZATION WELL LOG

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WELL No. GW-539

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Sanitary Landfill II

DATE: START: 4/26/89

DRILLER: Mark Baker

FINISH: 5/11/89

HELPER: John Young

LOGGED BY: C. Allison Hodges

DRILL: Ingersol Rand XL-750

NOTES Began drilling with water at 15.0' to 97.0' Drilled dry from 97.0'
to 156.0'. Representative samples taken every 10.0' from 0.0' to
156.0' used rotary rig.

THICKNESS OF SOIL: 74.0'

DEPTH DRILLED IN ROCK: 82.0'

TOTAL DEPTH OF WELL: 156.0'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	1.0		Gravel, roots, clay (top soil) grayish brown.
1.0	10.0		Clay, light brown, brittle, dry.
10.0	74.5		Clay, mottled, light brown and very pale orange, brittle, also contains some chert, medium light gray, flinty. Damp at 11.0'. At 11.5 hit mud filled cavity, light brown and free flowing water. At 18.0' encountered another mud filled cavity. At 71.0 hit a soft spot dropped 2.0'. No free flowing water.
74.0	80.0		Dolomite, light medium gray, medium grained, clay light brown, and chert light gray, white flinty, rough drilling. Increasing chert and dolomite at 77.0'.
80.0	97.0		Dolomite, light gray, fine to medium grained, sugary texture large fragments. 82.5 to 83.0 chert layer, light gray, flinty. 85.0' dolomite is light gray and brownish gray.
97.0	110.0		Dolomite, light gray, and pinkish gray, fine to medium grained, sugary, few scattered pyrite crystals, 5% chert, olive gray, glassy, dry.
110.0	149.0		Dolomite, light gray, fine to medium grained sugary texture, dry.
149.0	150.0		Dolomite, medium gray, ironstained, medium grained, sugary texture.
150.0	155.0		Dolomite, medium grained, ironstained, fine grained, sugary texture, very hard drilling.

Y-12 CHARACTERIZATION WELL LOG

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WELL No. GW-540PAGE 1 OF 2**Y-12 WELL INSTALLATION PROGRAM****WELL LOG**LOCATION: Y-12 Sanitary Landfill IIBucky Young

DRILLER:

Ron Phillips

HELPER:

Ingersol Rand RD-10

DRILL:

DATE: START: 5/23/89

FINISH:

LOGGED BY: Chris Wallen

NOTES

THICKNESS OF SOIL: 143.0'DEPTH DRILLED IN ROCK: 28.5'TOTAL DEPTH OF WELL: 171.5'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	10.0		Clay, silty, light brown, firm dry, w/chert fragments, very pale orange, encountered water zone at 4.0'.
10.0	20.0		Clay, silty, light brown, w/chert fragments, very pale orange.
20.0	30.0		Clay, light brown, with significant chert, yellowish gray/pale olive, flinty.
30.0	40.0		Clay, light brown, with significant chert, yellowish gray/pale orange, sugary texture.
40.0	50.0		Clay, light brown with significant chert, very pale orange yellowish orange sugary.
50.0	60.0		Clay, light brown, with chert, pale orange.
60.0	70.0		Clay, light brown, with flinty chert, light gray and oolitic chert light gray, thin chert beds.
70.0	80.0		Clay, moderate yellowish brown, with significant chert, light gray, flinty, fine grained, with chert dark yellowish orange, sandy (sandstone) texture pinhead vugs.
80.0	90.0		Clay, moderate yellowish brown, with chert, light gray, sugary to flinty, with minor dark oolitic chert fragments.
90.0	100.0		Clay, grayish orange, with chert, sugary, fine grained, and chert flinty, light gray, ratty drilling.
100.0	110.0		Clay, grayish orange, with chert, light gray, flinty w/chert, moderate yellowish orange, sugary.

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ED|Ge**Engineering, Design & Geosciences Group, Inc.**
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P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788WELL No. GW-541PAGE 1 OF 1**Y-12 WELL INSTALLATION PROGRAM****WELL LOG**LOCATION: Y-12 Sanitary Landfill IIDATE: START: 5/04/89DRILLER: Mark BakerFINISH: 5/11/89HELPER: Mark CoapmanDRILL: Ingersol Rand XL-750LOGGED BY: C. Allison HodgesNOTES Representative samples taken every 10.0'.THICKNESS OF SOIL: 56.0'DEPTH DRILLED IN ROCK: 48.5'TOTAL DEPTH OF WELL: 104.5'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	1.0		Gravel (fill material).
1.0	54.0		Clay, light brown, with chert fragments, light gray, flinty. Chert layer fragments 16.0 to 17.0' and again fragments 35.0' to 38.0'.
54.0	56.0		Clay, light brown, with chert, light gray, white and pinkish gray, flinty, and porous. Also shale, light olive gray, with ironstains, laminated, weathered.
56.0	57.0		Dolomite, light brownish gray, fine to medium grained, with chert, light gray, flinty, and shale, light olive gray, with ironstains, laminated, weathered.
57.0	63.0		Dolomite, light brownish gray, fine grained, with some chert, light medium gray, flinty. Hit good water at 60.5'.
63.0	69.5		Dolomite, medium light gray, fine grained. Some chert at 66.5'. Hit a cavity at 69.0 to 69.5'. Clay and chert filled. No water.
69.5	104.5		Dolomite, light gray, fine to medium grained, sugary texture, oolitic chert, medium light gray, flinty, sugary texture. Soft drilling at 86.0'. Sample damp at 95.5'. Sample wet at 96.5'. Saturated at 98.5'.
	104.5		Total depth.

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WELL No. GW-542PAGE 1 OF 2**Y-12 WELL INSTALLATION PROGRAM****WELL LOG**

LOCATION: Y-12 Sanitary Landfill II
DRILLER: Mark Baker
HELPER: Mark Coapman
DRILL: Ingersol Rand XL-750

DATE: START: 5/16/89
FINISH: 5/18/89
LOGGED BY: C. Allison Hodges

NOTES: Drilling dry from 0.0' to 6.0'. Drilling with water from
from 6.0' to 77.5'. Representative samples taken every 10.0'.

THICKNESS OF SOIL: 77.5'+
DEPTH DRILLED IN ROCK: N/A
TOTAL DEPTH OF WELL: 77.5'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Gravel (fill material)
0.5	9.0		Silty clay, mottled moderate yellowish brown and light brown, with chert fragments white and medium light gray earthy and flinty, fine to medium grained, sugary texture, slightly damp. Chert layer from 8.0' to 9.0'.
9.0	22.5		Sandy clay, light brown, sand, very pale orange, fine to medium grained, subrounded to rounded. Also contains chert fragments, medium light gray, flinty.
22.5	45.0		Clay, light brown, with oolitic chert, medium gray and white, fine to medium grained, with some medium to coarse grained quartz crystals, sugary texture, flinty and earthy.
45.0	73.0		Clay, light brown, with oolitic chert, medium gray, white and ironstained dark yellowish orange, fine to medium grained, with some weathered porous chert, sugary texture flinty and earthy. Also contains 1% dark black brown carbonaceous mineral, soft. Soft drilling from 45.0' to 67.5'. Bit bouncing at 67.5' to 73.0'.
73.0	76.0		Clay, light brown, with oolitic chert, medium gray, flinty, and white ironstained, earthy, fine to medium grained, vugs

Y-12 CHARACTERIZATION WELL LOG

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WELL No. GW-543PAGE 1 OF 3**Y-12 WELL INSTALLATION PROGRAM****WELL LOG**LOCATION: Y-12 Sanitary Landfill IIDRILLER: Mark BakerHELPER: Mark CoapmanDRILL: Ingersol Rand XL-750DATE: START: 5/25/89FINISH: 6/02/89LOGGED BY: C. Allison Hodges

NOTES Representative samples taken every 10.0'. Drilled dry from 0.0'
to 7.0'. Drilled with water from 7.0' to 36.0'. Drilled dry
from 36.0' to 85.5'. Drilled with water from 85.5' to 94.0'.

THICKNESS OF SOIL: 16.0'DEPTH DRILLED IN ROCK: 78.0'TOTAL DEPTH OF WELL: 94.0'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Gravel (fill material)
0.5	3.0		Clay, mottled, dark yellowish orange and light brown, with 5% flinty chert light medium gray, damp.
3.0	5.0		Clay, light brown, with 30% flinty chert medium light gray, white and light brownish gray. Some of the light brownish gray chert is porous, other chert of the same type contains a black rhombohedran shaped mineral (hematite). Slightly damp.
5.0	16.0		Clay, light brown, 2% flinty chert, light medium gray. Some water at 14.0', not much.
16.0	18.0		Dolomite, light olive gray, fine grained, sugary texture with 30% flinty chert, light medium gray, and 20% clay, light gray rough drilling.
18.0	19.5		Dolomite, light olive gray, fine grained sugary texture, 5% clay, light brown, 5% flinty chert, light medium gray.
19.5	21.0		Dolomite, light olive gray and light brownish gray, medium to coarse grained, sugary texture 2% clay, light olive gray, and 2% flinty chert.

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WELL NO. GW-544

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Sanitary Landfill II

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersol Rand XL-750

DATE: START: 5/18/89

FINISH: 5/30/89

LOGGED BY: C. Allison Hodges

NOTES Water was used to drill from 4.5' to 5.5'. Drilled dry from
5.5 to 100.0'. Representative 10' samples collected from 0.0'
to 110.0'.

THICKNESS OF SOIL: 47.0'

DEPTH DRILLED IN ROCK: 63.0'

TOTAL DEPTH OF WELL: 110.0'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Gravel, roots, clay, light brown, dry.
0.5	2.5		Sandy clay, mottled, light brown and dark yellowish orange, sand grains are fine to medium. Some chert fragments, very light gray to white, milky to clear in appearance, fine grained
2.5	22.0		Clay, light brown, contains 1 to 2% sand, fine to medium grained also chert fragments that range from an ironstained, milky white, fine grained type to a medium gray, flinty, fine to medium grained, with a sugary texture.
22.0	27.5		Clay, light brown, chert fragments, white and medium gray, fine to medium grained. Sample also contains 15% sandstone which is dark yellowish orange, fine to medium grained, with subrounded grains. The sandstone also contains 1% of a dark mineral.
27.5	30.0		Clay, light brown, with chert, white and medium gray, fine to medium grained. 10% sandstone, dark yellowish orange and light brown, medium to coarse grained, with subrounded grains.
30.0	44.0		Clay, light brown, with 30% chert, medium gray, fine to medium grained, flinty type. Hit some water at 44.0'.

Y-12 CHARACTERIZATION WELL LOG

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DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
44.0	47.0		Clay, light brown, chert, light olive gray, fine grained with some medium sized quartz crystals, and light gray, fine grained, glassy, flinty type. Sample also contains 10% dolomite, dusky brown, medium to coarse grained with some coarse grained quartz crystals.
47.0	50.5		Dolomite, sandy, pale yellowish brown, fine to medium grained, sand grains are rounded and not well cemented (loose). Sample effervesces with HCl. Also contains 5% chert, light gray, fine grained, glassy (flinty type), and 30% clay, light brown.
50.0	51.5		Dolomite, sandy (10% sand) medium light gray, fine grained, sand grains are rounded and not well cemented. Also contains 20% clay, light brown.
51.5	52.5		Dolomite, medium gray, fine grained, has a sugary texture. Contains 15% clay, light brown.
52.5	55.0		Dolomite, medium gray, fine grained, sugary texture, with 5% chert, medium grained quartz crystals. Contains 5% clay, light brown.
55.0	59.5		Dolomite, medium light gray, fine to medium grained, sugary texture, contains 5% clay, light brown.
59.5	98.0		Dolomite, medium light gray, fine to medium grained, sugary texture, also contains chert, light gray and light brownish grain, flinty, damp.
98.0	99.0		Dolomite, light olive gray, fine to medium grained, with chert, white, light gray and light brownish gray, flinty, damp.
99.0	103.0		Dolomite, light brownish gray, and light medium gray, with 15% chert, light gray and light brownish gray, flinty. Rough drilling at 103.5'.
103.0	104.0		Dolomite, light brownish gray, fine to medium grained with medium sized quartz grains, with 10% chert, light gray, white and clear, flinty. Hit some H ₂ O at 104.0' not much.
104.0	107.0

WELL No. GW-544

Y-12 CHARACTERIZATION WELL LOG

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WELL No. GW-545PAGE 1 OF 2**Y-12 WELL INSTALLATION PROGRAM****WELL LOG**LOCATION: Y-12 Sanitary Landfill IIDRILLER: Mark BakerHELPER: Mark CoapmanDRILL: Ingersol Rand XL-750DATE: START: 5/12/89FINISH: 5/18/89LOGGED BY: C. Allison HodgesNOTES Drilled dry from 0.0' to 11.5'. Water used to drill from
11.5' to 67.0'. Representative samples were taken every 10.0'.THICKNESS OF SOIL: 54.5'DEPTH DRILLED IN ROCK: 12.5'TOTAL DEPTH OF WELL: 67.0'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	1.5		Gravel (fill material), clay, light brown.
1.5	8.0		Sandy clay, light brown, sand, very pale orange, fine to medium grained, subrounded to rounded. Chert fragments from 4.0' to 8.0'. Chert is light gray, flinty. Damp from 3.0' to 5.0' and moist from 5.0 to 8.0'.
8.0	10.0		Clay, light brown, with chert fragments, light gray and pinkish gray, fine to medium grained with a sugary texture.
10.0	26.0		Clay, mottled, pale yellowish orange and light brown, with chert fragments, light gray and medium light gray, flinty.
26.0	54.5		Clay, light brown, with chert, medium light gray and medium gray fine to medium grained, with some coarse grained quartz crystals, sugary texture, flinty.
54.5	56.5		Dolomite, light gray, fine to medium grained, sugary texture, chert, medium gray, flinty, clay, light brown and some shale, light olive gray, laminated, weathered. Hard drilling, bit bouncing. Hit some water at 55.0'.
56.5	60.5		Dolomite, medium light gray, fine to medium grained, some clay, light brown, and chert medium light gray, flinty. Hit some more water at 59.0'.

Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Sanitary Landfill II
 DRILLER: Mark Baker
 HELPER: Mark Coapman
 DRILL: Ingersol Rand XL-750

DATE: START: 6/05/89
 FINISH: 6/07/89
 LOGGED BY: C. Allison Hodges

NOTES Drilled dry from 0.0 - 8.0'. Drilled with water from 8.0' to 84.5'. Representative samples were taken every 10.0'.

THICKNESS OF SOIL: 74.5'

DEPTH DRILLED IN ROCK: 10.0'

TOTAL DEPTH OF WELL: 84.5'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	1.0		Gravel, clay, light brown (top soil).
1.0	6.0		Clay, light brown, with 2% chert, white and light gray, earthy, moist.
6.0	18.0		Clay, light brown, brittle, with 25% chert, light gray and white, flinty and earthy. Hit a cavity at 13.0', mud and chert filled, bit dropped 1.5'. Very soft drilling from 14.5' to 18.0'.
18.0	46.0		Clay, dark yellowish orange, 15% chert, light gray and white, flinty and earthy, 1% dark carbonaceous mineral. Hit a cavity at 22.5', dropped to 24.5', clay and chert filled, no free flowing water. At 36.5' hit a chert layer, medium light gray, flinty. Very soft drilling 18.0' to 46.0'.
46.0	54.5		Clay, light brown, with chert, medium gray, flinty, very soft drilling 46.0' to 54.5'.
54.5	66.5		Clay, light brown, chert, oolitic and flinty, also contains 1% coarse grained chert.
66.5	73.0		Clay, dark yellowish orange with chert medium light gray flint. Some water at 71.5'. Soft drilling. Loss of circulation at 72.5'.

Y-12 CHARACTERIZATION WELL LOG

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Oil Landfarm
 DRILLER: Mark Baker
 HELPER: Earl Sexton
 DRILL: XL 750 Ingersol Rand

DATE: START: 8/3/89
 FINISH: 8/31/89

LOGGED BY: David B. Wright

NOTES: _____

THICKNESS OF SOIL: 13'

DEPTH DRILLED IN ROCK: 343'

TOTAL DEPTH OF WELL: 356'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Gravel pad
0.5	8.0		Clay, reddish-brown with weathered chert
8.0	15.0		Dolomite, light gray; minor clay, reddish-brown
15.0	19.0		Dolomite, light olive gray to olive gray
19.0	24.0		Dolomite, olive gray, finely crystalline; minor clay from up hole, chert dark gray to black; drilling break 23'-25'
24.0	29.0		Dolomite, olive gray; minor shale light olive gray; minor chert, dark gray
29.0	34.0		Dolomite, olive gray to dark olive gray
34.0	39.0		Dolomite, olive gray minor break at 38'
39.0	44.0		Dolomite and Dolostone, olive gray to dark olive gray; minor chert, dark gray; minor shale light olive gray.
			TD 15 1/2" hole at 44'
44.0	49.0		Dolostone, olive gray; chert, light gray to dark gray, oolitic; weathered shale dark gray H ₂ O at 46'
49.0	54.0		Dolostone, olive gray, chert light gray to dark gray, weathered (solutional activity)
54.0	59.0		Dolostone, olive gray, chert light to dark gray, flinty in part minor olive green shale
59.0	64.0		Dolostone, olive gray; minor chert, milky white

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WELL No. GW-601Y-12 CHARACTERIZATION WELL LOGPAGE 2 OF 4

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
64.0	69.0		Dolostone, olive gray
69.0	74.0		Dolostone, dark olive gray, minor calcite spars
74.0	79.0		Dolostone, light olive gray to dark olive gray, minor spars
79.0	84.0		Dolostone, olive gray, minor chert, dark gray, flinty
84.0	89.0		Dolostone, light olive gray
89.0	94.0		Dolostone, olive gray, minor limestone, dark gray
94.0	99.0		Dolostone, light olive gray
99.0	104		Dolostone, olive gray, chert, dark gray, to light gray, flinty to oolitic some staining
104	109		Dolostone, olive gray
109	114		Dolostone, light olive gray
114	119		Dolostone, light olive gray to olive gray
119	124		Dolostone, olive gray, some staining from solutional activity
124	129		Dolostone, light olive gray, minor staining
129	134		Limestone, dark gray, medium grained
134	139		Dolostone, olive gray, minor limestone, dark gray, medium grained
139	144		Dolostone, olive gray to dark gray
144	149		Dolostone, olive black
149	154		Dolostone, olive gray to black, minor calcite
154	159		Dolostone, olive gray to brownish black, minor calcite
159	164		Dolostone, olive gray to brownish gray, leaning towards a limestone, good porosity
164	169		Dolostone and limestone, olive black, calcite spars
169	174		Dolostone, olive black, calcite veinlets and spars
174	179		Dolostone, olive black, sucrosic
179	184		Dolostone, olive black with calcite veinlets and spars
184	189		Dolostone, olive black with calcite veinlets and spars
189	194		Dolostone, olive black with calcite veinlets and spars
194	199		Dolostone and dolomitic limestone, olive black and fine to medium grained minor vugs
199	204		Dolostone and dolomitic limestone, olive black, and fine to

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WELL No. GW-601**Y-12 CHARACTERIZATION WELL LOG**PAGE 3 OF 4

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
			medium grained
204	209		Dolostone and dolomitic limestone, olive black, fine to medium grained
209	214		Dolostone and dolomitic limestone, olive black medium grained vuggy
214	219		Dolostone and dolomitic limestone, olive black, sucrosic
219	224		Dolostone and dolomitic limestone, olive black, sucrosic with minor vugs
224	229		Dolomitic limestone, olive black, sucrosic
229	234		Dolomitic limestone, olive black, sucrosic,
234	239		Dolomitic limestone, olive black, sucrosic, minor vugs
239	244		Dolomitic limestone, olive black, sucrosic
244	249		Dolomitic limestone, olive black, sucrosic, minor vugs
249	254		Dolomitic limestone, olive black, sucrosic
254	259		Dolomitic limestone, olive black, sucrosic
259	264		Dolomitic limestone, olive black, sucrosic
264	269		Limestone, dark gray, medium grained H ₂ O at 268'
269	274		Limestone, medium dark gray to dark gray, fine grained
274	279		Limestone, dark gray to grayish black, fine grained, dolomitic gas smell at 275'. Photovac 15-18 ppm
279	284		Limestone, dark gray, fine grained, minor oolitics
284	289		Limestone, dark gray, medium grained, minor oolitics
289	294		Limestone, medium dark gray to dark gray, micritic
289	294		to medium grained, minor oolitics
294	299		Limestone, brownish gray to dark gray, micritic to medium grained
299	304		Limestone, dark gray, medium grained, oolitic
304	309		Limestone, dark gray, fine to medium grained slightly oolitic
309	314		Limestone medium dark gray to dark gray, fine to medium grained, slightly oolitic
314	319	105/8" hole	Limestone, brownish gray to dark gray, micritic to medium grained, minor oolitics

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Oil Landfarm
 DRILLER: Mark Baker
 HELPER: Earl Sexton
 DRILL: XL-750 Ingersol Rand

DATE: START: 7/18/89
 FINISH: 8/3/89

LOGGED BY: David B. Wright

NOTES: _____

THICKNESS OF SOIL: 67'
 DEPTH DRILLED IN ROCK: 145'
 TOTAL DEPTH OF WELL: 212'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	55		Clay, reddish-orange, chert fragments, gray to dark gray flinty to oolitic, 3' cavity at 26; minor H ₂ O
55	65		Dolostone, dark gray, vuggy; chattering of rig at 58', minor H ₂ O at 60', minor clay, reddish-orange, and chert dark gray, flinty
65	67		Clay, reddish-orange, with dolomite, dark gray, vuggy, medium crystalline
67	70		Dolomite, dark gray, sparry (minor), medium crystalline
70	80		Dolomite, and dolostone, gray to dark gray, some spars in dolomite fragments
80	85		Dolomite, dark gray, minor spars within dolomite
85	90		Dolostone and dolomite, gray to dark gray, chert, light gray, flinty with some iron staining H ₂ O at 86'
90	95		Dolostone and dolomite, dark gray, minor chert, gray to dark gray, flinty very minor weathered, chert fragment yellowish-gray
95	100		Dolostone and dolomite, dark gray some minor spars, very minor chert, light gray, some fragments show solutional activity ie (Fe stains, vugs)
100	105		Dolostone and dolomite, dark gray

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Y-12 CHARACTERIZATION WELL LOG

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DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
105	110		Dolostone and dolomite, dark gray, minor spars, very minor shale, grayish olive green
110	115		Dolostone and dolomite, dark gray, minor spars
115	120		Dolostone and dolomite, dark gray, minor spars, minor banded (gray and dark gray) dolomitic siltstone
120	125		Dolostone and dolomite, dark gray, minor limestone, gray medium grained
125	130		Dolomite and dolostone, dark gray, dolomite has minor calcite veinlets
130	135		Dolomite and dolostone, dark gray, finely crsytalline
135	140		Dolomite, light gray to gray, finely crystalline
140	145		Dolomite, dolostone, gray to dark gray, minor chert, very pale orange, dolomite grades to light olive gray, finely crystalline
145	150		Dolomite, dolostone, dark gray to light olive gray, finely crystalline
150	155		Dolostone, dark gray to olive gray
155	160		Dolostone, dark gray to olive gray with calcite veinlets
160	165		Dolostone, dark gray to olive gray, finely crystalline
165	170		Dolostone, dark gray to olive gray, minor calcite veinlets
170	175		Dolostone, dark gray to olive gray, minor dark gray shale
			rough drilling at 173' H ₂ O at 173'
175	180		Dolostone, light olive gray, finely crystalline
180	185		Dolostone, light olive gray, finely crystalline
185	190		Dolostone, light olive gray, shale dark gray to black, minor mud (solotional activity)
190	195		Dolostone, light olive gray to dark gray, finely crystalline
195	200		Dolostone, light olive gray to dark gray, finley crystalline
200	205		Dolostone, light olive gray, finely crystalline
205	210		Dolostone, light gray to olive gray, finely crystalline

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: New Hope Pond
 DRILLER: Mark Baker
 HELPER: Earl Sexton
 DRILL: Ingersoll-Rand 750

DATE: START: 9/12/89
 FINISH: 9/15/89
 LOGGED BY: David B. Wright

NOTES: _____

THICKNESS OF SOIL: 24'
 DEPTH DRILLED IN ROCK: 51.2'
 TOTAL DEPTH OF WELL: 75.2'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	1.0		Top soil
1.0	10.0		Clay, silty with some rock fragments, brown, (fill material)
10.0	15.0		Clay, silty, some rock fragments, orange brown, wet H ₂ O at
			13'
15.0	24.0		Clay, silty, brown
24.0	30.0		Dolostone, olive gray, shale, black, minor limestone, light gray, fine grained, minor chert, fragment
30.0	32.0	TD Pilot	Dolostone, olive gray, minor shale, black, minor limestone
		hole 32'	light to dark gray
32.0	35.0		Dolostone, light olive gray to gray, minor dolomitic limestone(?)
35.0	40.0		Dolostone, olive gray, minor dolomitic limestone, small cavity at 39'
40.0	45.0		Dolostone, olive gray, 2' Drop at 45' moist
45.0	50.0		Dolostone, light olive gray
50.0	55.0		Dolostone and dolomitic limestone, olive gray
55.0	60.0		Dolostone and dolomitic, limestone, olive gray to light olive gray 3' drop at 55' moist
60.0	65.0		oolitic chert fragment, dolostone and dolomitic limestone fine grained olive gray

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: New Hope Pond
 DRILLER: Mark Baker
 HELPER: Earl Sexton
 DRILL: XI 750 Ingersoll Rand

DATE: START: 9/18/89
 FINISH: 9/25/89

LOGGED BY: David B. Wright

NOTES: _____

THICKNESS OF SOIL: 31'

DEPTH DRILLED IN ROCK: 81'

TOTAL DEPTH OF WELL: 112.4'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	1.0		Topsoil
1.0	10.0		Clay, silty, dark brown rock fragments (fill) moist at 8'
10.0	17.0		Clay, silty, brown to dark brown, H ₂ O at 15'
17.0	20.0		Clay, slightly silty, reddish-brown
20.0	25.0		Clay, slightly silty, reddish-brown, with chert fragments, olive gray
25.0	30.0		Clay, reddish-brown, chert and dolostone fragments
30.0	35.0		Top of rock at 31' dolostone, olive gray, minor chert
35.0	40.0		Cavity at 35-39 dropped quickly dolostone, olive gray to gray, 2 fragments of oolitic chert
40.0	45.0		Mud cavity from 43' - 47'; dolostone fragments, olive gray
45.0	50.0		Continued of cavity to 47'; dolostone, olive gray, dolomitic limestone olive gray, fine grained; minor limestone, gray, fine to medium very minor green shale
50.0	55.0		Dolostone, olive gray, dolomitic limestone, olive gray, fine grained, shale, black; cavity 52.5 - 54.5'
55.0	60.0		Dolostone and dolomitic limestone, olive gray; limestone dark gray, medium grained, minor shale, green to black
60.0	65.0		Limestone, gray to dark gray, fine to medium grained; dolomitic limestone, olive gray, fine grained minor green shale

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Chestnut Ridge
 DRILLER: Mark Baker
 HELPER: Mark Coapman
 DRILL: XL 750 Ingersol Rand

DATE: START: 6/8/89
 FINISH: 6/14/89

LOGGED BY: David B. Wright

NOTES: Encountered very muddy H₂O at 143.0'. Area has received
 most rain for much of June since creation of TVA.

THICKNESS OF SOIL: 107.0'

DEPTH DRILLED IN ROCK: 44.3'

TOTAL DEPTH OF WELL: 151.3'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	30.0		Clay, reddish-brown with chert, white to light bluish gray, slight organic odor, 6 to 10 ppm on Photovac.
30.0	70.0		Clay, reddish-brown, with chert, white, medium gray and light bluish gray, slight organic odor, 6 to 10 ppm on Photovac.
70.0	100.0		Clay, reddish-brown, with chert, dark gray to black.
100.0	107.0		Clay, reddish-brown with chert, light gray and black.
107.0	115.5		Dolomite, light olive gray, fine crystalline, few thin white dolomitic filled fractures, chert, white to medium gray, oolitic, flinty, solid-no cavities or voids
115.5	120.0		Dolomite, light olive gray, brown, fine crystalline, chert, gray, flinty, with minor oolitic chert fragments, gray
120.0	130.0		Dolomite, mottled brown and gray, fine crystalline, minor chert, gray
130.0	140.0		Dolomite, gray, fine to medium crystalline, minor chert, gray to black, oolitic
140.0	151.3		Dolomite, gray, brown, vuggy, mud filled, dolostone, brown, water at 143.0, very muddy
	151.3		Total depth.

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Chestnut Ridge
 DRILLER: Mark Baker
 HELPER: Earl Sexton
 DRILL: XL 750 Ingersol Rand

DATE: START: 9/26/89
 FINISH: 10/5/89

LOGGED BY: David B. Wright

NOTES: _____

THICKNESS OF SOIL: 1 weathered BDR 140'

DEPTH DRILLED IN ROCK: 80'

TOTAL DEPTH OF WELL: 220'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	1.0		Gravel pad
1.0	19.0		Clay, reddish-brown with chert fragments 15%, gray to black, flinty
19.0	65.0		Clay, reddish-brown with chert fragments, gray to black flinty to oolitic
65.0	70.0		Clay, reddish-brown, chert, gray to black, flinty, 20-40%, minor H ₂ O at 67'
70.0	75.0		Clay, reddish-brown, chert, gray to black, flinty, 20-40%
75.0	80.0		Clay, reddish-brown, chert, light gray to black, flinty, 10-20%
80.0	85.0		Clay, reddish-brown, chert, light gray to dark gray, flinty 10-20%
85.0	90.0		Clay, reddish-brown, chert, light gray to black, oolitic to flinty 10-20%
90.0	95.0		Clay, reddish-brown, chert, light gray to black, oolitic to flinty 40-50%
95.0	100.0		Chert, light gray to black, oolitic to flinty, 60-70%, clay, reddish-brown
100.0	105.0		Clay, reddish-brown, chert, light gray to black, oolitic to flinty 30-40%

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DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
105.0	110		Clay, reddish-brown, chert light gray to black, oolitic to flinty, 30 to 40%
110	115	Thought top of BDR was 113' but immediately went back into clay & chert fragments	Clay, reddish-brown, dolostone at 113' with chert, back into clay at 114' dolostone, olive gray, chert light to dark gray
115	120		Very fast drilling to 119', clay, reddish-brown, chert light to dark gray, minor olive gray, dolostone, drilled from 114' to 139' in 12 minutes, this zone looks like an erosional surface or sink feature
120	125		Clay, reddish-brown, chert light gray to dark gray, oolitic to flinty 20-30%
125	130		Clay, reddish-brown, chert light gray to black, oolitic to flinty 20-30%
130	135		Clay, reddish-brown, chert, light gray to black, flinty 20-30%
135	140	Top of rock 140'	Clay and chert to 140', dolostone at 140', olive gray, chert, light to dark gray, oolitic to flinty
140	145		Dolostone, olive gray, chert gray to black, flinty
145	152	TD Pilot	Dolostone, light olive gray, minor chert, translucent to black, flinty
152	155		Dolostone, light olive gray, chert, black, flinty and oolitic
155	160		Dolostone, light olive gray to olive black, minor calcite veinlets
160	165		Dolostone, olive black, sucrosic minor calcite veinlets
165	170		Dolostone, olive gray, fine grained, minor calcite veinlets

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Chestnut Ridge Sec. Pits

DRILLER: Mark Baker

HELPER: Earl Sexton

DRILL: XL 750 Ingersol Rand

DATE: START: 10/9/89

FINISH: 10/18/89

LOGGED BY: David B. Wright

NOTES: _____

THICKNESS OF SOIL: 107'

DEPTH DRILLED IN ROCK: 162'

TOTAL DEPTH OF WELL: 269'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	2.0		Top Soil
2.0	44.0		Clay, slightly silty, reddish-brown, with weathered chert fragments (I had to leave site at 44.0')
44.0	92.0		Clay, reddish-brown, with chert fragments
92.0	97.0		Clay, reddish-brown, weathered dolostone, and chert fragments
97.0	107.0		Cavity, mud filled, H ₂ O at 97' ± Chris Wallen
107.0	117.0		Dolostone, olive gray, fine to medium crystalline
117.0	120.0		Dolostone, olive gray, fine to medium crystalline
120.0	125.0		Dolostone, olive gray, fine to medium crystalline, some staining, minor chert, brown to black
125.0	130.0		Cavity at 125' dropped to 129.5' in approximately 75 sec.
			Dolostone, olive gray fine crystalline to medium crystalline
130.0	135.0		Dolostone, olive gray, fine to medium crystalline, minor chert, dark gray, some staining
135.0	140.0		Dolostone, olive black, fine to medium crystalline
140.0	145.0		Dolostone, olive gray to olive black, fine to medium crystalline, minor chert, gray to dark gray
145.0	150.0		Dolostone, olive black, fine to medium crystalline
150.0	155.0		Dolostone, olive gray to olive black, fine to medium crystalline, minor calcite veinlets

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WELL LOG

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DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
155	160		Dolostone, olive gray to olive black, fine to medium crystalline, minor staining, chert fragments
160	165		Dolostone, olive gray, fine to medium crystalline, minor chert
165	170		Dolostone, olive gray, fine to medium crystalline
170	175		Dolostone, olive gray, fine to medium crystalline, minor staining at 172.5', minor calcite veinlets, very minor chert
175	180		Dolostone, dark olive gray to olive black, fine to medium crystalline, minor calcite veinlets
180	185		Dolostone, dark olive gray to olive black, fine to medium crystalline, minor calcite veinlets
185	190		Dolostone, dark olive gray, fine to medium crystalline, minor calcite veinlets
190	195		Dolostone, olive gray, finely crystalline
195	200		Dolostone, light olive gray to olive gray, fine to medium crystalline, minor shale, dark gray
200	205		Dolostone, dark olive gray, medium to coarsely crystalline
205	210		Dolostone, olive gray, fine to medium crystalline
210	215		Dolostone, olive gray, fine to medium crystalline, minor calcite veinlets
215	220		Dolostone, olive gray to light olive gray, fine to medium crystalline, more calcite veinlets, chert at 219.5'
220	225		Dolostone, olive gray, finely crystalline, minor chert
225	230		Dolostone, olive gray, fine to medium crystalline, minor shale, dark gray, very minor chert some staining
230	235		Dolostone, olive gray, fine to medium crystalline, staining more abundant getting close to H ₂ O
235	240		Dolostone, olive gray to brownish gray, finely crystalline staining as the 230-235 interval
240	245		Dolostone, brownish-gray to olive gray, fine to medium crystalline, staining abundant

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WELL LOG .

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WELL No. GW-610

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: CRSP
 DRILLER: J.C. Draper
 HELPER: Greg Shillings
 DRILL: DrillTech D40K

DATE: START: 12/6/89
 FINISH: 12/15/89

LOGGED BY: David B. Wright

NOTES: 15 1/2" Big Stab. & Bit 25.8'
9 1/2 DT4B & Sub. 24.0'

THICKNESS OF SOIL: 39'

DEPTH DRILLED IN ROCK: 78.4'

TOTAL DEPTH OF WELL: 117.4'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	2.0		Gravel & clay of road bed
2.0	15.0		Clay, slightly silty, brown, chert fragments, weathered
15.0	39.0		Clay, slightly silty, reddish-brown, weathered, chert fragments. Top of weathered rock at 39'
39.0	45.0		Clay, reddish-brown, dolostone, olive gray, chert, opaque to black
45.0	50.0		Dolostone, gray to olive gray, weathered, chert fragments
50.0	55.0		Dolostone dark olive gray, coarsely crystalline, some sandy fragments, chert, light gray (minor)
55.0	63.0		Clay filled cavity no samples, drilled in 35 sec. J.C. (Driller) eased back into rock to keep hole as straight as possible
63.0	65.0		Dolostone, dark olive gray, coarsely crystalline, minor chert, oolitic to flinty
65.0	70.0		Dolostone, dark olive gray, medium to coarsely crystalline, minor chert, oolitic to flinty
70.0	75.0		Dolostone, dark olive gray to olive gray, fine to medium crystalline, top of fresh rock 75'±
75.0	80.0		Oolitic interval; dolomite and silica replacement, dark olive gray, medium to coarsely crystalline

Y-12 CHARACTERIZATION WELL LOG

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WELL No. GM-611

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Chestnut Ridge Security Pits

DRILLER: Steve Brown

HELPER: Greg Shilling

DRILL: Drill Tech D40K

DATE: START: 1/11/90

FINISH: 1/19/90

LOGGED BY: Jeff Carter

NOTES: 9 1/2 inch Sub and Bit = 24.1 ft., 15 1/2 inch Sub and Bit = 27.4 ft.

Table Height = 2.5 ft.

All depths from ground surface unless otherwise noted

THICKNESS OF SOIL: 63.8'

DEPTH DRILLED IN ROCK: 121.6'

TOTAL DEPTH OF WELL: 121.6'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	5		Clay, red-brown with weathered chert fragments
5	10		Clay, red-brown with weathered chert fragments
10	15		Clay, red-brown with weathered chert fragments
15	20		Clay, red-brown with weathered chert fragments
20	25		Clay, brown with weathered chert and dolomite fragments
			Soap up at 21.6 feet to clean hole
25	30		Clay, red-brown with weathered chert and dolomite
30	35		Limestone, medium to dark gray trace green tint, dolomitic, abundant clay filled cavities
35	40		Clay, red-brown with weathered limestone fragments
40	45		Clay, red-brown with weathered limestone fragments
45	50		Dolostone, dark brown with green tint, highly stained with abundant red clay
50	55		Dolostone, dark brown with green tint, highly stained with abundant red clay
55	60		Dolostone, dark brown to dark gray, highly weathered, abundant clay filled cavities
60	65		Dolostone, dark brown to dark gray stained and weathered to 63.8 feet. TOP OF FRESH ROCK AT 63.8 FEET
65	70		Dolostone, dark brown to gray slight olive green tint, scattered calcite crystals

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Chestnut Ridge

DRILLER: Mark Baker

HELPER: Earl Sexton

DRILL: 750 XL Ingersol Rand

DATE: START: 10/23/89

FINISH: 11/1/89

LOGGED BY: David B. Wright

NOTES: _____

THICKNESS OF SOIL: 78', 3' Cavity after drilling 2' of rock

DEPTH DRILLED IN ROCK: _____

TOTAL DEPTH OF WELL: _____

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Top soil
0.5	4.0		Clay, reddish-brown, slight silty
4.0	9.0		Clay, reddish-brown, chert, light gray, oolitic
9.0	78.0		Clay, reddish-brown, chert fragments
78.0	81.0		Clay, reddish-brown, dolostone, gray, chert, black
81.0	84.0		Cavity, clay filled, with minor dolostone and chert
84.0	90.0		Dolostone, gray to olive gray, magenta spots, chert, black flinty, minor shale, brown stained.
90.0	95.0		Dolostone, olive gray, fine to medium crystalline, minor chert and shale
95.0	100.0		Dolostone, olive gray, fine to medium crystalline, minor stained; chert oolitic and flinty; minor brown iron stained shale
100.0	104.0		Dolostone, olive gray, fine to medium crystalline, minor chert and shale
104.0	110.0		Cavity (fast drilling)
110.0	115.0		Cavity few samples, very ugly and stained
115.0	119.5		Cavity no samples
119.5	125.0		Dolostone, olive gray, fine to medium crystalline, chert white to gray, vugular chert from above

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WELL No. GW 612

WELL LOG

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DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
125	130		Dolostone, olive gray, fine to medium crystalline; abundant chert, flinty to oolitic
130	135		Dolostone, olive gray, fine to medium crystalline, minor chert and shale
135	141	TD Pilot Hole	Started soap at 138', poor returns, Dolostone, olive gray, fine to medium crystalline; shale iron stained Move I/R Rig off, move Drilltek on
141	150		Poor returns
150	155		Dolostone, olive gray, fine to medium crystalline; chert dark brown to white, oolitic to flint; scattered cement
155	160		Dolostone, olive gray, fine to medium crystalline, minor stains; chert
160	165		Dolostone, olive gray, fine to medium crystalline, minor stains; chert, flinty to oolitic
165	170		Dolostone, olive gray, fine to medium crystalline, minor stains, chert, dark brown to white, flinty to oolitic
170	175		Dolostone, olive gray, fine to medium crystalline, very minor stains; chert flinty, scattered cement fragments
175	180		Damp @ 178', Dolostone, dark olive gray, fine to medium crystalline; very minor chert
180	185		Dolostone, dark olive gray, fine to medium crystalline, very minor chert
185	190		Dolostone, dark olive gray, fine to medium crystalline; very minor chert
190	195		Damp (cutting dust); Dolostone, olive gray, fine to medium crystalline chert
195	200		Damp (cut dust) Dolostone, olive gray, fine to medium crystalline, chert
200	205		Damp (dust cut) Dolostone, olive gray, fine to medium crystalline, abundant chert
205	210		Damp (dust cut) dolostone, olive gray, fine to medium crystalline; abundant chert, flinty to oolitic

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Y-12 CHARACTERIZATION WELL LOG

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WELL No. GW-613PAGE 1 OF 1**Y-12 WELL INSTALLATION PROGRAM****WELL LOG**

LOCATION: S-3 Waste Management Area
 DRILLER: Mark Baker
 HELPER: Earl Sexton
 DRILL: XL 750

DATE: START: 7/5/89
 FINISH: 7/8/89
 LOGGED BY: David B. Wright

NOTES: _____

 _____THICKNESS OF SOIL: 15.0'DEPTH DRILLED IN ROCK: 27.0'TOTAL DEPTH OF WELL: 42.0'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.6		Gravel pad
0.6	2.0		Clay, silty, brown with roots
2.0	5.0		Clay, silty, brown slightly moist
5.0	10.0		Clay, silty, brown
10.0	15.0		Clay, silty, brown with shale fragments, olive to brown top of weathered rock at 15'
15.0	17.0		Shale, brown, stained, very minor limestone fragments, gray, medium crystalline
17.0	20.0		Shale, brown and olive gray moist to very moist
20.0	25.0		Shale, brown and olive gray moist to very moist with staining
25.0	30.0		Shale, olive gray and brown, stained; siltstone, brown, grading to a gray shale
30.0	42.0		Shale, greenish-gray, brown; siltstone, brown, blocky, water at 34'
	42.0		Total depth

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: S-3 Waste Management Area

DRILLER: Mark Baker

HELPER: Earl Sexton

DRILL: Ingersol Rand

DATE: START: 7/10/89

FINISH: 7/19/89

LOGGED BY: Chris Wallen

NOTES: _____

THICKNESS OF SOIL: 7.0'

DEPTH DRILLED IN ROCK: 83.4'

TOTAL DEPTH OF WELL: 90.4'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Gravel pad
0.5	0.9		Topsoil
0.9	4.5		Clay, silty, dark yellowish-orange, medium dense, damp
4.5	5.4		Clay, silty, dusky yellow, medium dense, w/streaks, dark yellowish-orange
5.4	7.0		Clay, light olive gray, dense, dry
7.0	8.8		Shale, light olive gray, weathered
8.8	10.0		Shale, dark yellowish-orange, iron stained, weathered
10.0	11.5		Shale, dark yellowish-brown, soft, damp, w/slight clay
11.5	11.8		Siltstone, dusk yellow, w/shale, dark yellowish-brown
11.8	12.5		Shale, moderate olive brown, crumble, dirty
12.5	18.3		Shale, pale olive, moderate olive brown, iron stains
18.3	19.5		Shale, moderate olive brown, iron stains, highly weathered
			very damp
19.5	20.4		Shale, moderate olive brown, iron stained, weathered, wet
20.4	23.0		Shale, light olive brown, thinly bedded, dry
23.0	24.2		Shale, moderate olive brown/medium gray, w/clay, dark yellowish-brown, wet
24.2	25.3		Shale, medium bluish gray, thinly, bedded, wet
25.3	30.0		Shale, medium dark gray, thinly bedded w/scattered

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Y-12 CHARACTERIZATION WELL LOG.

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DEPTH (FEET) FROM TO		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
			limestone, medium dark gray, w/little calcite, very light gray, scattered siltstone, light olive brown, iron stained
30.0	31.5		Shale, limy, medium dark gray, w/limestone, medium dark gray, sugary, w/calcite, very light gray, shale, moderate olive brown/light olive brown, iron stained, siltstone in thin beds, minor siltstone
31.5	34.0		Shale, medium dark gray/dark gray, thinly bedded, friable, w/calcite, medium dark gray, sugary, w/calcite streaks, very light gray, shale, light olive brown, thin beds, iron stained
34.0	37.5		Limestone, medium dark gray, massive, w/streaks calcite, very light gray to pinkish gray, w/siltstone, moderate olive brown, light olive brown often iron stained, thin beds shale, limy, dark gray,
37.5	50.8		Shale, dark greenish-gray/medium bluish gray/brownish gray, siltstone, (minor) light olive gray, iron stained
50.8	52.5		Limestone, olive gray, sugary w/calcite minor, bluish white, shale, greenish black, thinly bedded, friable
52.5	53.5		Shale, greenish black/medium bluish gray, thinly bedded, scattered limestone, olive gray, w/minor calcite
53.5	57.0		Shale, greenish black, thinly bedded
57.0	59.5		Shale, greenish black, thinly bedded, w/scattered limestone, olive gray, sugary
59.5	61.4		Limestone, olive gray, coarse grained, sugary, w/scattered shale, greenish black/dark gray
61.4	67.0		Shale, greenish black, w/limestone scattered, olive gray greenish gray
67.0	73.0		Shale, greenish black, thin to blocky, w/limestone scattered olive gray, w/calcite 15%
73.0	75.5		Limestone, olive gray/dark greenish gray, sugary, w/shale greenish black, thinly bedded, calcite, minor bluish-white pinkish-gray

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: S-3 Waste Management Area
 DRILLER: Steve Brown
 HELPER: Greg Shilling
 DRILL: DrillTech D40K

DATE: START: 1/25/90
 FINISH: 2/13/90

LOGGED BY: Jeff Carter

NOTES: Table Height = 2.7 ft. Change to 2.8 at 16.7 ft.
9 1/2" Stabilizer and Bit = 19.4 ft. in length at 40.7 ft. Change Stabilizer
9 1/2" Stabilizer and Bit = 24.1 ft. in length

THICKNESS OF SOIL: 15'

DEPTH DRILLED IN ROCK: 230'

TOTAL DEPTH OF WELL: 245'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	4.8		Random fill-soil, bricks, boulders, metal, etc.
4.8	13.5		Mixture of random fill and clay-brown, silty with limestone fragments
13.5	15.0		Clay-brown, silty with roots occasional gray limestone fragments. Water at 10.7 ft. in hole after hole had been undisturbed for 2 hours.
15.0	26.7		Shale, maroon to gray-green, very silty, non calcareous, highly weathered, very soft, highly stained
26.7	30.0		Limestone, dark gray, mottled, oolitic, with calcite filled fractures, very rough drilling, highly stained in part
			Limestone appears to be interbedded with shale, evidence of clay filled cavities very slight.
30.0	35.0		Limestone, dark gray, medium grained, very silty, with abundant calcite filled fractures, clay filled cavity 33.5 to 34.5', highly stained in part.
35.0	40.0		Limestone, dark gray, mottled, oolitic with abundant calcite filled fractures, abundant staining, clay filled cavity from 36.0 to 38.5'
40.0	45.0		Limestone, dark gray, argillaceous, highly oolitic in part. Occasional calcite filled fracture, medium to coarse grained

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Y-12 CHARACTERIZATION WELL LOG

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WELL LOG

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
83.5	95		Shale, green to maroon brown, limestone, gray, medium crystalline with some individual crystals
95	105		Shale, green to maroon, minor limestone, gray, oolitic to coarsly crystalline
105	115		Shale, green to maroon, minor limestone, gray, medium crystalline
115	125		Shale, green to maroon brown, minor limestone, gray, medium crystalline
125	135		Limestone, gray, medium crystalline, individual crystals, minor fracturing, calcareous siltstone, gray-green
135	145		Calcareous siltstone, gray-green, limestone, gray, medium crystalline
145	155		Calcareous siltstone, gray-green to brown, limestone, gray, medium crystalline with filled fractures
155	165		Calcareous siltstone gray-green, shale, green to brown, minor limestone, gray-brown, oolitic to medium crystalline
165	175		Calcareous siltstone and shale, gray-green, limestone, gray brown, medium crystalline
175	185		Calcareous siltstone and shale, gray-green to brown, minor limestone, gray-brown, medium crystalline
185	195		Calcareous siltstone, gray-green, limestone, gray, medium crystalline, filled fractures
195	205		Shale, gray-green, limestone, gray-brown, medium crystalline
205	215		Calcareous siltstone and shale, gray-green, limestone, gray, medium crystalline, filled fractures
215	222.5	TD 10 5/8"	Calcareous siltstone and shale, gray-green, limestone, gray-brown, coarsly crystalline
		Hole

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WELL No. GW-615

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WELL LOG

LOCATION: Near Portal 17 S-3 Ponds
 DRILLER: Steve Brown
 HELPER: Greg Shillings/Dan Scott
 DRILL: DrillTech D40K

DATE: START: 1-25-90
FINISH: 2-13-90

Jeff Carter/
David Wright/
LOGGED BY: Timothy A. Lee

NOTES: _____

THICKNESS OF SOIL: _____

DEPTH DRILLED IN ROCK: _____

TOTAL DEPTH OF WELL: _____

[illegible]

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WELL No. GW-616

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WELL LOG

LOCATION: S-3 Ponds
DRILLER: Steve Brown
HELPER: Greg Shillings
DRILL: DrillTech D40K

DATE: START: 2/16/90
FINISH: 3/10/90

LOGGED BY: David Wright

NOTES: 9 1/2" bit + stab. 24.1' Table at 3.5'
10 5/8" bit + stab. 27.3' Table at 3.6'

THICKNESS OF SOIL: + Fill 42'
DEPTH DRILLED IN ROCK: 227'
TOTAL DEPTH OF WELL: 269'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	3		Fill material; gravel, silty clay and debris, hit limestone boulder could not auger any deeper
3	10		Silty clay, brown, weathered limestone, gray-brown, still fill material
10	16.5		Head dropped quickly at 11.7' also minor moisture, silty
16.5	20		Clay, slightly silty, reddish-brown, good soil
20	30		Clay, slightly silty, reddish-brown, minor shale fragments green
30	35		Clay, reddish-brown, shale, green, minor limestone fragments, gray
35	40		Shale, green-gray, weathered, limestone, gray, fine to medium crystalline
40	45.6	TD Pilot	Limestone, gray, medium crystalline, shale, green top of
		Hole	unweathered rock at 42'
45.6	58		Limestone, gray, fine to medium crystalline
58	68		Limestone, gray, fine to medium crystalline, shale, gray- green, fissile
68	78		Ratty drilling at 69-70', limestone, gray, fine to medium crystalline, highly stained, H ₂ O at 69-70' interval; limestone became oolitic at 75-78'

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
78	88		Shale, gray-green, minor limestone, gray, medium crystalline
88	98		Limestone, gray to olive gray, finely crystalline, very minor shale, gray-green
98	108		Shale, gray-green to brown, minor limestone, gray-brown finely crystalline
108	118		Shale, gray-green, stained, minor limestone, gray, finely crystalline, more H ₂ O at 112-113'
118	128		Shale, gray-green to maroon-brown, minor limestone, gray fine to medium crystalline
128	138		Ratty drilling at 131', shale and calcareous siltstone, gray- green to brown, limestone, gray, micritic
138	148		Shale, gray-green to maroon brown, very minor limestone, gray finely crystalline
148	158		Shale and calcareous siltstone, gray-green to brown, limestone, gray, micritic
158	168		Limestone, gray, fine to medium crystalline, minor shale, gray-green, fissile
168	178		Limestone, gray to light gray, micritic to finely crystalline gray-green shale, fissile
178	188		Limestone, gray, fine to medium crystalline, siltstone and shale, gray-green
188	198		Shale, gray-green to maroon brown, minor limestone, gray, fine to medium crystalline
198	208		Shale, gray-green to maroon-brown
208	219.7	TD Of	Siltstone and shale, gray-green to maroon-brown
		10 5/8" hole	
219.7	224		Limestone, gray, medium crystalline with minor oolitic fragments, minor shale
224	234		Shale, maroon-brown to gray-green, soft drilling
234	244		Shale, maroon-brown to gray-green, limestone 243-244', gray medium crystalline

WELL No. GW-616

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WELL LOG

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WELL No. GW- 617

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WELL LOG

LOCATION: S-3 Ponds

DRILLER: Steve Brown

HELPER: Greg Shillings

DRILL: D40K

DATE: START: 3/16/90

FINISH: 3/19/90

LOGGED BY: David B. Wright

NOTES: 9 1/2" bit + Stabilizer = 24.1'; Table at 2.6'

THICKNESS OF SOIL: 18.0'

DEPTH DRILLED IN ROCK: 0.0'

TOTAL DEPTH OF WELL: 18.0'

[illegible]

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WELL No. GW-618

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WELL LOG

LOCATION: S-3 Ponds

DRILLER: Steve Brown

HELPER: Greg Shillings

DRILL: Drillteck D40K

DATE: START: 3/12/90
FINISH: 3/15/90

LOGGED BY: David B. Wright

NOTES: 15 1/2" bit + Stabilizer = 27.4'; Table at 3'
9 1/2" bit + Stabilizer = 24.1'; Table at 3'

THICKNESS OF SOIL: 27.0'

DEPTH DRILLED IN ROCK: 10.0'

TOTAL DEPTH OF WELL: 37.0'

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WELL No. GW-619

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: S-3 Ponds

DRILLER: Steve Brown

HELPER: Greg Shillings

DRILL: Driltech D40K

DATE: START: 3/27/90

FINISH: _____

LOGGED BY: David B. Wright

NOTES: 9 1/2" bit stab. 24.1', Table at 2.4'

THICKNESS OF SOIL: 40'

DEPTH DRILLED IN ROCK: 8'

TOTAL DEPTH OF WELL: 40.8'

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WELL NO. GW-620

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: S-3 Ponds

DRILLER: Steve Brown

HELPER: Greg Shillings

DRILL: Driltech D40K

DATE: START: 3/20/90

FINISH: 3/27/90

LOGGED BY: David B. Wright

NOTES: 9 1/2" bit + stab. = 24.1' Table at 3.5'

15 1/2" bit + stab. = 27.4' to 15 1/2" bit = 25.9' Table at 3.4'

3/23/90 9 1/2" bit + stab. = 24.1' Table at 3.8' 3/26/90 Table at 3.6'

THICKNESS OF SOIL: 41'

DEPTH DRILLED IN ROCK: 34'

TOTAL DEPTH OF WELL: 75'

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WELL No. GW-621

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Burial Grounds - Bear Creek Rd

DRILLER: Randy Phillips

HELPER: Ronnie Phillips & Steve Brown

DRILL: Ingersol-Rand T-4

DATE: START: 9/14/89

FINISH: 9/19/89

Christopher M. Wallen
LOGGED BY: Michael J. Ebers

NOTES:

THICKNESS OF SOIL: 22.0

DEPTH DRILLED IN ROCK: 21.0

TOTAL DEPTH OF WELL: 43.0

[illegible]

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WELL No. GW-622

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Burial Ground

DRILLER: Mark Baker

HELPER: Earl Sexton

DRILL: Ingersol Rand XL-750

DATE: START: 12/1/89

FINISH: 12/1/89

LOGGED BY: Bryn Howze

NOTES: _____

THICKNESS OF SOIL: 14.2'

DEPTH DRILLED IN ROCK: 6.3'

TOTAL DEPTH OF WELL: 20.5'

[illegible]

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WELL No. GW-623

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Burial Grounds

DRILLER: Mark Baker

HELPER: Earl Sexton

DRILL: Ingersol Rand XI-750

DATE: START: 11/22/89
 FINISH: 12/1/89

Michael L. Ebers
 LOGGED BY: Bruce McMaster

NOTES: Water at 35', 130-139', 267' and 298'

THICKNESS OF SOIL: 16'

DEPTH DRILLED IN ROCK: 333'

TOTAL DEPTH OF WELL: 349'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	5		Clay, silty, tan
5	9		Clay, silty, tan and shale, weathered, dark brown
9	16		Shale, clayey, maroon gray, weathered
16	19		Dolostone, fine grained, gray; minor limestone
19	23		Limestone, fine grained, gray with minor shale
23	28		Limestone, gray, blue-gray; minor dolostone, fairly hard
28	38		Shale, gray and light purple, highly weathered, small water at 35'
38	45		Shale, gray and light purple; minor limestone with calcite veins
45	50		Limestone, dark gray with calcite veins; shale, dark gray maroon
50	60		Shale, fissile, dark gray-maroon; minor limestone with calcite
60	65		Shale, gray-green; minor limestone with calcite
65	70		Shale, green laminated with limestone, minor calcite in limestone
70	72		Shale, laminated, green and maroon, minor limestone with calcite
72	75		Shale, fissile, laminated, maroon

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WELL No. GW-623

Y-12 CHARACTERIZATION WELL LOG

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DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
75	85		Shale, laminated, maroon, minor limestone
85	90		Shale, laminated, maroon; minor oolitic limestone; and shale, laminated, green
90	95		Limestone, coarse grained, with calcite veins, minor shale, green
95	100		Shale, dark green and maroon; minor limestone
100	105		Shale, laminated, light maroon and green
105	110		Shale, laminated, maroon, silty: minor green shale and limestone
110	125		Shale, dark maroon and green, laminated, minor limestone
125	139		Shale, dark maroon; minor shale, green and oolitic limestone with calcite stringers, hit additional water from 130' to 139'
139	141		Limestone, gray-green, oolitic; minor green shale
141	145		Shale, laminated, dark maroon and dark green; minor limestone
145	146		Shale, dark maroon and limestone, gray-green; minor green shale
146	150		Shale, dark green; minor gray limestone
150	155		Limestone, gray-green, with calcite veins; minor green and maroon shale
155	160		Shale, dark maroon and green, minor limestone with calcite
160	165		Shale, dark green, minor maroon shale, and minor limestone
165	170		Shale, dark maroon; minor green shale and minor limestone
170	180		Shale, dark maroon and green; limestone, gray-green, with calcite
180	183		Shale, dark maroon and green; limestone, oolitic with calcite
183	190		Shale, dark green and maroon; minor limestone, gray-green
190	195		Shale, dark green; minor limestone, gray-green and maroon shale
195	200		Limestone, dark green with calcite veins; shale, dark green

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Y-12 CHARACTERIZATION WELL LOG

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DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
			minor maroon shale
200	205		Limestone, dark green with calcite veins, shale, dark green; shale, olive gray
205	210		Limestone, gray-green, slightly oolitic, with calcite veins; minor green shale
210	215		Limestone, gray-green with calcite veins; minor green shale
215	219		Limestone, green-gray, oolitic, with calcite veins
219	245		Shale, very silty, greenish-gray, thinly bedded with limestone, olive gray, fine grained, scattered pink calcite filled fractures
245	250		Limestone, light olive gray, fine to medium grained, oolitic with thin greenish gray shale partings
250	270		Shale, greenish-gray, locally silty; and limestone, light olive gray, fine grained, locally oolitic, few thin greenish-gray partings, with pink calcite filled fractures, minor water at 267'
270	280		Limestone, medium light gray, fine to medium grained, locally oolitic; and shale, greenish-gray, silty; few pink calcite filled fractures
280	300		Shale, medium dark gray and greenish-gray, locally silty; and limestone, medium light gray, fine grained, water at 298', killed dust
300	310		Limestone, light olive gray to medium gray, fine grained, locally oolitic, scattered green glauconite grains; shale greenish-gray, silty
310	324		Shale, greenish-gray, fissile, micaceous, locally silty; limestone, fine to medium grained, light olive gray, locally abundant green glauconite
324	349		Shale, fissile, dark maroon, locally greenish-gray, micaceous; limestone, light olive gray, fine to medium grained
	349		Total Depth

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WELL No. GW-02

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Burial Ground

DRILLER: Mark Baker

HELPER: Earl Sexton

DRILL: Ingersol Rand XL 750

DATE: START: 1/5/90

FINISH: 1/5/90

LOGGED BY: David B. Wright

NOTES: _____

THICKNESS OF SOIL: 25'

DEPTH DRILLED IN ROCK: 2.2'

TOTAL DEPTH OF WELL: 27.5'

[illegible]

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WELL No. GW-625

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Burial Ground
 DRILLER: Mark Baker
 HELPER: Earl Sexton
 DRILL: Ingersol Rand XL 750

DATE: START: 12/20/89
 FINISH: 1/5/90

LOGGED BY: David B. Wright

NOTES: 9 1/2" bit + Stab 28' Table at 3.4'

THICKNESS OF SOIL: 20'

DEPTH DRILLED IN ROCK: 263'

TOTAL DEPTH OF WELL: 283'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	3		Gravel pad
3	15		Weathered shale and silt; shale green to maroon and stained
15	22		Limestone, light gray to gray, medium to coarsely crystalline shale olive green to maroon, stained
22	30		Shale, olive green to maroon, with limestone stringers dark gray, coarsely crystalline
30	35		Limestone, dark gray, oolitic, shale gray green to maroon
35	50		Limestone, gray, oolitic, shale partings green to maroon
50	55		Limestone, gray, oolitic to medium crystalline, shale, green to maroon
55	62	TD Pilot Hole	Limestone, gray, oolitic to medium crystalline, shale green to maroon
62	69		Limestone, gray, oolitic, medium grained, oolites are brownish-gray, shale, green and maroon, thinly laminated
69	70.5		Shale, green and maroon, thickly laminated. Limestone gray, oolitic, medium grained, oolites are brownish-gray and some are very large and irregular shaped (elongated)
70.5	71.5		Limestone, gray, oolitic, medium grained, oolites are brownish-gray, shale, maroon and green, thickly laminated
71.5	102		Shale, grayish-red purple and pale green, fissile, and 10%

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Y-12 CHARACTERIZATION WELL LOG

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DEPTH (FEET) FROM TO		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
			limestone, olive gray, oolitic, medium to coarse grained
102	110		Shale, grayish-red purple and minor pale green, fissile to blocky and 20% limestone, maroon, medium grained, trace green glauconite
110	120		Shale, grayish-red purple and pale green, blocky, few thin silty lenses and 15% limestone, gray, oolitic
120	130		Siltstone, shaly, dark greenish-gray and 20% shale, maroon and 15% limestone, light olive gray, medium grained oolitic
130	140		Shale, maroon and pale green; 20% siltstone, shaly, dark greenish gray and 15% limestone, olive gray, fine grained and calcite, pink (2%)
140	150		Shale, maroon and pale green; siltstone, olive gray, fine grained, oolitic
150	160		Siltstone, dark greenish-gray, shaly and lesser shale, maroon and pale green; 20% limestone, medium grained, olive gray
160	170		Limestone, light olive gray, fine grained, with white calcite filled fractures, locally brecciated; and shale, maroon and pale green, silty to locally siltstone
170	180		Shale, maroon and pale green, silty with minor limestone fine grained, light olive gray
180	185		Siltstone, dark greenish gray and limestone, olive gray, fine grained; minor shale, maroon and pale green
185	210		Shale, silty, dark greenish-gray, trace maroon shale; 30% limestone, light olive gray, fine grained, locally oolitic, locally pink calcite filled fractures
210	231		Shale, silty, dark greenish-gray; 15% limestone, olive gray
	231.5		Bottom of 10 5/8" hole
231.5	235		Shale, gray green, minor cement
235	240		Shale, gray to gray green, minor limestone, gray, oolitic
240	245		Shale, gray green, blocky
245	248		Shale, gray green, blocky to fissile minor limestone, gray,

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Burial Ground
 DRILLER: Mark Baker
 HELPER: Earl Sexton
 DRILL: Ingersol Rand XL-750

DATE: START: 12/12/89
FINISH: 12/15/89

LOGGED BY: Bryn Howze

NOTES: _____

THICKNESS OF SOIL: 48.0'

DEPTH DRILLED IN ROCK: 30.0'

TOTAL DEPTH OF WELL: 78.0'

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Burial Ground
 DRILLER: Mark Baker
 HELPER: Earl Sexton
 DRILL: Ingersol Rand XL-750

DATE: START: 12/5/89
 FINISH: 12/11/89
 LOGGED BY: Bryn Howze

NOTES: _____

THICKNESS OF SOIL: 43.0'
 DEPTH DRILLED IN ROCK: 227.0'
 TOTAL DEPTH OF WELL: 270.0'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	3.0		Silt, clayey, medium brown
3.0	43.0		Shale, highly weathered, medium brown, mottled, black, yellow, orange, moist at 22'
43.0	47.0		Shale, olive gray, medium gray, interbedded with limestone light to medium gray, fine-grained
47.0	53.0		Shale, olive gray, medium gray, interbedded with limestone light to medium gray, calcite veins
53.0	55.0		Shale, olive gray, medium gray with minor limestone, light gray
55.0	64.0		Shale, olive gray to medium gray, interbedded with limestone, light gray, fine-grained, calcite veins, minor iron-stained cuttings
64.0	70.0		Oolitic limestone, light to medium gray with calcite veins and some interbedded shale, medium gray
70.0	80.0		Interbedded shale, olive gray to medium gray and limestone light to medium gray, fine-grained with some oolitic limestone and calcite veins, water at 74'
80.0	88.0		Limestone, light to medium gray, some oolitic limestone, calcite veins, minor shale, medium gray
88.0	163.0		Shale, olive gray medium gray with minor limestone, light

Y-12 CHARACTERIZATION WELL LOG

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Burial Grounds
 DRILLER: Mark Baker
 HELPER: Morris McMillan
 DRILL: Ingersol Rand XL-750

DATE: START: 1/11/90
 FINISH: 1/22/90
 LOGGED BY: David B. Wright

NOTES: 16.8' 9 1/2 Bit + Stabilizer
3.8' Table off ground
24.1' 15 1/2" bit + Stabilizer

THICKNESS OF SOIL: 13'

DEPTH DRILLED IN ROCK: 275'

TOTAL DEPTH OF WELL: 288'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	3		Gravel pad
3	8		Clay, brown, silty, weathered shale, gray green
8	13		Clay, brown, silty, weathered shale, green, maroon brown
13	18		Shale, maroon brown, green, minor limestone, gray, medium to coarsely crystalline
18	23		Shale, maroon brown, green, minor limestone, gray, medium crystalline
23	28		Shale, maroon to green, fissile, stained, minor oolitic limestone
28	33		Shale, gray green to green, blocky, stained, limestone, gray, medium crystalline to oolitic
33	38		Shale, gray green-green to maroon brown, stained, limestone, gray, medium crystalline to oolitic
38	43		Shale, maroon brown to green; green is calcareous in nature minor limestone, gray, medium crystalline
43	48		Shale, maroon brown to green, calcareous, blocky, stained (minor), limestone, gray, medium crystalline
48	53		Shale, maroon brown to green, calcareous, blocky to fissile, limestone, gray medium crystalline to oolitic
53	58		Shale, maroon brown to green, limestone, gray, oolitic to medium crystalline

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
58	61	TD of	Limestone, gray, oolitic to medium crystalline, calcareous
		9 1/2"	siltstone, green-gray, minor shale, maroon brown, minor
		Pilot Hole	staining
62	67		Shale, maroon to green, limestone, gray, oolitic
67	72		Limestone, gray, medium crystalline to oolitic, shale green
			blocky to fissle
72	77		Limestone, gray, medium crystalline, shale, green
77	82		Shale, maroon to green, minor limestone, gray, medium
			crystalline
82	87		Limestone, gray-brown, medium to coarsely crystalline,
			shale, maroon
87	92		Shale, maroon to green, limestone stringers, gray, medium
			crystalline
92	97		Shale, maroon to green, minor limestone, gray, medium
			crystalline
97	102		Shale, maroon to green, minor limestone, medium crystalline
			to oolitic
102	107		Shale, maroon to green, minor limestone, gray medium
			crystalline
107	112		Siltstone, green, blocky, limestone, gray, medium crystalline
			minor maroon shale
112	117		Siltstone, green, blocky, limestone, gray, medium crystalline
117	122		Shale, maroon and green, minor limestone, gray, medium
			crystalline
122	127		Siltstone, green, blocky, limestone, gray, medium crystalline
127	132		Siltstone, green, blocky, limestone, gray, medium crystalline
132	137		Siltstone green to maroon, blocky, minor limestone gray,
			medium crystalline
137	147		Siltstone and shale, green, limestone, gray, medium to
			coarsely crystalline
147	157		Siltstone and shale, green-gray, limestone, gray, medium
			crystalline

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
157	167		Siltstone, green, limestone, gray, medium crystalline, shale, gray
167	177		Siltstone and shale, green, calcareous, limestone, gray, medium crystalline
177	187		Siltstone and shale, green-gray, limestone, gray-brown, oolitic
187	197		Siltstone and shale, gray-green, limestone, gray-brown, medium crystalline
197	207		Shale and siltstone, green, minor limestone, gray-brown, oolitic
207	213	Sampled water 1/17/90	Hit something at 212-213', deep brown, I think same smell at 625, siltstone and shale gray green, limestone, gray, medium crystalline
213	223		Siltstone and shale, gray-green; limestone, olive gray, medium crystalline, oolitic. Poor returns in first five ft.
223	228		Siltstone and shale, gray-green to reddish-brown; limestone gray to gray-brown, medium crystalline, oolitic
228	232		Siltstone and shale, gray-green; limestone, gray to gray- brown, medium crystalline, oolitic
232	236.9		Siltstone and shale, gray-green; limestone, gray to gray- brown, medium crystalline, oolitic. Scattered fragments of reddish-brown siltstone
238	248		Shale, gray, fissile, limestone, gray, fine to medium crystalline, might have hit a little H ₂ O at 241' easv drilling
248	258		Shale, gray to brown, limestone, gray, oolitic to medium crystalline
258	268		Shale and siltstone, gray-green, minor limestone, gray- brown, oolitic to fine crystalline, minor filled fractures
268	278		Shale and siltstone, maroon and green, limestone, gray, oolitic to medium crystalline, filled fractures, slight drilling break at 269-270'

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

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Y-12 WELL INSTALLATION PROGRAM	WELL LOG
LOCATION: <u>Burial Grounds</u>	DATE: START: <u>1/23/90</u>
DRILLER: <u>Mark Baker</u>	FINISH: <u>2/2/90</u>
HELPER: <u>Earl Sexton</u>	
DRILL: <u>XL 750 Ingersol Rand</u>	LOGGED BY: <u>David B. Wright</u>

NOTES: Table at 3.1'
Stabilizer + Bit 16.7' - Bit = 15.8' Hole opener 3'; 1.5 to Bit 15 1/2"
Stabilizer + 15 1/2" Bit = 18.8'; Stabilizer + 10 5/8" Bit = 16.8' Table at 4.5'

THICKNESS OF SOIL: 11' to weathered shale

DEPTH DRILLED IN ROCK: 301'

TOTAL DEPTH OF WELL: 312'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	2		Gravel pad
2	6		Clay, brownish-orange, silty
6	12		Clay, brown, weathered shale fragments
12	22		Silty clay, brown and shale, brown, H ₂ O at 20'
22	32		Shale, mottled gray green and brown, stained
32	42		Shale, gray-green to maroon brown, minor limestone, gray, fine to medium crystalline, minor staining of shale
42	47.5	TD Pilot	Shale, siltstone, gray to gray-green, limestone, gray, medium crystalline
47.5	57		Shale, gray to gray brown, limestone, gray, fine to medium crystalline
57	67		Shale, gray to gray green, minor maroon, limestone, gray, fine to medium crystalline
67	77		Shale, gray, fissile to blocky, limestone, gray, fine to medium crystalline, oolitic, individual pink calcite crystals
77	87		Shale, gray, limestone, gray to light gray, medium crystalline with minor pink calcite crystals
87	97		Shale, gray, limestone, gray, medium crystalline, minor veinlets with calcite crystals or calcite rich dolomite

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
97	107		Very few cuttings; shale, gray to gray green, calcareous siltstone, gray
107	117	Ratty	Shale, gray, green, maroon, brown, limestone, gray, medium
		Drilling at	crystalline, shale, highly stained and rounded.
		117'	
117	127		Shale, gray-green, maroon and brown, stained, rounded, calcareous siltstone, gray, minor limestone, gray medium crystalline
127	137		Shale, gray-green, maroon, brown, rounded and stained
137	147	Hard	Calcareous, siltstone, gray to gray-green, limestone, gray
		Drilling to	fine to medium crystalline
		146'	
147	157		Shale and calcareous, siltstone, gray to gray-green, blocky limestone, light gray-brown to gray, oolitic
157	167		Shale, green, calcareous, siltstone, gray-green, limestone, gray, medium crystalline.
167	177		Calcareous, siltstone, gray to gray-green, limestone, gray- brown, medium crystalline to oolitic, shale, gray; veinlets and minor fracturing observed; slight dark brown cut in drilling H ₂ O
177	187		Calcareous, siltstone, gray-green, shale, gray-green, limestone, brown-gray, medium crystalline to oolitic; cut increased slightly. No odor could be discerned
187	197		Hit creosote, sweet odor 194'-195', calcareous, siltstone, gray-green, limestone, gray-brown, medium crystalline to oolitic. Shown of influx of brown fluid in limestone facies I think; also individual pink calcite or CA Rich Dolomite crystals
197	207		Calcareous, siltstone, gray-green, shale, green, minor limestone, gray-brown, oolitic, individual crystals
207	212.5		Calcareous, siltstone, gray-green, limestone, gray-brown,

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WELL LOG

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WELL No. GW-E30

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Lysimeter Installation Site

DRILLER: Steve Brown

HELPER: Greg Shillings

DRILL: Drilltech D40K

DATE: START: 5/3/90

FINISH: 5/3/90

LOGGED BY: Jeff Carter

NOTES: Stabilizer + Sub + Bit = 24.1 ft. Table height = 2.0 ft.

Cuttings were monitored as drilling progressed but no samples were retained.

THICKNESS OF SOIL: 10.0'

DEPTH DRILLED IN ROCK: 18.6'

TOTAL DEPTH OF WELL: 28.6'

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Bear Creek Burial Grounds/Oil
Landfarm
 DRILLER: Mark Baker
 HELPER: Bucky Young/Mark Coapman
 DRILL: Ingersoll Rand XL 750

DATE: START: 5/23/90
 FINISH: 5/31/90

LOGGED BY: C.G. Hagegeorge

NOTES: Hit good flow of water at 107 ft. Water level 4 ft. above ground level
would flow at ground level.

THICKNESS OF SOIL: 8.0 ft.

DEPTH DRILLED IN ROCK: 109 ft.

TOTAL DEPTH OF WELL: 117 ft.

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	8		Clay, yellow-brown.
8	10		Weathered-shale, olive green, fissile.
10	16		Fresh rock -- limestone, gray fine crystalline. Some shale, olive green, heavily weathered. Suspect weathered shale from up the hole.
16	20		Limestone, medium gray, fine crystalline with shale, olive green, weathered.
20	23		Limestone, medium gray, fine crystalline, shale, olive green, silty. Some siltstone. Some weathering. Water coming in.
23	30		Shale, gray green, fissile.
30	40		Shale, gray green, fissile. Some iron staining.
40	50		Limestone, medium gray, very fine to fine crystalline. Scattered iron staining.
50	56		Shale, gray green and gray with limestone, medium gray, fine crystalline. Shale and limestone probably interbedded.
60	70		Shale, medium to dark gray, fissile.
70	80		Shale, gray-green and dark gray, some mottled, fissile, with limestone, medium to dark gray, fine crystalline.
80	90		Shale, gray-green, and dark gray, some mottled, fissile, with limestone, medium to dark gray, fine crystalline.

Y-12 WELL INSTALLATION PROGRAM

WELL LOG

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Bear Creek Burial Grounds/oil
landfarm

DRILLER: Mark Baker

HELPER: Steve Brown

DRILL: Ingersoll Rand XL 750

DATE: START: 5/31/90

FINISH: 6 / 190

LOGGED BY: Charles G. Hagegeorge

NOTES:

THICKNESS OF SOIL: 5.0'

DEPTH DRILLED IN ROCK: 22.5'

TOTAL DEPTH OF WELL: 27.5

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Donald Kee

DRILL: Ingersoll Rand XL 750

DATE: START: 6/5/90

FINISH: 6/5/90

LOGGED BY: Bruce McMaster

NOTES:

THICKNESS OF SOIL: 12'

DEPTH DRILLED IN ROCK: 0'

TOTAL DEPTH OF WELL: 11.5

[illegible]

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL 750

DATE: START: 6/11/90

FINISH: 6/15/90

LOGGED BY: Bruce McMaster

NOTES: _____

THICKNESS OF SOIL: 3'

DEPTH DRILLED IN ROCK: 122.5'

TOTAL DEPTH OF WELL: 125.5'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	3		Gravel pad, dark tan, native sandy silt
3	10		Brown-maroon fissile shale, weathered
10	20		Brown-maroon fissile shale, weathered
20	26		Gray-green to brown & maroon shale, silty, crumbly to fissile.
26	30		Gray-green to brown & maroon shale, silty, crumbly to fissile.
30	31.5		Gray-green to maroon shale & minor gray oolitic limestone.
			Tight drilling
31.5	33		Gray-green limestone, finely crystalline w/calcite fillings.
			Minor maroon shale.
33	40		Gray-maroon fissile shale w/gray-green limestone; finely crystalline.
40	43.0		Oolitic and fine grained limestone gray to green; minor shale
43.0	43.5		Gray to green oolitic & fine grained limestone
43.5	47		Gray to olive green fissile shale, slightly micaceous. Minor light gray limestone.
47	50		Green fissile, slightly micaceous shale. Equal light gray limestone, finely crystalline.
50	53		Gray to olive green fissile shale w/minor gray oolitic limestone with macro-calcite clasts.
53	58		Major gray-green limestone, finely crystalline; minor gray shale.

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
58	60		Olive green, fissile shale and gray finely crystalline limestone.
60	65		Major maroon & green shale minor light gray limestone w/calcite banding.
65	70		Major maroon & green shale, slight ammount light gray limestone.
70	75		Light gray to dark limestone w/spary calcite. Minor light brown shale.
75	78		Dark green finely micaceous shale, fissile, minor dark gray limestone w/calcite banding, finely crystalline.
78	80		Dark green finely micaceous shale, fissile, equal light to dark gray limestone w/spary calcite.
80	85		Major dark green shale w/slight ammount of calcite cementing Minor dark brown shale
85	90		Major dark green shale w/slight ammount of calcite cementing. Minor dark brown shale.
90	92		Major light to dark gray limestone, recrystallized minor dark green shale.
92	95.5		Dark green shale w/small ammount of calcite cementing fissile. Dark gray limestone, finely crystalline.
95.5	100		Dark gray-green limestone, finely crystalline, minor dark gray shale.
100	110		Dark gray-green limestone (w/calcite veinings) minor dark gray shale.
110	120		Massive dark gray-green shale, fissile.
120	125.5		Recrystallized limestone, dark gray.
	125.5		TOTAL DEPTH

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL 750

DATE: START: 6/15/90

FINISH: 6/18/90

LOGGED BY: Bruce McMaster

NOTES:

THICKNESS OF SOIL: 3'

DEPTH DRILLED IN ROCK: 44.4'

TOTAL DEPTH OF WELL: 47.4'

[illegible]

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL 750

DATE: START: 6/19/90

FINISH: 6/19/90

LOGGED BY: Bruce McMaster

NOTES:

THICKNESS OF SOIL: 11'

DEPTH DRILLED IN ROCK: 13.3'

TOTAL DEPTH OF WELL: 24.3'

[illegible]

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersol Rand XL-750

DATE: START: 6/19/90

FINISH: 6/20/90

LOGGED BY: Bruce McMaster

NOTES:

THICKNESS OF SOIL: 1.0'

DEPTH DRILLED IN ROCK: 35.5'

TOTAL DEPTH OF WELL: 36.5'

[illegible]

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Bear Creek Burial Grounds/Oil
 DRILLER: Mark Baker Landfarm
 HELPER: Mark Coapland
 DRILL: Ingersoll Rand T-4

DATE: START: 6/22/90
 FINISH: 6/25/90

LOGGED BY: Timothy A. Lee

NOTES: _____

THICKNESS OF SOIL: 0.5'

DEPTH DRILLED IN ROCK: 28.8'

TOTAL DEPTH OF WELL: 29.3'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Gravel fill
0.5	5.0		Weathered shale, dark yellowish orange to brownish yellow, iron stains.
5.0	10.0		Weathered shale, dark yellowish orange to reddish brown, iron stains; scattered sandstone fine gravel. RAD=0.05-0.1 MR/hr.
10.0	15.0		Weathered shale, dark yellowish orange to reddish brown, iron stains; scattered sandstone, fine grained. RAD≤Background
15.0	20.0		Weathered shale and siltstone, dark yellowish orange to reddish brown, iron stains; scattered sandstone, fine grained. RAD≤Background.
20.0	25.0		Weathered shale, dark yellowish orange, reddish brown and greenish grey, iron stains; scattered sandstone fragments, fine grained.
25.0	29.3		Weathered shale, dark yellowish orange, reddish brown, greenish grey, iron stains; scattered sandstone, fine grained. RAD ≤ Background
	29.3		TOTAL DEPTH

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL 750

DATE: START: 6/19/90
FINISH: 6/2/90

LOGGED BY: Bruce McMaster

NOTES:

THICKNESS OF SOIL: _____ 1

DEPTH DRILLED IN ROCK: 22.4

TOTAL DEPTH OF WELL: 23.4

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Burial Grounds/Oil Landform

DRILLER: Mark Baker

HELPER: Mark Coapland

DRILL: Ingersoll Rand T-4 750

DATE: START: 6-26-90

FINISH: 7-03-90

LOGGED BY: Timothy A. Lee

NOTES: Loss of circulation at 34.0' required sparingly use of drill soap/foam
used Quick foam from Baroid drilling fluid, Houston, TX. (isopropyl alcohol
ethyl alcohol; alcohol ether sulfate)

THICKNESS OF SOIL: 19.0'

DEPTH DRILLED IN ROCK: 66.8'

TOTAL DEPTH OF WELL: 85.8'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Gravel fill.
0.5	10.0		Clay, moderate brown, slightly silty, scattered fragments of weathered chert.
10.0	17.5		Clay, moderate brown, scattered fragments of chert. Rad $\leq$ Background.
17.5	19.0		Dolomite siliceous olive gray, medium grained.
19.0	23.5		Cavity, clay filled, no moisture.
23.5	27.0		Dolomite siliceous olive gray, medium grained; scattered chert, flint very hard.
27.0	28.0		Cavity, clay filled, no moisture.
28.0	30.0		Dolomite, olive gray, medium to coarse grained, silty.
30.0	34.0		Dolomite, medium olive gray, "sugary" texture, medium grained; scattered tan colored siltstone.
34.0	41.0		Dolomite, siliceous, dark olive gray, "sugary" texture, scattered chert fragments, scattered siltstone fragments.
41.0	45.0		Cavity, clay filled, loss of circulation.
45.0	46.5		Dolomite siliceous, dark olive gray, medium crystalline; scattered chert fragments, volit: c/weathered.
46.5	58.0		No returns, no sample to describe. (Hard drilling, dolomite, siliceous, dark olive gray, with interbedded chert.)

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WELL LOG

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL 750

DATE: START: 7-06-90
FINISH: 7-23-90

LOGGED BY: Michael L. Ebers/
Timothy A. Lee

NOTES: b.g.s. = below ground surface; hydraulic hose leak detected at 36.0
feet; down @ 51.0 feet to fix leak; down @ 62.5 feet to fix hydraulic
pump.

THICKNESS OF SOIL: 29.8'

DEPTH DRILLED IN ROCK: 46.1'

TOTAL DEPTH OF WELL: 75.9'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	0.5		Gravel pad.
0.5	20.0		Clay, dark yellowish orange, scattered chert, weathered chert. (flint) OVA less than 0.05 ppm.
20.0	25.0		Clay, dark yellowish orange, scattered fragments of weathered chert and chert (flint).
25.0	29.8		Clay, dark yellowish orange, scattered fragments of chert (flint) OVA less than .05 ppm, RAD $\leq$ background.
29.8	35.0	"fresh rock"	
		@29.8' bgs	Dolomite, very hard, siliceous, light olive gray, medium crystalline, scattered chert (flint). RAD ~ background.
35.0	38.8		Dolomite, hard, light gray, medium crystalline, "sugary" texture, scattered fragments of chert. RAD ~ background.
38.8	45.0		Dolomite, hard, light gray, medium crystalline, "sugary" texture, scattered fragments of chert.
45.0	51.0		Dolomite, hard, light gray to olive gray, medium crystalline, "sugary" texture, scattered fragments of chert.
51.0	55.0		Dolomite, hard, olive gray, fine to medium crystalline, scattered chert fragments.
55.0	60.0		Dolomite, hard, olive gray, fine to medium crystalline; scattered chert fragments; scattered dolomite, light gray, "sugary" texture.

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WELL LOG

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL-750

DATE: START: 8/17/90

FINISH: 8/24/90

LOGGED BY: Timothy A. Lee

NOTES: Weathered chert at 10.0 feet, fresh rock at 11.5 feet, hydraulic oil
leak at 29.0 feet which did not appear to contaminate well, another
hydraulic leak at 59 feet which did not appear to contaminate well.

THICKNESS OF SOIL: 10.0'

DEPTH DRILLED IN ROCK: 81.0'

TOTAL DEPTH OF WELL: 91.0'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	10.0		Clay, sticky, dark yellowish orange to moderate brown, scattered fragments of weathered chert (RAD $\leq$ Background; OVA $<$ 0.05 ppm).
10.0	11.5		Predominately weathered chert, very hard. (RAD $\leq$ Background; OVA $<$ 0.05 ppm).
11.5	20.0		Dolostone, siliceous, hard, fine to medium crystalline, light olive gray to yellowish gray, scattered chert. (RAD $\leq$ Background, OVA $<$ 0.05 ppm).
20.0	25.0		Dolostone, siliceous, very hard, fine to medium crystalline, sugary texture, medium dark gray to dark gray, scattered fragments of "dead oil" or tar.
25.0	29.0		Dolostone, siliceous, very hard, medium to coarse crystalline, sugary texture, dark gray, platy.
29.0	35.0		Dolostone, fine crystalline, sugary textured, olive gray, hard; minor shale, olive black; scattered chert fragments.
35.0	45.0		Dolostone, very sugary texture, light olive gray, very slight iron staining.
45.0	50.0		Dolostone, fine to medium crystalline, sugary textured, hard, scattered chert fragments, slight iron staining. (RAD $\leq$ Background)

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WELL LOG

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek Burial Ground

DATE: START: 9-10-90

DRILLER: Mark Baker

FINISH: 9-17-90

HELPER: Mark Coadman

DRILL: Ingersoll Rand XL-750

LOGGED BY: Timothy A. Lee

NOTES: Top of fresh rock at 49.5', cavity from 51.0' to 53.0', cavity from
57.5' to 60.0', cavity from 62.5' to 64', hydraulic leak at 80' which
did not appear to contaminate well.

THICKNESS OF SOIL: 49.5'

DEPTH DRILLED IN ROCK: 30.6'

TOTAL DEPTH OF WELL: 80.1'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	11.0		Clay, moist, dark yellowish orange, scattered weathered chert. (RAD $\leq$ Background, PV = less than .05 ppm).
11.0	39.0		Clay, dark yellowish orange mottled with yellowish gray; weathered chert; soft drilling, poor returns (RAD $\leq$ Background, PV less than .05 ppm).
39.0	49.5		Clay, dark yellowish orange; weathered chert, shale, weathered, grayish yellowish green. (RAD $\leq$ Background, PV less than .05 ppm)
49.5	51.0		Dolostone, light olive gray, siliceous, sugary textured, hard drilling.
51.0	53.0		Cavity, soft, clay filled.
53.0	57.5		Dolostone, light olive gray, siliceous, sugary textured, chert.
57.5	60.0		Cavity, clay filled, poor returns.
60.0	62.5		Dolostone, siliceous, light olive gray, sugary textured, chert.
62.5	64.0		Cavity, clay filled, poor returns.
64.0	70.5		Dolostone, light olive gray, sugary texture, hard drilling, chert (RAD $\leq$ Background, PV = less than .05 ppm).
70.5	73.0		Dolostone, light olive gray, iron staining, sugary texture,

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WELL LOG

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Oil Landfarm

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL 750

DATE: START: 7-24-90

FINISH: 7-25-90

LOGGED BY: Michael L. Ebers

NOTES: _____

THICKNESS OF SOIL: 7.0'

DEPTH DRILLED IN ROCK: 13.8'

TOTAL DEPTH OF WELL: 20.8'

[illegible]

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WELL No. GW-651PAGE 1 OF 2**Y-12 WELL INSTALLATION PROGRAM****WELL LOG**LOCATION: Y-12 Bear Creek Burial GroundsDATE: START: 7/30/90DRILLER: Mark BakerFINISH: 8/8/90HELPER: Mark CoapmanDRILL: Ingersoll Rand XL-750LOGGED BY: Timothy A. LeeNOTES: Water encountered at 11.0'Weathered Rock at 7.5 feet; Fresh Rock at 11.0 feetTHICKNESS OF SOIL: 11.0'DEPTH DRILLED IN ROCK: 40.5'TOTAL DEPTH OF WELL: 51.5'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	3.5		Clay, moderate brown, scattered vegetation
3.5	7.5		Clay dark yellowish orange, scattered weathered chert fragments
			moist at 7.5 feet (RAD: Background, OVA: .5 ppm)
7.5	11.0		Weathered shale, olive gray, iron staining
11.0	13.5		Limestone, olive gray, wet, medium fine crystalline, hard,
			massive; scattered fragments of shale, olive gray
			(RAD ≠ Background; OVA = .05 ppm)
13.5	18.0		Limestone, olive gray, medium fine crystalline, hard massive,
			scattered fragments of shale, olive gray (RAD ≠ Background
			OVA = .05 ppm)
18.0	24.0		Shale dark greenish gray, softer, scattered fragments of lime-
			stone, olive gray, medium fine crystalline
24.0	26.0		Limestone, olive gray, hard, medium crystalline
26.0	32.0		Shale, olive gray to dark greenish gray, soft, scattered
			fragments of limestone, olive gray to brownish gray, medium
			crystalline.
32.0	41.0		Limestone, olive gray, medium crystalline, sucrosic hard;
			scattered shale, dark greenish gray, minor scattered sandstone,
			reddish brown (RAD ≠ Background; OVA = .05 ppm)
41.0	43.0		Shale, dark greenish gray, soft (RAD ≠ Background; OVA = .05 ppm)

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WELL LOG

[illegible]

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL 750

DATE: START: 7-25-90

FINISH: 7-30-90

LOGGED BY: Timothy A. Lee/
Michael L. Ebers

NOTES: Water encountered at 17.0'. Water level at 11.0'.

THICKNESS OF SOIL: 9.5'

DEPTH DRILLED IN ROCK: 21.7'

TOTAL DEPTH OF WELL: 31.2'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	9.5		Clay, moderate yellowish brown, locally fine silty, abundant chert, off white to medium light gray, hard, flinty.
9.5	13.5		Limestone, olive gray, medium fine grained, sucrosic, hard dense, massive, several limestone chips have an etched crystalline calcite druse on one side indicating solution cavities.
13.5	17.0		Limestone, olive gray, medium fine grained, sucrosic, hard, dense, massive, several chips have a crystalline calcite, dense.
17.0	18.0		Clay filled cavity, very wet, moderate yellowish orange, gravel sized fragments of limestone, brown to olive gray, secondary calcite.
18.0	19.0		Limestone, olive gray, medium fine crystalline, sucrosic, hard, dense, massive.
19.0	22.5		Shale, medium dark gray, blocky.
22.5	27.0		Limestone, olive gray, medium fine crystalline, sucrosic, "ratty" drilling, iron staining.
27.0	31.2		Shale, medium dark gray, blocky.
	31.2		Total Depth

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL 750

DATE: START: 8/9/90

FINISH: 8/10/90

LOGGED BY: Timothy A. Lee

NOTES: Top of weathered rock at 3.5', top of fresh rock at 35.0'

water at 23.7 feet

THICKNESS OF SOIL: 35.0'

DEPTH DRILLED IN ROCK: 3.5'

TOTAL DEPTH OF WELL: 38.5'

[illegible]

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Bear Creek Burial Grounds

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL 750

DATE: START: 8/10/90

FINISH: 8/13/90

LOGGED BY: Timothy A. Lee

NOTES: Top of weathered rock at 4' and top of fresh rock at 7'. Water level at 4.0 feet below ground level.

THICKNESS OF SOIL: 7.0'

DEPTH DRILLED IN ROCK: 8.5'

TOTAL DEPTH OF WELL: 15.5'

[illegible]

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Burial Grounds
 DRILLER: Mark Baker
 HELPER: Mark Coapman
 DRILL: Ingersoll Rand XL-750

DATE: START: 9-05-90
 FINISH: 9-06-90
 LOGGED BY: Michael L. Ebers

NOTES: First water at 57.0 feet. Well had 30 feet of water
overnight.

THICKNESS OF SOIL: and weathered rock = 47.0 feet

DEPTH DRILLED IN ROCK: 18.0 feet

TOTAL DEPTH OF WELL: 65.0 feet

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	9.0		Clay, reddish brown, silty with weathered sandstone fragments, moderate red, black and yellow, damp, soft.
9.0	17.0		Shale, weathered, moderate red with thin beds of light olive gray weathered siltstone, dry, soft, friable.
17.0	36.0		Sandstone, deeply weathered, light olive gray, dry, interbedded with shale, moderate red, dry, soft, friable, weathered.
36.0	37.0		Sandstone, fine grained, medium light gray, fairly hard, dry.
37.0	47.0		Shale, medium gray and moderate red, soft, weathered micaceous, slightly damp.
47.0	57.0	Top of Bedrock	Shale, medium dark gray, slightly weathered, medium soft to medium hard, dry.
57.0	65.0		Siltstone, light greenish gray, hard, moist, water at 57.0 feet.
	65.0		Total Depth

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG Hole 4, UST 0134-3

LOCATION: Building 9204-2

DRILLER: Tom Jenkins

HELPER: Jim Martin

DRILL: CME 55

DATE: START: 7/17/90

FINISH: 7/19/90

LOGGED BY: Carol L. Goldinger

NOTES: _____

THICKNESS OF SOIL: _____ N/A

DEPTH DRILLED IN ROCK: _____ N/A

TOTAL DEPTH OF WELL: _____ 20.9'

DEPTH (FEET)		SAMPLE (NUMBER & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	1.3		Concrete
1.3	3.5		Crushed stone with silt, brown
3.5	5.0	s-1/3-4-4	Clay, silty brown, mottled gray w/shale fragments firm (fill)
5.0	6.0		Probably fill to natural
6.0	7.5	s-2/4-5-7	Clay, silty, brown, mottled gray, stiff (NAT)
7.5	9.0		
9.0	10.5	s-3/ 7-10-15	Clay, silty, brown, mottled gray w/shale fragments to weathered shale, brown, very stiff
10.5	12.0		Probably weathered shale, brown
12.0	13.5	s-4/ 14-19	Weathered shale, brown
13.5	17.0		Probably weathered shale, brown
17.0	18.5	s-5/ 9-11-9	Weathered shale, brown
18.5	20.0		Probably weathered shale, brown to gray
20.0	21.5	s-6/ 11-11	Weathered shale, gray
			No refusal
			Water at 12.1' upon completion
			Water encountered at 18.4'

[illegible]

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WELL No. GW-658

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Gas Station

DRILLER: Mark Baker

HELPER: David B. Wright/Mark Coapman

DRILL: Ford 555B Back Hoe/Ingersoll Rand XL-750

DATE: START: 8-21-90

FINISH: 8-31-90

LOGGED BY: Timothy A. Lee

NOTES: Petroleum odor detected at 1.0', top of weathered rock at 1.5', definite product encountered, water level at 8.7 feet with skim oil/gas.

THICKNESS OF SOIL: 1.5'

DEPTH DRILLED IN ROCK: _____

TOTAL DEPTH OF WELL: 19'

[illegible]

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Y-12 WELL INSTALLATION PROGRAM

WELL LOG

LOCATION: Y-12 Fuel Station

DRILLER: Steve Brown

HELPER: Mark Coapman

DRILL: Ingersoll Rand XL-750/
Ford 555B Backhoe

DATE: START: 8-29-90

FINISH: 9-02-90

LOGGED BY: Timothy A. Lee

NOTES: Top of weathered rock at 1.4', petroleum odor detected at 1.0', skim oil detected on water level at 8.8' below ground surface.

THICKNESS OF SOIL: 1.4'

DEPTH DRILLED IN ROCK: _____

TOTAL DEPTH OF WELL: 16.7'

[illegible]

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-683</u>
WELL LOG		PAGE 1 OF <u>4</u>

LOCATION: <u>Chestnut Ridge - Bear Creek Valley</u> DRILLER: <u>Randy Phillips</u> HELPER: <u>Ronnie Phillips</u> DRILL: <u>IR XL 1050</u>	DATE: START: <u>10/11/90</u> FINISH: <u>10/24/90</u> DRILLING METHOD: <u>Air Rotary</u> LOGGED BY: <u>B. McMaster</u>
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NOTES: Table - 2.8' Depth drilled in rock - 171'
Stabilizer & bit - 20.7' Total depth of well - 197.5 ft.
Thickness of soil - 26'

DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	26		Clay and chert fragments
26	30		Light to dark gray dolostone, micritic to fine grained.
30	35		Light to dark olive gray dolostone, micritic to fine grained.
35	40		Light to dark gray dolostone, minor ribbon banding in some fragments, minor silica veinlets, fine grained. Hard drilling.
40	45		Light to dark gray dolostone, minor ribbon banding in some fragments, minor silica veinlets, fine grained.
45	50		Predominantly light gray dolostone, with minor dark gray; silica replacements gives mottled appearance, fine grained.
50	55		Light gray, fine grained dolostone, minor silica veinlets. Hard drilling.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-683</u>
WELL LOG - continued			PAGE <u>2</u> OF <u>4</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
55	60		Light gray sucrosic dolostone, ribbon banding in some fragments.
60	65		Light gray sucrosic dolostone. Hard drilling.
65	70		Predominantly light gray sucrosic dolostone, minor dark gray with silica fillings.
70	75		Light gray sucrosic dolostone with minor bluish-gray chert fragments.
75	80		Light gray sucrosic dolostone with minor bluish-gray chert fragments.
80	85		Light gray, fine grained dolostone. Hard drilling.
85	90		Light gray, fine grained dolostone.
90	92.5		Slightly darker (medium gray), fine grained dolostone, minor silica veinlets, minor oolitic chert fragments.
92.5	97.5		Medium gray, very fine grained dolostone and oolitic chert.
97.5	102.5		Medium gray, fine grained dolostone with black chert fragments.
102.5	108		Very fine-grained, medium gray dolostone with more abundant silica fragments and replacements. Minor light gray to light pink chert; minor oolitic

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-683</u>
WELL LOG - continued			PAGE <u>3</u> OF <u>4</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
102.5	108		chert. Small amount staining. Ribbon banding wider in fragments.
108	113		Very fine grained medium gray dolostone (slightly darker than previous).
113	118		Very fine grained medium gray dolostone; some water.
118	123		Light gray dolostone, fine grained to micritic, minor black chert fragments.
123	127.5		Dark gray very fine grained dolostone - higher silica content (recrystallization) with thread veinings. Minor black chert. Pick up more water.
127.5	134		Medium gray, very fine grained dolostone; highly recrystallized with silica veinings and fillings. Minor black chert.
134	139		Medium gray very fine grained dolostone; highly recrystallized with silica veinings and fillings. Minor black chert.
139	144		Medium gray very fine grained dolostone, highly recrystallized with silica veinings and fillings. Minor black chert.
144	149		Fine grained medium gray dolostone, minor stylolites. Very hard drilling - drill returns pulverized. Note stronger petroliferous odor

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-683

WELL LOG - continued

PAGE 4 OF 4

[illegible]

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-684</u>
WELL LOG			PAGE 1 OF <u>3</u>
LOCATION: <u>Bear Creek Road</u>		DATE: START: <u>9/18/90</u>	
DRILLER: <u>Mark Baker</u>		FINISH: <u>11/6/90</u>	
HELPER: <u>Mark Coapman</u>		DRILLING METHOD: <u>Air Rotary</u>	
DRILL: <u>IR XL-750</u>		LOGGED BY: <u>Jeff Carter/B. McMaster</u>	
NOTES: <u>Begin drilling 9½" hole</u> <u>Table Height - 2.7 ft.</u> <u>Stabilizer and Bit - 16.5'</u>			
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0.0	9.5		Unconsolidated soils and rock fragments.
9.5	12.0		Dolostone - medium to dark gray brown, sucrosic, minor silica filled fractures.
12.0	13.8		Dolostone - medium to dark gray, sucrosic, silica filled fractures.
13.8	20.0		Dolostone - medium to dark gray brown, very fine grained, abundant silica filled fractures, minor staining and weathering noted.
20.0	25.0		Dolostone - dark to medium gray, abundant silica filled fractures, sucrosic, no staining.
25.0	35.0		Dolostone - dark to medium gray brown, abundant black chert with scattered oolites, abundant silica filled fractures, trace of staining. Open cavity from 31.0 to 32.0 feet (1.0 ft)
35.0	38.0		Dolostone - medium to dark brown gray, very fine grained, abundant silica filled fractures, scattered black chert, occassional staining.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-684</u>
WELL LOG - continued			PAGE <u>2</u> OF <u>3</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
38.8	40.0		Dolostone - medium to dark gray - black, brown in part, abundant silica oolites, fine grained; abundant silica filled fractures.
40.0	45.0		Dolostone - medium to dark brown gray, fine grained, abundant silica filled fractures.
45.0	52.0		Dolostone - medium to dark brown gray, slightly calcareous, scattered oolites. Suspect top of Maynardville at 47 feet b.g.s.
52.0	63.8		Dolostone - medium to dark brown gray, fine grained, slightly to very slightly calcareous, trace calcareous filled fractures, occasional oolites.
63.8	75.0		Dolostone - medium to dark gray brown, slight to very slightly calcareous, scattered calcite filled fractures, sucrosic. Soft drilling from 71 to 78 feet (7 feet) Cavity from 72.0 to 73.0 (1 foot)
75.0	90.0		Dolostone - medium to dark gray brown, very slightly calcareous, sucrosic, trace calcite filled fractures. Soft drilling from 85.0 to 87.0 feet
90.0	100.0		Dolostone - medium to dark gray, very slightly calcareous, scattered calcite filled fractures, fine grained, sucrosic. Ream to 15½-inch diameter hole to 100 ft depth set casing.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-684</u>
WELL LOG - continued			PAGE <u>3</u> OF <u>3</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
100	102		Light olive gray dolostone with silica fillings, fine grained, minor staining noted.
102	104		Light olive gray dolostone, fine grained, minor silica veinlets. Small amount of staining.
104	105		Light olive gray dolostone with silica veinlets. Fine grained.
105	110		Light olive gray, fine grained dolostone, minor calcite veinlets and fillings, minor staining.
110	115		Light olive gray, fine grained dolostone, minor silica veinlets, stylolites noted, some staining, picking up small amount of water.
115	117		Light to dark olive gray, fine grained dolostone, minor stylolites, some staining.
117	120		Predominantly limestone, minor dolostone. Light to dark olive gray, fine grained; minor oolites and calcite veinlets.
120	122		Limestone with minor dolostone, light to dark olive gray, fine grained. Hard drilling at 121' (chattering of rig).
122	124		Cavity - large volume of water - can't contain.
124	129	Total Depth	No samples - washing bit down with Halliburton aid.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-685</u>																																
WELL LOG		PAGE 1 OF <u>5</u>																																
LOCATION: <u>Bear Creek Road @ Chestnut Ridge Road</u> DRILLER: <u>Randy Phillips</u> HELPER: <u>Ronnie Phillips</u> DRILL: <u>IR RD-10</u>		DATE: START: <u>10/29/90</u> FINISH: <u>11/12/90</u> DRILLING METHOD: <u>Air Rotary</u> LOGGED BY: <u>B. McMaster</u>																																
NOTES: <u>Table @ 3.0'</u> <u>Depth drilled in rock - 133.5'</u> <u>Stabilizer and bit - 16.7'</u> <u>Total depth of well - 138.5'</u> <u>Thickness of soil - 5'</u>																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DEPTH (ft)</th> <th style="text-align: center;">SAMPLE (NO. & INTERVAL)</th> <th style="text-align: center;">SOIL/BEDROCK DESCRIPTION</th> </tr> <tr> <th style="text-align: center;">FROM</th> <th style="text-align: center;">TO</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">10</td> <td></td> <td>Medium gray, coarsely crystalline dolostone. Massive with pinhole vugs, minor silica replacements.</td> </tr> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">15</td> <td></td> <td>Medium gray, coarsely crystalline dolostone. Massive with prominent porosity - vugs; minor silica replacements.</td> </tr> <tr> <td style="text-align: center;">15</td> <td style="text-align: center;">20</td> <td></td> <td>Medium gray, coarsely crystalline dolostone. Massive with prominent porosity - vugs; minor silica replacements.</td> </tr> <tr> <td style="text-align: center;">20</td> <td style="text-align: center;">25</td> <td></td> <td>Medium gray, coarsely crystalline dolostone. Massive with prominent porosity - vugs; minor silica replacements.</td> </tr> <tr> <td style="text-align: center;">25</td> <td style="text-align: center;">30</td> <td></td> <td>Medium gray, coarsely crystalline dolostone. Very minor porosity features in vugs; minor silica replacement.</td> </tr> <tr> <td style="text-align: center;">30</td> <td style="text-align: center;">35</td> <td></td> <td>Medium gray, medium crystalline dolostone. Slightly more silica replacement than previous. Very small amount of black chert and</td> </tr> </tbody> </table>			DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION	FROM	TO			5	10		Medium gray, coarsely crystalline dolostone. Massive with pinhole vugs, minor silica replacements.	10	15		Medium gray, coarsely crystalline dolostone. Massive with prominent porosity - vugs; minor silica replacements.	15	20		Medium gray, coarsely crystalline dolostone. Massive with prominent porosity - vugs; minor silica replacements.	20	25		Medium gray, coarsely crystalline dolostone. Massive with prominent porosity - vugs; minor silica replacements.	25	30		Medium gray, coarsely crystalline dolostone. Very minor porosity features in vugs; minor silica replacement.	30	35		Medium gray, medium crystalline dolostone. Slightly more silica replacement than previous. Very small amount of black chert and
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Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-685</u>
WELL LOG - continued			PAGE <u>2</u> OF <u>5</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
			limestone. Pinhole vugs.
35	38.2		Slightly darker gray, coarsely crystalline dolostone. Significant porosity in vugs. Very minor silica replacement.
38.2	42		Dark gray, coarsely crystalline dolostone. Minor porosity features in pinhole vugs.
42	47		Dark gray, coarsely crystalline dolostone. Minor porosity in vugs. Very small amount silica replacement.
47	52		Dark gray, medium crystalline dolostone. Minor porosity in vugs. Small amount silica replacement.
52	57		Medium to coarsely grained dolostone. Slightly more silica replacement gives some fragments a mottled look. Very small amount of wispy or ribbon banding.
57	62		Medium to coarsely grained dolostone. Slight content of limestone fragments wispy or banded. Silica replacement in dolostone gives some fragments a mottled look.
62	67		Very fine to medium grained limestone, light to medium gray. Minor dolostone with silica replacements.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-685</u>
WELL LOG - continued			PAGE <u>3</u> OF <u>5</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
67	70.2		Dark gray, fine-medium grained limestone. Some fragments banded with micritic dove gray limestone to dark gray limestone. Minor silica replacement.
70.2	75		Dark gray, fine to medium grained limestone. Some fragments banded with micritic dove gray limestone. Minor silica replacement.
75	80.2		Dark gray, fine to medium grained limestone. Some fragments banded. Small amount oolites present. Minor silica replacement.
80.2	85		Dark gray, medium-coarse grained oolitic limestone. Minor silica replacement. Minor dark gray massive shale.
85	89	7" casing @ 88.5'	Dark gray, medium coarse grained oolitic limestone. Minor dark gray massive shale.
89	94		Medium to dark gray limestone, coarsely crystalline. Minor dove gray micritic limestone. scattered oolites. Fair amount of staining in fragments. Minor calcite veins and replacement.
94	100		Medium to dark gray coarsely crystalline limestone. Minor dove gray micritic limestone. Oolites more abundant than previous interval. Minor calcite replacement. Minor wispy banding observed in few fragments.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-685</u>
WELL LOG - continued			PAGE <u>4</u> OF <u>5</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
100	105		Medium to dark gray, medium crystalline limestone. Minor micritic limestone. Small amount banding observed - micritic limestone to dark gray shale. Minor oolites.
105	110		Medium to dark gray, medium crystalline oolitic limestone. Oolites more prevalent than previous interval. Very minor micritic limestone and one fragment of light gray dolostone.
110	116		Fine to medium grained, medium gray oolitic limestone. Very minor micritic limestone. Minor calcite replacement. Minor staining.
116	121		Medium gray limestone. Medium to coarsely crystalline. Smaller amount oolites than previous. Minor calcite replacement.
121	124		Medium gray limestone, medium to coarsely crystalline. Minor micritic limestone. Dark gray massive shale more abundant than previous (still minor amount). Scattered oolitic limestone fragments.
124	129		Light gray finely crystalline limestone. Minor dark gray shale and scattered dark gray medium crystalline limestone.
129	134		Light gray, fine to medium crystalline limestone. Small amount wispy banding in some fragments.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-685

WELL LOG - continued

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Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-703</u>																																												
WELL LOG		PAGE 1 OF <u>4</u>																																												
LOCATION: <u>Bear Creek Road</u> DRILLER: <u>Mark Baker</u> HELPER: <u>Mark Coapman</u> DRILL: <u>IR XL-750</u>		DATE: START: <u>11/27/90</u> FINISH: <u>12/7/90</u> DRILLING METHOD: <u>Air Rotary</u> LOGGED BY: <u>B. McMaster</u>																																												
NOTES: <u>Stabilizer and bit - 19.0' 10-5/8"-diameter hole to 135'</u> <u>Table - 2.7' 6 1/2"-diameter hole to 182'</u>																																														
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Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-703</u>
WELL LOG - continued			PAGE <u>2</u> OF <u>4</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
67	72		Medium gray, medium grained dolostone.
			Minor staining.
72	77		Medium gray, medium crystalline dolostone; small
			amount staining.
77	82		Medium gray, medium grained dolostone. Slightly
			more silica replacement and veinings than previous
			cuttings look "mottled".
82	87		Medium to dark gray dolostone, medium to coarsely
			crystalline, minor silica replacements; small
			amount of vugs.
87	92		Medium to dark gray dolostone, medium to coarsely
			crystalline; minor silica replacement; small
			amount vugs.
92	100		Medium to dark gray dolostone, medium to coarsely
			crystalline; minor banded micritic dolostone.
100	110		Medium to dark gray dolostone, medium grained,
			minor staining and porosity.
110	112		Medium to dark gray dolostone, medium grained,
			minor staining and porosity.
112	117		Medium to dark gray dolomitic limestone, fine to
			medium grained. Minor silica veinlets and
			stylolites. (Pick top Maynardville at 111'-112').

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-703</u>
WELL LOG - continued			PAGE <u>3</u> OF <u>4</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
117	122		Medium to dark gray dolomitic limestone, fine to medium grained. Minor silica veinlets and stylolites.
122	127		Medium to dark gray dolomitic limestone, fine to medium grained. Minor silica veinlets and stylolites. Slightly higher limestone content.
127	132		Medium gray dolomitic limestone, fine to medium grained. Minor silica veinlets and stylolites.
132	135	7" casing at 132.8'	Medium gray, medium grained oolitic limestone, minor silica replacements.
135	140		Medium gray dolomitic limestone, micritic to medium grained. Scattered oolites, minor silica replacement and wispy banding.
140	145		Medium to dark gray dolomitic limestone, micritic to medium grained. Small evidence of banding; dark gray micritic dolostone to dark gray limestone. Oolites common. Minor dark gray shale at 143'.
145	150		Medium to dark gray dolomitic limestone, medium grained. Oolites common. Minor silica replacements makes cuttings look "mottled".
150	155		Medium gray, medium grained dolomitic limestone. Oolites common. Very minor micritic dolostone. Small amount silica replacement and staining.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-703**WELL LOG - continued**

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Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-704</u>
WELL LOG			PAGE 1 OF <u>4</u>
LOCATION: <u>Bear Creek Road</u>		DATE: START: <u>12/10/90</u>	
DRILLER: <u>Mark Baker</u>		FINISH: <u>12/20/90</u>	
HELPER: <u>Mark Coapman</u>		DRILLING METHOD: <u>Air Rotary</u>	
DRILL: <u>IR XL-750</u>		LOGGED BY: <u>B. McMaster</u>	
NOTES: <u>Weathered rock @ 16', fresh rock @ 23'</u>			
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
23	28		Olive gray dolostone, finely crystalline with pin-hole vugs. Very minor silica replacement.
28	38		Olive gray dolostone, medium crystalline with very minor oolites. Vugs larger, more prevalent.
38	48		Olive gray dolostone, coarsely crystalline with high porosity in pin-hole vugs. Vugs have small amount calcite replacement.
48	58		Olive gray dolostone, coarsely crystalline with high porosity in pin-hole vugs. Vugs exhibit small amount of calcite replacement. Minor silica replacement.
58	68		Olive gray dolomitic limestone coarsely crystalline with high porosity. Vugs show small amount of calcite replacement.
68	78		Dark gray, medium crystalline limestone. Minor calcite replacement.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-704</u>
WELL LOG - continued			PAGE <u>2</u> OF <u>4</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
78	88		Dark gray, medium crystalline limestone. Minor calcite veining; small amount of wispy or stylolitic banding.
88	98		Dark gray, medium crystalline limestone slightly oolitic with calcite veinings more prominent. One fragment of banded micritic limestone with dark gray shale.
98	108		Dark gray, medium crystalline limestone. Oolitic with calcite veinings and pin-hole vugs. Minor wispy markings, minor staining.
108	118		Dark gray, medium crystalline limestone; mottled. Minor oolites and several fragments of dark gray micritic limestone.
118	128		Dark gray, medium crystalline limestone, slightly oolitic with minor calcite replacement.
128	138		Dark gray, medium crystalline limestone; mottled. Minor oolites and minor dark gray massive shale.
138	148		Dark gray, medium crystalline limestone, slightly oolitic. Minor amount of light gray micritic limestone.
148	158		Olive gray, medium crystalline limestone slightly oolitic. Small amount of fragments look mottled and slightly stylolitic. Minor light gray, fine grained limestone.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-704</u>
WELL LOG - continued			PAGE <u>3</u> OF <u>4</u>
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
158	168		Olive gray, medium crystalline limestone slightly oolitic and stylolitic. Some fragments have mottled look. Minor light gray fine grained limestone.
168	178		Olive gray, medium crystalline limestone, oolitic and stylolitic. Minor light gray fine grained limestone.
178	188		Olive gray, medium crystalline oolitic limestone. Minor calcite replacement.
188	198		Dark gray, medium crystalline limestone. Slightly oolitic.
198	208		Olive gray, medium crystalline limestone, moderately oolitic and stylolitic.
208	218		Olive gray, medium crystalline limestone, moderately oolitic and stylolitic.
218	228		Olive gray, medium crystalline limestone. Moderately oolitic and stylolitic. Minor light gray fine grained limestone.
228	238		Olive gray, medium grained oolitic limestone, equal amount light olive gray oolitic limestone. Small amount calcite replacement.

[illegible]

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-707</u>
WELL LOG			PAGE 1 OF <u>1</u>
LOCATION: <u>Y-12 Plant Adjacent to Bldg.</u>		DATE: START: <u>10/03/90</u>	
DRILLER: <u>Mark Baker</u> 9201-1		FINISH: <u>10/11/90</u>	
HELPER: <u>Mark Coapman</u>		DRILLING METHOD: <u>Air Rotary</u>	
DRILL: <u>IR XL 750</u>		LOGGED BY: <u>B. McMaster</u>	
NOTES: <u>All cuttings after augering to 4' were diverted into containment box. No detailed log available to TD of hole.</u>			
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
0	4		Drill through asphalt (1') and into fill material
			Light tan silty clay. Drill through timbers
			treated with creosote - fairly strong odor.
4	10		Believe to be cutting concrete; very hard and
			even; drilling fluid is light tan colored with
			sand particles like concrete cuttings.
10	20		Believe still cutting concrete - no breaks during
			drilling or any indication of cutting rock.
			No water encountered.
20	26	TD	Start digging in containment box and find small
			amount of limestone cuttings - appears to be what
			we are cutting presently. Assume top rock <u>very</u>
			roughly @ 20'. No evidence of water after
			blowing hole.
			*Check hole with flashlight after pulling drill
			steel and can see trickle of water at
			approximately 9'. Very slow. Hole makes 5'
			water in 3 hours.

[illegible]

APPENDIX III
WELL CONSTRUCTION DIAGRAMS

EDGE**Engineering, Design & Geosciences Group, Inc.**

725 Pellissippi Parkway

P.O. Box 23010 Knoxville, Tn 37933-1010

(615)966-9788

WELL No. GW-183**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM****DRILLING DATES:**STARTED: 8/1/89FINISHED: 8/2/89

LOGGED

BY: Michael L. EbersDRILLING COMPANY: Charlie YoungDRILLER: James C. Draper HELPER: Gregg Shillings

NOT TO SCALE

EDGE**Engineering, Design & Geosciences Group, Inc.**

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WELL No. GW-190**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

DRILLING DATES:

STARTED: 7/31/89FINISHED: 8/1/89

LOGGED

BY: Michael L. EbersDRILLING COMPANY: Charlie YoungDRILLER: James C. Draper HELPER: Gregg Shillings

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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P.O. Box 23010 Knoxville, Tn 37933-1010

(615)966-9788

WELL No. GW-193**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

DRILLING DATES:

STARTED: 8/3/89FINISHED: 8/4/89

LOGGED

BY: Y-12, Near Building 9201-1DRILLING COMPANY: Charlie Young DrillingDRILLER: James C. Draper HELPER: Gregg Shilling

EDGE**Engineering, Design & Geosciences Group, Inc.**

725 Pellissippi Parkway

P.O. Box 23010 Knoxville, Tn 37933-1010 (615)986-9788

WELL No. GW-204**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: Christopher M. WallenDRILLING COMPANY: Highland DrillingDRILLER: Donald Key HELPER: Scott Gilbert

DRILLING DATES:

STARTED: 8/30/89FINISHED: 8/30/89

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(615)966-9788

WELL No. GW-302**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: David B. WrightDRILLING COMPANY: Highland DrillingDRILLER: J.C. Draper HELPER: Greg Shillings

DRILLING DATES:

STARTED: 11/2/89FINISHED: 11/10/89

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(615)966-9788

WELL No. GW-339**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: David B. Wright

DRILLING DATES:

STARTED: 11/20/89FINISHED: 12/4/89DRILLING COMPANY: Highland DrillingDRILLER: J.C. DraperHELPER: Greg Shillings

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WELL No. GW-533

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: Jeff Carter

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown HELPER: Greg Shillings

DRILLING DATES:

STARTED: 5/2/90

FINISHED: 5/2/90

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

NOT TO SCALE

EDGE**Engineering, Design & Geosciences Group, Inc.**

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WELL No. GW-534**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY:

C. Allison Hodges

DRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Billy Ray Strader

DRILLING DATES:

STARTED: 03-28-89FINISHED: 04-03-89

NOT TO SCALE

EDGE**Engineering, Design & Geosciences Group, Inc.**725 Pellissippi Parkway
P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788WELL No. GW-538**WELL INSTALLATION DIAGRAM**Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: C. Allison HodgesDRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Billy Ray Strader

DRILLING DATES:

STARTED: 03-22-89FINISHED: 04-03-89

EDGE

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P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788

WELL No. GW-539**WELL INSTALLATION DIAGRAM**Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 04-26-89FINISHED: 05-11-89

LOGGED

BY: C. Allison HodgesDRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: John Young

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT
TO 156.0 FEET

NOT TO SCALE

EDGE**Engineering, Design & Geosciences Group, Inc.**725 Pellissippi Parkway
P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788WELL No. GW-540**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: C. Allison Hodges/Chris WallenDRILLING COMPANY: Highland DrillingDRILLER: John Young HELPER: Ronnie Phillips

DRILLING DATES:

STARTED: 05/23/89

FINISHED: _____

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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WELL No. GW-541**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: C. Allison HodgesDRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: John Young

DRILLING DATES:

STARTED: 05-04-89FINISHED: 05-11-89

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 05/16/89

FINISHED: 05/18/89

LOGGED

BY: C. Allison Hodges

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

NOT TO SCALE

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WELL No. GW-543**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: C. Allison HodgesDRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Mark Coapman

DRILLING DATES:

STARTED: 05/25/89FINISHED: 06/02/89

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WELL No. GW-5--**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

DRILLING DATES:

STARTED: 05/18/89FINISHED: 05/30/89

LOGGED

BY:

C. Allison Hodges

DRILLING COMPANY: Highland DrillingDRILLER: Mark BakerHELPER: Mark Coapman

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P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788WELL No. GW-545**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM****DRILLING DATES:**STARTED: 05/12/89FINISHED: 05/18/89

LOGGED

BY: C. Allison HodgesDRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Mark Coapman

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WELL No GW-546**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

DRILLING DATES:

STARTED: 06/05/89FINISHED: 06/07/89

LOGGED

BY: C. Allison HodgesDRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Mark Coapman

WELL INSTALLATION DIAGRAM

DRILLING DATES:

STARTED: 8/3/89

FINISHED: 8/31/89

Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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WELL No. GW-602

Y-12 CHARACTERIZATION WELL PROGRAM

O.R.N.L. MONITORING WELL PROGRAM

DRILLING DATES:

STARTED: 7/18/89

FINISHED: 10/12/89

LOGGED

BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

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WELL No. GW-603**WELL INSTALLATION DIAGRAM**Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: David B. Wright

DRILLING DATES:

STARTED: 9/12/89FINISHED: 9/15/89DRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Earl Sexton

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(615)966-9788

WELL No. GW-604

WELL INSTALLATION DIAGRAM**Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: David B. WrightDRILLING COMPANY: Highland DrillingDRILLER: Mark BakerHELPER: Earl Sexton

DRILLING DATES:

STARTED: 9/18/89FINISHED: 9/25/89

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WELL No. GW-607**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

DRILLING DATES:

STARTED: 6/8/89FINISHED: 6/21/89

LOGGED

BY: David B. WrightDRILLING COMPANY: Highland DrillingDRILLER: Mark BakerHELPER: Mark Coapman

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT
TO 151.3 FEET

NOT TO SCALE

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WELL No. 608

WELL INSTALLATION/DIAGRAM

DRILLING DATES:

STARTED: 9/26/89

FINISHED: 10/5/89

LOGGED

BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

NOT TO SCALE

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 10/9/89

FINISHED: 10/18/89

LOGGED

BY: Timothy Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

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WELL No. GW 610

WELL INSTALLATION DIAGRAM**Y-12 WELL INSTALLATION PROGRAM**

DRILLING DATES:

STARTED: 12/06/89

FINISHED: 01/02/90

LOGGED

BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: J. C. Draper HELPER: Greg Shillings

NOTE:

ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

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WELL No. GW-611**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

DRILLING DATES:

STARTED: 1/11/20FINISHED: 1/16/20

LOGGED

BY: Jeff CarterDRILLING COMPANY: Charlie Young DrillingDRILLER: Steve Brown HELPER: Greg Shilling

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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WELL No. GW 612**WELL INSTALLATION DIAGRAM**Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: David B. Wright/Timothy LeeDRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Earl Sexton

DRILLING DATES:

STARTED: 10/23/89FINISHED: 11/17/89

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 7/5/89

FINISHED: 7/18/89

LOGGED

BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

DRILLING DATES:

STARTED: 7/10/89

FINISHED: 7/19/89

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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WELL No. GW-615**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: David B. Wright and Jeff Carter

DRILLING DATES:

STARTED: 1/25/90FINISHED: 2/13/90DRILLING COMPANY: Highland DrillingDRILLER: Steve Brown HELPER: Greg Shillings

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

DRILLING DATES:

Y-12 WELL INSTALLATION PROGRAM

STARTED: 2/16/90

FINISHED: 3710790

LOGGED

BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown HELPER: Greg Shillings

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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WELL No. GW- 617

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY:

David B. Wright

DRILLING DATES:

STARTED: 3/16/90

FINISHED: 3/19/90

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown HELPER: Greg Shillings

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 3/12/90

FINISHED: 3/15/90

LOGGED

BY:

David B. Wright

DRILLING COMPANY:

Highland Drilling

DRILLER:

Steve Brown

HELPER:

Greg Shillings

NOTE:

ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

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WELL No. GW-619

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 3/27/90

FINISHED: 3/27/90

LOGGED

BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown HELPER: Greg Shillings

NOT TO SCALE

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WELL No. GW-627**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: David B. WrightDRILLING COMPANY: Highland DrillingDRILLER: Steve Brown HELPER: Greg Shillings

DRILLING DATES:

STARTED: 3/20/90FINISHED: 3/27/90

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT
TO 75.0 FEET

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WELL No. GW-621

WELL INSTALLATION DIAGRAM**Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: Christopher M. Wallen/Michael L. Ebers

DRILLING DATES:

STARTED: 9/14/89

FINISHED: 9/19/89

DRILLING COMPANY: Highland Drilling

DRILLER: Randy Phillips HELPER: Ronnie Phillips

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 12/1/89

FINISHED: 12/1/89

LOGGED

BY: Bryn Howze

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

NOT TO SCALE

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 11/23/89

FINISHED: 12/1/89

LOGGED

BY: Bruce McMaster & Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

NOTE:
ALL DEPTHS ARE MEASURED
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WELL No. CH-001**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

DRILLING DATES:

STARTED: 1/5/90FINISHED: 1/5/90

LOGGED

BY: David B. WrightDRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Earl Sexton

NOT TO SCALE

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WELL No. Y-12**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY:

David B. Wright

DRILLING DATES:

STARTED: 12/10/84FINISHED: 12/10/84

DRILLING COMPANY:

Highland Drilling

DRILLER:

Mark Baker

HELPER:

Earl Sexton

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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WELL No. GW-626**WELL INSTALLATION DIAGRAM****Y-12 WELL INSTALLATION PROGRAM**

LOGGED

BY: Bryn Howze

DRILLING DATES:

STARTED: 12/12/89FINISHED: 12/15/89DRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Earl Sexton

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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WELL No. GW-627**WELL INSTALLATION DIAGRAM**Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: Bryn Howze

DRILLING DATES:

STARTED: 12/5/89FINISHED: 12/11/89DRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Earl Sexton

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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WELL No. GW-628WELL INSTALLATION DIAGRAMY-12 WELL INSTALLATION PROGRAM

LOGGED

BY: David B. Wright

DRILLING DATES:

STARTED: 1/11/90FINISHED: 1/22/90DRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Earl Sexton

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 1/23/90

FINISHED: 2/2/90

LOGGED

BY: David B. Wright

DRILLING COMPANY: Highland

DRILLER: Mark Baker HELPER: Earl Sexton

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

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WELL No. GW-630

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY:

Jeff Carter

DRILLING DATES:

STARTED: 5/3/90

FINISHED: 5/3/90

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown HELPER: Greg Shillings

NOT TO SCALE

ERCE
Environmental
and Energy
Services Co.

WELL No. GW-636

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 5/23/90

FINISHED: 5/31/90

LOGGED

BY: C.G. Hagegeorge

DRILLING COMPANY: Highland Drilling

DRILLER: M. Baker HELPER: B. Young/M. Coapman

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and Energy
Services Co.

WELL No. GW-637

WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:
STARTED: 6/1/90
FINISHED: 6/1/90

LOGGED

BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Bucky Young

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and Energy
Services Co.

WELL No. EW-638

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Donald Kee

DRILLING DATES:

STARTED: 6/5/90

FINISHED: 6/5/90

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Services Co.

WELL No. GW-639

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: Bruce McMaster

DRILLING DATES:

STARTED: 6/8/90

FINISHED: 6/15/90

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

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WELL No. 7N-640

WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 6/15/90

FINISHED: 6/18/90

LOGGED

BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-641

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 6/19/90

FINISHED: 6/20/90

LOGGED

BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

NOT TO SCALE

1221-LONG

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-642

WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:
STARTED: 6-19-90
FINISHED: 6-20-90

LOGGED

BY: Timothy A. Lee

DRILLING COMPANY: Highland Driller

DRILLER: Mark Baker HELPER: Mark Coapland

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW643

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 6/22/90

FINISHED: 6/25/90

LOGGED

BY: Tomothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapland

NOT TO SCALE

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-644

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 6/19/90

FINISHED: 6/20/90

LOGGED

BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

NOT TO SCALE

1221-1221

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-645

WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 6/25/90

FINISHED: 7/3/90

LOGGED

BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapland

CENTRALIZERS AT 30.0 FEET.
65.0 FEET.
_____ FEET.

ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:
NOTE:

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-646

WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 7-06-90

FINISHED: 7-23-90

LOGGED

BY: Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

CENTRALIZERS AT 15.0 FEET.
55.0 FEET.
FEET.

ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:
NOTE:

ERCE
Environmental
and Energy
Services Co.

WELL No. GW-647

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 8/17/90

FINISHED: 8/24/90

LOGGED

BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

ERCE
Environmental
and Energy
Services Co.

WELL No. GW-648

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

DRILLING DATES:
STARTED: 9/10/90
FINISHED: 9/17/90

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-649

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

DRILLING DATES:

STARTED: 7-24-90

FINISHED: 7-25-90

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

NOT TO SCALE

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-651

WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 7/30/90

FINISHED: 8/8/90

LOGGED

BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

CENTRALIZERS AT 10.0 FEET.
35.0 FEET.
 FEET.

ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:
NOTE:

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-652

WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 7-25-90

FINISHED: 7-30-90

LOGGED

BY: Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

ERCE
Environmental
and Energy
Services Co.

WELL No. GW-653

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 8/08/90

FINISHED: 8/10/90

LOGGED

BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

ERCE
Environmental
and Energy
Services Co.

WELL No. GW-654

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 8/10/90

FINISHED: 8/13/90

LOGGED

BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

NOT TO SCALE

X35601.DWG

ERCE
Environmental
and Energy
Services Co.

WELL No. GW-655

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 9-05-90

FINISHED: 9-06-90

LOGGED

BY: Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coadman

ERC
Environmental
and Energy
Services Co.

WELL No. GW-656

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED

BY: Carol L. Goldinger

DRILLING COMPANY: GA Technical Services, Inc.

DRILLER: Tom Jenkins HELPER: Jim Martin

DRILLING DATES:

STARTED: 7/17/90

FINISHED: 7/19/90

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-657

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING DATES:

DRILLING COMPANY: Highland DrillingSTARTED: 10/3/90FINISHED: 10/11/90DRILLER: Mark Baker HELPER: Mark Coapman

NOT TO SCALE

ERCE
Environmental
and Energy
Services Co.

WELL No. GW-658

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 8-21-90

FINISHED: 8-31-90

LOGGED

BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

ERCE
Environmental
and Energy
Services Co.

WELL No. GW-659

WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

DRILLING DATES:

STARTED: 8-29-90

FINISHED: 9-02-90

LOGGED

BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coadman

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-683

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING DATES:

STARTED: 10/11/90FINISHED: 12/3/90DRILLING COMPANY: Highland DrillingDRILLER: Randy Phillips HELPER: Ronnie Phillips
Bucky Young

NOT TO SCALE

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-684

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING DATES:

DRILLING COMPANY: Highland DrillingSTARTED: 9/18/90FINISHED: 10/9/90DRILLER: Randy Phillips HELPER: Ronnie Phillips
Mark Baker Mark Coapman

NOT TO SCALE

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-685

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING DATES:

DRILLING COMPANY: Highland DrillingSTARTED: 10/29/90FINISHED: 11/12/90DRILLER: Randy Phillips HELPER: Ronnie Phillips

NOT TO SCALE

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-703

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING DATES:

STARTED: 11/27/90FINISHED: 12/7/90DRILLING COMPANY: Highland DrillingDRILLER: Mark Baker HELPER: Mark Coapman

NOT TO SCALE

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-704

WELL INSTALLATION DIAGRAM

LOGGED BY: Bruce McMaster

DRILLING DATES:

STARTED: 12/10/90DRILLING COMPANY: Highland Drilling CompanyFINISHED: 12/20/90DRILLER: Mark Baker HELPER: Mark Coapman

NOT TO SCALE

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-707

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING DATES:

DRILLING COMPANY: Highland Drilling

STARTED: 10/05/90

FINISHED: 10/11/90

DRILLER: Mark Baker HELPER: Mark Coapman

NOT TO SCALE

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-708

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING DATES:

DRILLING COMPANY: Highland DrillingSTARTED: 10/09/90DRILLER: Mark Baker HELPER: Mark CoapmanFINISHED: 10/12/90

NOT TO SCALE

APPENDIX IV
WELL DEVELOPMENT FORMS

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-183

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Stainless steel submersible pump

DEVELOPMENT
BEGAN DATE: 5/7/90

DEVELOPMENT
ENDING DATE: 5/11/90

DEVELOPMENT
OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 29.2 GALLONS

TOTAL GALLONS PUMPED: 153 TOTAL WELL VOLUMES PUMPED: 5.2

INITIAL pH: 7.2 FINAL pH: 7.1

INITIAL DISSOLVED SOLIDS (μ S): 530 FINAL DISSOLVED SOLIDS (μ S): 480

DESCRIPTION OF INITIAL TURBIDITY: Very muddy

DESCRIPTION OF FINAL TURBIDITY: Slightly silty

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Bruce McMaster

ODOR
OF WATER: Hydrocarbon odor

WATER
DISCHARGED
TO: ☐ GROUND SURFACE
☐ STORM SEWERS
☒ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 8.0 feet from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Bruce McMaster 5/11/90
Bruce McMaster

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and Energy
Services Co.

WELL No. GW-190

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Stainless steel submersable electric pump

DEVELOPMENT
BEGAN DATE: 5/3/90

DEVELOPMENT
ENDING DATE: 5/3/90

DEVELOPMENT
OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 21.7 GALLONS

TOTAL GALLONS PUMPED: 40 TOTAL WELL VOLUMES PUMPED: 1.8

INITIAL pH: 8.2 FINAL pH: 8.2

INITIAL DISSOLVED SOLIDS (μ S): 140 FINAL DISSOLVED SOLIDS (μ S): 140

DESCRIPTION OF INITIAL TURBIDITY: Clear

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: NA

WELL APPROVED BY: Bruce McMaster

ODOR
OF WATER: None

WATER
DISCHARGED
TO:

☐ GROUND SURFACE
☐ STORM SEWERS
☒ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 10 feet from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

Bruce W. McMaster

5/3/90

Bruce McMaster

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and Energy
Services Co.

WELL No. GW-193

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Stainless steel submersible pump

DEVELOPMENT
BEGAN DATE: 5/15/90

DEVELOPMENT
ENDING DATE: 5/18/90

DEVELOPMENT
OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 7.6 GALLONS

TOTAL GALLONS PUMPED: 35 TOTAL WELL VOLUMES PUMPED: 4.6

INITIAL pH: 8.0 FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (μ S): 760 FINAL DISSOLVED SOLIDS (μ S): 710

DESCRIPTION OF INITIAL TURBIDITY: Dirty

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Bruce McMaster

ODOR
OF WATER: Hydrocarbon odor

WATER
DISCHARGED
TO:

☐ GROUND SURFACE
☐ STORM SEWERS
☒ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 5.6' from ground surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Bruce McMaster 5/18/90
Bruce McMaster

ERC / EDGE
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and Energy
Services Co.

WELL No. GW-204

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Stainless steel submersible pump

DEVELOPMENT
BEGAN DATE: 5/14/90

DEVELOPMENT
ENDING DATE: 5/17/90

DEVELOPMENT
OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 6.5 GALLONS

TOTAL GALLONS PUMPED: 33 TOTAL WELL VOLUMES PUMPED: 5.1

INITIAL pH: 8.1 FINAL pH: 8.0

INITIAL DISSOLVED SOLIDS (μ S): 545 FINAL DISSOLVED SOLIDS (μ S): 550

DESCRIPTION OF INITIAL TURBIDITY: Dirty

DESCRIPTION OF FINAL TURBIDITY: Slightly cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Bruce McMaster

ODOR
OF WATER: Hydrocarbon/sewage odor

WATER	☐ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☒ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 5.4' from ground surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Bruce McMaster 5/17/90

Bruce McMaster

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725 Pellissippi Parkway

P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788

WELL No. GW-302

Chestnut

LOCATION: Ridge**Y-12 MONITORING WELL
DEVELOPMENT FORM****DEVELOPMENT DETAILS**METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubingDEVELOPMENT
BEGAN DATE: 11/21/89DEVELOPMENT
ENDING DATE: 11/22/89DEVELOPMENT
OBSERVED BY: David B. WrightONE WELL VOLUME: 27.1 GALLONSTOTAL GALLONS PUMPED: 225 TOTAL WELL VOLUMES PUMPED: 8.3INITIAL pH: 8.5 FINAL pH: 8.3INITIAL DISSOLVED SOLIDS (μ S): 670 FINAL DISSOLVED SOLIDS (μ S): 580DESCRIPTION OF INITIAL TURBIDITY: MuddyDESCRIPTION OF FINAL TURBIDITY: Very cloudyFINAL MEASURED TURBIDITY: N/AWELL APPROVED BY: David B. WrightODOR
OF WATER: No Odor

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 99.8' from surface**DEVELOPMENT OBSERVATIONS**

OBSERVER SIGNATURE/DATE

David B. Wright CPG TN 0061

EDGE

Engineering, Design & Geosciences Group, Inc.
725 Pellissippi Parkway
P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788

WELL No. GW-339
United
LOCATION: Nuclear

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 12/7/89

DEVELOPMENT
ENDING DATE: 12/15/89

DEVELOPMENT
OBSERVED BY: David B. Wright CPG TN0061

ONE WELL VOLUME: 33.8 GALLONS

TOTAL GALLONS PUMPED: 250 TOTAL WELL VOLUMES PUMPED: 7.4

INITIAL pH: 11.2 FINAL pH: 8.5

INITIAL DISSOLVED SOLIDS (μ S): 1110 FINAL DISSOLVED SOLIDS (μ S): 370

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER
DISCHARGED
TO:

☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 69.5' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright 12/15/89

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-533

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Workover rig with steel cable and swab.

DEVELOPMENT
BEGAN DATE: 5/17/90

DEVELOPMENT
ENDING DATE: 5/30/90

DEVELOPMENT
OBSERVED BY: Bruce McMaster & C. G. Hagegeorge

ONE WELL VOLUME: 25 GALLONS

TOTAL GALLONS PUMPED: 234 TOTAL WELL VOLUMES PUMPED: 9.4

INITIAL pH: 8.0 FINAL pH: 7.5

INITIAL DISSOLVED SOLIDS (μ S): 140 FINAL DISSOLVED SOLIDS (μ S): 60

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Sli. Cloudy

FINAL MEASURED TURBIDITY: 60

WELL APPROVED BY: Bruce McMaster

ODOR
OF WATER: None

WATER
DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: _____

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Bruce W. McMaster
5/30/90

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT
BEGAN DATE: 04/03/89

DEVELOPMENT
ENDING DATE: 04/07/89

DEVELOPMENT
OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 46.22 GALLONS

TOTAL GALLONS PUMPED: 335 TOTAL WELL VOLUMES PUMPED: 7.25

INITIAL pH: 7.94 FINAL pH: 7.77

INITIAL DISSOLVED SOLIDS (μ S): 406 FINAL DISSOLVED SOLIDS (μ S): 415

DESCRIPTION OF INITIAL TURBIDITY: Opaque

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: C. Allison Hodges, EDGe

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 3.78' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE C. Allison Hodges 04-07-89
C. Allison Hodges

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WELL No. GW-538LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT
BEGAN DATE: 03/31/89

DEVELOPMENT
ENDING DATE: 04/07/89

DEVELOPMENT
OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 35.4 GALLONS

TOTAL GALLONS PUMPED: 305 TOTAL WELL VOLUMES PUMPED: 8.6

INITIAL pH: 7.5 FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (μ S): 340 FINAL DISSOLVED SOLIDS (μ S): 359

DESCRIPTION OF INITIAL TURBIDITY: Translucent

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: C. Allison Hodges

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 13.77' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE C. Allison Hodges 04-07-89
C. Allison Hodges

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P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788

WELL No. GW-539

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT
BEGAN DATE: 05/08/89

DEVELOPMENT
ENDING DATE: 05/22/89

DEVELOPMENT
OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 66.50 GALLONS

TOTAL GALLONS PUMPED: 540 TOTAL WELL VOLUMES PUMPED: 8.1

INITIAL pH: 8.2 FINAL pH: 8.4

INITIAL DISSOLVED SOLIDS (μ S): 34.0 FINAL DISSOLVED SOLIDS (μ S): 39.0

DESCRIPTION OF INITIAL TURBIDITY: Opaque

DESCRIPTION OF FINAL TURBIDITY: Transparent

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: C. Allison Hodges, EDGE

ODOR
OF WATER: None

WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 88.65' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE C. Allison Hodges 05-22-89
C. Allison Hodges

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WELL No. 540

Sanitary

LOCATION: LandfillY-12 MONITORING WELL
DEVELOPMENT FORMDEVELOPMENT DETAILSMETHOD OF
DEVELOPMENT: Swab with rubbers through 2 3/8" tubingDEVELOPMENT
BEGAN DATE: 6/19/89DEVELOPMENT
ENDING DATE: 6/23/89DEVELOPMENT
OBSERVED BY: David B. WrightONE WELL VOLUME: 89.49 GALLONSTOTAL GALLONS PUMPED: 540 TOTAL WELL VOLUMES PUMPED: 6INITIAL pH: 11.3 FINAL pH: 8.3INITIAL DISSOLVED SOLIDS (μ S): off scale FINAL DISSOLVED SOLIDS (μ S): 320DESCRIPTION OF INITIAL TURBIDITY: MurkyDESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: _____

ODOR

OF WATER: No Odor

WATER

DISCHARGED

TO:

☒ GROUND SURFACE☐ STORM SEWERS☐ DRUMS☐ TANK TRUCK☐ STORAGE TANKS☐ OTHER _____

INITIAL PRE-DEVELOPMENT

WATER DEPTH:

65.5' from ground surfaceDEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright 7/11/89
David B. Wright CPG TN 0061

EDGE**Engineering, Design & Geosciences Group, Inc.**

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WELL No. GW-541LOCATION: Y-12Y-12 MONITORING WELL
DEVELOPMENT FORMDEVELOPMENT DETAILSMETHOD OFDEVELOPMENT: Swabbing through 2 3/8" upset tubingDEVELOPMENTBEGAN DATE: 05/16/89DEVELOPMENTENDING DATE: 05/23/89DEVELOPMENTOBSERVED BY: C. Allison HodgesONE WELL VOLUME: 49.54 GALLONSTOTAL GALLONS PUMPED: 660 TOTAL WELL VOLUMES PUMPED: 13.3INITIAL pH: 10.7 FINAL pH: 13.3INITIAL DISSOLVED SOLIDS (µS): 1040 FINAL DISSOLVED SOLIDS (µS): 180DESCRIPTION OF INITIAL TURBIDITY: Translucent/cloudyDESCRIPTION OF FINAL TURBIDITY: Translucent/cloudyFINAL MEASURED TURBIDITY:WELL APPROVED BY: C. Allison Hodges, EDGEODOROF WATER: NoneWATERDISCHARGEDTO:☒ GROUND SURFACE☐ STORM SEWERS☐ DRUMS☐ TANK TRUCK☐ STORAGE TANKS☐ OTHERINITIAL PRE-DEVELOPMENTWATER DEPTH: 58.0' from surfaceDEVELOPMENT OBSERVATIONSOBSERVER SIGNATURE/DATE C. Allison Hodges 05-23-89C. Allison Hodges

EDGE

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WELL No. GW-542LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT
BEGAN DATE: 05/23/89

DEVELOPMENT
ENDING DATE: 06/02/89

DEVELOPMENT
OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 21.78 GALLONS

TOTAL GALLONS PUMPED: 655 TOTAL WELL VOLUMES PUMPED: 30.0

INITIAL pH: 8.7 FINAL pH: 8.4

INITIAL DISSOLVED SOLIDS (μ S): 430 FINAL DISSOLVED SOLIDS (μ S): 310

DESCRIPTION OF INITIAL TURBIDITY: Opaque/muddy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: C. Allison Hodges

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 66.6' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE C. Allison Hodges 06-02-89
C. Allison Hodges

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WELL No. GW-543

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT
BEGAN DATE: 06/05/89

DEVELOPMENT
ENDING DATE: 06/15/89

DEVELOPMENT
OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 38.43 GALLONS

TOTAL GALLONS PUMPED: 240 TOTAL WELL VOLUMES PUMPED: 6.25

INITIAL pH: 9.5 FINAL pH: 10.6

INITIAL DISSOLVED SOLIDS (μ S): 960 FINAL DISSOLVED SOLIDS (μ S): 820

DESCRIPTION OF INITIAL TURBIDITY: Opaque/muddy

DESCRIPTION OF FINAL TURBIDITY: Transparent/cloudy

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: C. Allison Hodges

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 61.70' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE C. Allison Hodges 06-15-89
C. Allison Hodges

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT
BEGAN DATE: 06/06/89

DEVELOPMENT
ENDING DATE: 06/14/89

DEVELOPMENT
OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 64.5 GALLONS

TOTAL GALLONS PUMPED: 515 TOTAL WELL VOLUMES PUMPED: 8.0

INITIAL pH: 10.7 FINAL pH: 9.2

INITIAL DISSOLVED SOLIDS (µS): 1410 FINAL DISSOLVED SOLIDS (µS): 840

DESCRIPTION OF INITIAL TURBIDITY: Transparent/cloudy

DESCRIPTION OF FINAL TURBIDITY: Transparent

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: C. Allison Hodges

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 64.5' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE C. Allison Hodges 06-14-89
C. Allison Hodges

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P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788WELL No. GW-545LOCATION: Y-12Y-12 MONITORING WELL
DEVELOPMENT FORMDEVELOPMENT DETAILSMETHOD OF
DEVELOPMENT: Swabbing through 2 3/8" upset tubingDEVELOPMENT
BEGAN DATE: 05/22/89DEVELOPMENT
ENDING DATE: 06/14/89DEVELOPMENT
OBSERVED BY: C. Allison HodgesONE WELL VOLUME: 15.37 GALLONSTOTAL GALLONS PUMPED: 175 TOTAL WELL VOLUMES PUMPED: 11.4INITIAL pH: 12.1 FINAL pH: 11.5INITIAL DISSOLVED SOLIDS (μ S): * FINAL DISSOLVED SOLIDS (μ S): *DESCRIPTION OF INITIAL TURBIDITY: Opaque/muddyDESCRIPTION OF FINAL TURBIDITY: Transparent

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: C. Allison HodgesODOR
OF WATER: NoneWATER
DISCHARGED
TO:☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____INITIAL PRE-DEVELOPMENT
WATER DEPTH: 59.8' from surfaceDEVELOPMENT OBSERVATIONSWell is a low producer of water* The dissolved solids were greater than the instrument could read.OBSERVER SIGNATURE/DATE C. Allison Hodges 06-14-89C. Allison Hodges

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab with Rubbers through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 6/23/89

DEVELOPMENT ENDING DATE: 6/28/89

DEVELOPMENT OBSERVED BY: David B. Wright CPG TN 0061

ONE WELL VOLUME: 25.35 GALLONS

TOTAL GALLONS PUMPED: 860 TOTAL WELL VOLUMES PUMPED: 34

INITIAL pH: 8.2 FINAL pH: 8.0

INITIAL DISSOLVED SOLIDS (μ S): 420 FINAL DISSOLVED SOLIDS (μ S): 340

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: _____

ODOR

OF WATER: No Odor

WATER

DISCHARGED

TO:

☒ GROUND SURFACE

☐ STORM SEWERS

☐ DRUMS

☐ TANK TRUCK

☐ STORAGE TANKS

☐ OTHER _____

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 71.0' from ground surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright 7/11/89
David B. Wright CPG TN 0061

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P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788

WELL No. GW-601LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: SwabbingDEVELOPMENT
BEGAN DATE: 9/5/89DEVELOPMENT
ENDING DATE: 9/11/89DEVELOPMENT
OBSERVED BY: David B. WrightONE WELL VOLUME: 460.9 GALLONSTOTAL GALLONS PUMPED: 2445 TOTAL WELL VOLUMES PUMPED: 5.4INITIAL pH: 8.5 FINAL pH: 7.9INITIAL DISSOLVED SOLIDS (μ S): 740 FINAL DISSOLVED SOLIDS (μ S): 730DESCRIPTION OF INITIAL TURBIDITY: CloudyDESCRIPTION OF FINAL TURBIDITY: ClearFINAL MEASURED TURBIDITY: N/AWELL APPROVED BY: David B. WrightODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 88' from surface (ground)

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright9/11/89

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(615) 986-9758

WELL NO. LOCATION: **Y-12 MONITORING WELL
DEVELOPMENT FORM****DEVELOPMENT DETAILS****METHOD OF****DEVELOPMENT:** Swab through 2 3/8" tubing and air lift through 2" casing**DEVELOPMENT****BEGAN DATE:** 8/3/89**DEVELOPMENT****ENDING DATE:** 10/16/89**DEVELOPMENT****OBSERVED BY:** David B. Wright**ONE WELL VOLUME:** 215.7 **GALLONS****TOTAL GALLONS PUMPED:** 276.0 **TOTAL WELL VOLUMES PUMPED:** 12.8**INITIAL pH:** 12.3 **FINAL pH:** 8.4**INITIAL DISSOLVED SOLIDS (μ S):** 890.0 **FINAL DISSOLVED SOLIDS (μ S):** 800**DESCRIPTION OF INITIAL TURBIDITY:** Very cloudy**DESCRIPTION OF FINAL TURBIDITY:** Clear**FINAL MEASURED TURBIDITY:** N/A**WELL APPROVED BY:** David B. Wright**ODOR****OF WATER:** Sulfur smell**WATER****DISCHARGED****TO:**☒ **GROUND SURFACE**☐ **STORM SEWERS**☐ **DRUMS**☐ **TANK TRUCK**☐ **STORAGE TANKS**☐ **OTHER****INITIAL PRE-DEVELOPMENT****WATER DEPTH:** 86.5' from ground surface**DEVELOPMENT OBSERVATIONS****OBSERVER SIGNATURE/DATE**David B. Wright 11/21/89

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WELL No. GW-603

LOCATION: S-3 Pond

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 9/29/89

DEVELOPMENT
ENDING DATE: 10/4/89

DEVELOPMENT
OBSERVED BY: David B. Wright CPG Tn 0061

ONE WELL VOLUME: 15.1 GALLONS

TOTAL GALLONS PUMPED: 410 TOTAL WELL VOLUMES PUMPED: 27.2

INITIAL pH: 8.3 FINAL pH: 8.1

INITIAL DISSOLVED SOLIDS (μ S): 700 FINAL DISSOLVED SOLIDS (μ S): 570

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY:

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER DISCHARGED TO:
☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS
☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 55.4' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright, TN 0061

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WELL No. GW-604LOCATION: S-3 Pond

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 10/6/89

DEVELOPMENT
ENDING DATE: 10/6/89

DEVELOPMENT
OBSERVED BY: David B. Wright CPG TN 0061

ONE WELL VOLUME: 43.7 GALLONS

TOTAL GALLONS PUMPED: 330 TOTAL WELL VOLUMES PUMPED: 7.6

INITIAL pH: 9.5 FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (μ S): 630 FINAL DISSOLVED SOLIDS (μ S): 480

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Muddy

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 55.2 from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
10/6/89

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WELL No. 607Sanitary
LOCATION: LandfillY-12 MONITORING WELL
DEVELOPMENT FORMDEVELOPMENT DETAILSMETHOD OF
DEVELOPMENT: Swab with rubbers through 2 3/8" tubingDEVELOPMENT
BEGAN DATE: 6/23/89DEVELOPMENT
ENDING DATE: 7/5/89DEVELOPMENT
OBSERVED BY: David B. Wright CPG TN 0061ONE WELL VOLUME: 54.60 GALLONSTOTAL GALLONS PUMPED: 1155 TOTAL WELL VOLUMES PUMPED: 21.2INITIAL pH: 12.0 FINAL pH: 10.0INITIAL DISSOLVED SOLIDS (μ S): off scale FINAL DISSOLVED SOLIDS (μ S): 230DESCRIPTION OF INITIAL TURBIDITY: >1990 MuddyDESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: David B. WrightODOR
OF WATER: No OdorWATER ☒ GROUND SURFACE
DISCHARGED ☐ STORM SEWERS
TO: ☐ DRUMS☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____INITIAL PRE-DEVELOPMENTWATER DEPTH: 79.5' from ground surfaceDEVELOPMENT OBSERVATIONSHad heavy rain 6/28/89 pm

OBSERVER SIGNATURE/DATE

David B. Wright CPG TN 0061

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WELL No. GW-608
Chestnut
LOCATION: Ridge

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 10/17/89

DEVELOPMENT
ENDING DATE: 10/20/89

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 390.9 GALLONS

TOTAL GALLONS PUMPED: 3250 TOTAL WELL VOLUMES PUMPED: 8.3

INITIAL pH: 9.3 FINAL pH: 8.2

INITIAL DISSOLVED SOLIDS (μ S): 390 FINAL DISSOLVED SOLIDS (μ S): 300

DESCRIPTION OF INITIAL TURBIDITY: Extremely muddy

DESCRIPTION OF FINAL TURBIDITY: Muddy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 118' from ground surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright

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WELL No. 609
Chestnut
LOCATION: Ridge

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 10/27/89

DEVELOPMENT
ENDING DATE: 10/31/89

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 82 GALLONS

TOTAL GALLONS PUMPED: 545 TOTAL WELL VOLUMES PUMPED: 6.6

INITIAL pH: 11.1 FINAL pH: 8.4

INITIAL DISSOLVED SOLIDS (μ S): 750 FINAL DISSOLVED SOLIDS (μ S): 380

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright CPG 0061 TN

ODOR
OF WATER: No Odor

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 160.3' from ground surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright 10/31/89

EDGE**Engineering, Design & Geosciences Group, Inc.**
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P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788WELL No. GW-610LOCATION: CRSP**Y-12 MONITORING WELL
DEVELOPMENT FORM****DEVELOPMENT DETAILS**METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubingDEVELOPMENT
BEGAN DATE: 1/3/90DEVELOPMENT
ENDING DATE: 1/9/90DEVELOPMENT
OBSERVED BY: David B. WrightONE WELL VOLUME: 28.6 GALLONSTOTAL GALLONS PUMPED: 140 TOTAL WELL VOLUMES PUMPED: 5.0INITIAL pH: 12.1 FINAL pH: 8.5INITIAL DISSOLVED SOLIDS (μ S): 2300 FINAL DISSOLVED SOLIDS (μ S): 360DESCRIPTION OF INITIAL TURBIDITY: MurkyDESCRIPTION OF FINAL TURBIDITY: Slight cloudy

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: David B. Wright**ODOR****OF WATER:** No Odor**WATER****DISCHARGED****TO:**☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER**INITIAL PRE-DEVELOPMENT****WATER DEPTH:** 81.4' from surface**DEVELOPMENT OBSERVATIONS**

OBSERVER SIGNATURE/DATE

David B. Wright 1/9/90

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and Energy
Services Co.

WELL No. GW-611

LOCATION: CRSP

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 1-26-90

DEVELOPMENT
ENDING DATE: 1-31-90

DEVELOPMENT
OBSERVED BY: Jeff Carter

ONE WELL VOLUME: 15 GALLONS

TOTAL GALLONS PUMPED: 82.12 TOTAL WELL VOLUMES PUMPED: 5.5

INITIAL pH: 9.7 FINAL pH: 9.6

INITIAL DISSOLVED SOLIDS (μ S): 630 FINAL DISSOLVED SOLIDS (μ S): 430

DESCRIPTION OF INITIAL TURBIDITY: very murky (reddish-tan)

DESCRIPTION OF FINAL TURBIDITY: slightly cloudy (tan)

FINAL MEASURED TURBIDITY: Not measured

WELL APPROVED BY: Jeff Carter

ODOR

OF WATER: No Odor

WATER

DISCHARGED

TO:

☐ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☒ OTHER Pre-dug pit

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 104.5 ft.

DEVELOPMENT OBSERVATIONS

As more water was removed the recovered water level rose. Final measured
water level was at 95.3 ft.

OBSERVER SIGNATURE/DATE

Jeff R. Carter, P.G.
Jeff R. Carter 2/2/90

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P.O. Box 23010 Knoxville, Tn 37933-1010 (615)968-9788

WELL No. Gw-612
Chestnut
LOCATION: Ridge

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 11/3/89

DEVELOPMENT
ENDING DATE: 11/8/89

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 196 GALLONS

TOTAL GALLONS PUMPED: 1060 TOTAL WELL VOLUMES PUMPED: 5.4

INITIAL pH: 9.4 FINAL pH: 9.1

INITIAL DISSOLVED SOLIDS (μ S): 360 FINAL DISSOLVED SOLIDS (μ S): 350

DESCRIPTION OF INITIAL TURBIDITY: Slightly cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR

OF WATER: No Odor

WATER ☒ GROUND SURFACE ☐ TANK TRUCK
DISCHARGED ☐ STORM SEWERS ☐ STORAGE TANKS
TO: ☐ DRUMS ☐ OTHER

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 126' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright

EDGE

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WELL No. GW-613LOCATION: S-3 Pond

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 7/24/89

DEVELOPMENT
ENDING DATE: 7/27/89

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 44 GALLONS

TOTAL GALLONS PUMPED: 295 TOTAL WELL VOLUMES PUMPED: 6.7

INITIAL pH: 7.9 FINAL pH: 7.5

INITIAL DISSOLVED SOLIDS (μ S): 290 FINAL DISSOLVED SOLIDS (μ S): 240

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 10.0' from ground surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright CPG TN 0061

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WELL No. GW-614LOCATION: Y-12**Y-12 MONITORING WELL
DEVELOPMENT FORM**DEVELOPMENT DETAILSMETHOD OF
DEVELOPMENT: SwabbingDEVELOPMENT
BEGAN DATE: 7/20/89DEVELOPMENT
ENDING DATE: 7/24/89DEVELOPMENT
OBSERVED BY: David B. WrightONE WELL VOLUME: 83.3 GALLONSTOTAL GALLONS PUMPED: 450 TOTAL WELL VOLUMES PUMPED: 5.4INITIAL pH: 8.7 FINAL pH: 7.9INITIAL DISSOLVED SOLIDS (μ S): 410 FINAL DISSOLVED SOLIDS (μ S): 410DESCRIPTION OF INITIAL TURBIDITY: CloudyDESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: David B. Wright

ODOR

OF WATER: None

WATER

DISCHARGED

TO:

☒ GROUND SURFACE☐ STORM SEWERS☐ DRUMS☐ TANK TRUCK☐ STORAGE TANKS☐ OTHER _____

INITIAL PRE-DEVELOPMENT

WATER DEPTH: Ground surfaceDEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright 7/24/89

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and Energy
Services Co.

WELL No. GW-615

LOCATION: S-3 Ponds

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 2/20/90

DEVELOPMENT
ENDING DATE: 2/26/90

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 200.4 GALLONS

TOTAL GALLONS PUMPED: 1110 TOTAL WELL VOLUMES PUMPED: 5.4

INITIAL pH: 6.5 FINAL pH: 6.2

INITIAL DISSOLVED SOLIDS (d/s): 2200 FINAL DISSOLVED SOLIDS (d/s): 2000

DESCRIPTION OF INITIAL TURBIDITY: slightly cloudy

DESCRIPTION OF FINAL TURBIDITY: clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No odor

WATER	☐ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☒ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 128' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright 2/26/90
David B. Wright

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WELL No. GW-616

LOCATION: S-3 Pond

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 3/16/90

DEVELOPMENT
ENDING DATE: 3/23/90

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 232.7 GALLONS

TOTAL GALLONS PUMPED: 1290 TOTAL WELL VOLUMES PUMPED: 5.5

INITIAL pH: 10.2 FINAL pH: 9.7

INITIAL DISSOLVED SOLIDS (μ S): 2350 FINAL DISSOLVED SOLIDS (μ S): 2000

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR

OF WATER: No Odor

WATER

DISCHARGED

TO:

☒ GROUND SURFACE

☐ STORM SEWERS

☐ DRUMS

☐ TANK TRUCK

☐ STORAGE TANKS

☐ OTHER _____

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 129' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright 3/23/90

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-617

LOCATION: S-3 Pond

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 4/4/90

DEVELOPMENT
ENDING DATE: 4/10/90

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 10.7 GALLONS

TOTAL GALLONS PUMPED: 54 TOTAL WELL VOLUMES PUMPED: 5.0

INITIAL pH: 7.4 FINAL pH: 7.3

INITIAL DISSOLVED SOLIDS (μ S): 230 FINAL DISSOLVED SOLIDS (μ S): 110

DESCRIPTION OF INITIAL TURBIDITY: Murky

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER
DISCHARGED
TO: ☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 6' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright 4/11/90
David B. Wright

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-615

LOCATION: S-3 Pond

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 3/26/90

DEVELOPMENT
ENDING DATE: 3/30/90

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 24.3 GALLONS

TOTAL GALLONS PUMPED: 230 TOTAL WELL VOLUMES PUMPED: 9.5

INITIAL pH: 7.9 FINAL pH: 7.1

INITIAL DISSOLVED SOLIDS (µS): 990 FINAL DISSOLVED SOLIDS (µS): 400

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER
DISCHARGED
TO:

☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 7' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright

David B. Wright

3/30/90

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-619
S-3
LOCATION: Ponds

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 4/10/90

DEVELOPMENT
ENDING DATE: 4/17/90

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 30.2 GALLONS

TOTAL GALLONS PUMPED: 235 TOTAL WELL VOLUMES PUMPED: 7.8

INITIAL pH: 10.1 FINAL pH: 9.2

INITIAL DISSOLVED SOLIDS (μ S): 150 FINAL DISSOLVED SOLIDS (μ S): 110

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 4' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright 4/23/90

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-620

LOCATION: S-3 Ponds

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 4/3/90

DEVELOPMENT
ENDING DATE: 4/9/90

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 41.6 GALLONS

TOTAL GALLONS PUMPED: 215 TOTAL WELL VOLUMES PUMPED: 5.2

INITIAL pH: 10.2 FINAL pH: 8.6

INITIAL DISSOLVED SOLIDS (µS): 370 FINAL DISSOLVED SOLIDS (µS): 160

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER
DISCHARGED
TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 20.3' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright 4/9/90

ED|Ge**Engineering, Design & Geosciences Group, Inc.**
725 Pellissippi Parkway
P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788WELL No. GW-621

LOCATION: _____

**Y-12 MONITORING WELL
DEVELOPMENT FORM**DEVELOPMENT DETAILSMETHOD OF
DEVELOPMENT: Swab through 2 3/8" tubingDEVELOPMENT
BEGAN DATE: 9/20/89DEVELOPMENT
ENDING DATE: _____DEVELOPMENT
OBSERVED BY: David B. WrightONE WELL VOLUME: 23 GALLONSTOTAL GALLONS PUMPED: 2240 TOTAL WELL VOLUMES PUMPED: 97.4INITIAL pH: 8.4 FINAL pH: 8.2INITIAL DISSOLVED SOLIDS (µS): 460 FINAL DISSOLVED SOLIDS (µS): 440DESCRIPTION OF INITIAL TURBIDITY: MuddyDESCRIPTION OF FINAL TURBIDITY: Muddy

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: David B. WrightODOR
OF WATER: No OdorWATER
DISCHARGED TO: ☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRIUMS☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____INITIAL PRE-DEVELOPMENT
WATER DEPTH: 11.8' from surfaceDEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright, CPG TN 0061

EDGE**Engineering, Design & Geosciences Group, Inc.**

725 Pellissippi Parkway

P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788

WELL No. GW-622

LOCATION: _____

**Y-12 MONITORING WELL
DEVELOPMENT FORM****DEVELOPMENT DETAILS**METHOD OF
DEVELOPMENT: Swabbed through 2 3/8" tubingDEVELOPMENT
BEGAN DATE: 12/11/89DEVELOPMENT
ENDING DATE: 12/15/89DEVELOPMENT
OBSERVED BY: David B. WrightONE WELL VOLUME: 11.2 GALLONSTOTAL GALLONS PUMPED: 103 TOTAL WELL VOLUMES PUMPED: 9.2INITIAL pH: 8.4 FINAL pH: 8.3INITIAL DISSOLVED SOLIDS (µS): 370 FINAL DISSOLVED SOLIDS (µS): 370DESCRIPTION OF INITIAL TURBIDITY: MuddyDESCRIPTION OF FINAL TURBIDITY: CloudyFINAL MEASURED TURBIDITY: N/AWELL APPROVED BY: David B. WrightODOR
OF WATER: No OdorWATER
DISCHARGED
TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____INITIAL PRE-DEVELOPMENT
WATER DEPTH: 6.4' from surface**DEVELOPMENT OBSERVATIONS**

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright 12/15/89

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	WELL NO. <u>GW-623</u>
WELL DEVELOPMENT SUMMARY	
METHOD OF DEVELOPMENT: <u>Air Lifting and Surging</u>	
DEVELOPMENT OBSERVED BY: <u>T. Lee and B. McMaster</u>	
ONE WELL VOLUME: <u>47.9</u> GALLONS	
TOTAL GALLONS PUMPED: <u>983</u> TOTAL WELL VOLUMES PUMPED: <u>20.5</u>	
INITIAL pH: <u>12.2</u> FINAL pH: <u>9.5</u>	
INITIAL SPECIFIC CONDUCTANCE: <u>5500</u> FINAL: <u>1100</u>	
DESCRIPTION OF INITIAL TURBIDITY: <u>Clear</u>	
DESCRIPTION OF FINAL TURBIDITY: <u>Slightly Cloudy</u>	
FINAL MEASURED TURBIDITY: <u>N/A</u>	
WELL APPROVED BY: <u>Bruce McMaster</u>	
ODOR OF WATER: <u>Very slight odor, cannot identify. Less than 5 ppm.</u>	
WATER DISCHARGED TO: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;"> ☒ GROUND SURFACE ☐ STORM SEWERS ☐ DRUMS </div> <div style="width: 45%;"> ☐ TANK TRUCK ☐ STORAGE TANKS ☐ OTHER _____ </div> </div>	
INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>4'</u> below ground surface	
DEVELOPMENT OBSERVATIONS: <u>Air lifted well until 11/16 when started using stainless swab to agitate sand pack. Air lifted immediately after surging. Did this 11/16 - 11/21. Air lifted only from 11/26 to 12/4. Surged again from 12/4 to 12/6 and stopped because observed grout flakes in a sample. Air lifted 12/6 to 12/14. Very slight odor persisted from 11/26 thru 12/14 but not detectable with HNU; or less than 5 ppm.</u>	
OBSERVER SIGNATURE: _____ <div style="text-align: right;">DATE: _____</div>

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WELL No. GV-62
Burial
LOCATION: Ground

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: SWAB through 2 3/8" Tubing

DEVELOPMENT
BEGAN DATE: 2/6/90

DEVELOPMENT
ENDING DATE: 2/9/90

DEVELOPMENT
OBSERVED BY: David B. Wright

ONE WELL VOLUME: 20 GALLONS

TOTAL GALLONS PUMPED: 111 TOTAL WELL VOLUMES PUMPED: 5.6

INITIAL pH: 7.8 FINAL pH: 7.7

INITIAL DISSOLVED SOLIDS (µS): 380 FINAL DISSOLVED SOLIDS (µS): 350

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 3' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright
David B. Wright 2/12/90

EDGE

Engineering, Design & Geosciences Group, Inc.
725 Pellissippi Parkway
P.O. Box 23010 Knoxville, Tn 37933-1010 (615)966-9788

WELL No. LOCATION:

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 1/2/90

DEVELOPMENT
ENDING DATE: 1/9/90

DEVELOPMENT
OBSERVED BY: David B. Wright, CPC TN 0061

ONE WELL VOLUME: 4.7 GALLONS

TOTAL GALLONS PUMPED: 28.2 TOTAL WELL VOLUMES PUMPED: 6.6

INITIAL pH: 9.1 FINAL pH: 8.5

INITIAL DISSOLVED SOLIDS (μ S): 170 FINAL DISSOLVED SOLIDS (μ S): 170

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY:

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: No Odor

WATER
DISCHARGED
TO: ☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 22.6' from ground surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright 1/9/90

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No: GW-627
Burial
LOCATION: Ground

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 1/12/90

DEVELOPMENT
ENDING DATE: 1/18/90

DEVELOPMENT
OBSERVED BY: David B. Wright, CPG TN 0061

ONE WELL VOLUME: 407.3 GALLONS

TOTAL GALLONS PUMPED: 2040 TOTAL WELL VOLUMES PUMPED: 5

INITIAL pH: 8.5 FINAL pH: 8.5

INITIAL DISSOLVED SOLIDS (μ S): 1290 FINAL DISSOLVED SOLIDS (μ S): 1150

DESCRIPTION OF INITIAL TURBIDITY: Slightly cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: David B. Wright

ODOR
OF WATER: Very slight diesel odor

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 23.8' from ground surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright 1/22/90
David B. Wright

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	WELL NO. <u>GW-629</u>
WELL DEVELOPMENT SUMMARY	
<div style="display: flex; justify-content: space-between;"><div><p>METHOD OF DEVELOPMENT: <u>Steel swab with rubber cups</u></p><p>DEVELOPMENT OBSERVED BY: <u>Bruce McMaster</u></p><p>ONE WELL VOLUME: <u>55</u> GALLONS</p><p>TOTAL GALLONS PUMPED: <u>275</u> TOTAL WELL VOLUMES PUMPED: <u>5</u></p><p>INITIAL pH: <u>8.8</u> FINAL pH: <u>8.8</u></p><p>INITIAL SPECIFIC CONDUCTANCE: <u>800</u> FINAL: <u>820</u></p><p>DESCRIPTION OF INITIAL TURBIDITY: <u>Slightly Cloudy</u></p><p>DESCRIPTION OF FINAL TURBIDITY: <u>Slightly Cloudy</u></p><p>FINAL MEASURED TURBIDITY: <u>N/A</u></p><p>WELL APPROVED BY: <u>Bruce McMaster</u></p><p>ODOR OF WATER: <u>None</u></p><p>WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK ☐ STORM SEWERS ☐ STORAGE TANKS ☐ DRUMS ☐ OTHER _____</p><p>INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>7' below ground surface</u></p><p>DEVELOPMENT OBSERVATIONS: _____ Well developed using stainless steel swab with rubber cups in 2-1/8" diameter tubing.</p><p>Water has no odor; HNU meter shows less than 5 ppm volatiles with head space test.</p></div><div style="width: 30%; vertical-align: top;"><p>DEVELOPMENT DATE: START: <u>1/21/91</u> FINISH: <u>1/25/91</u></p></div></div>	
<p>OBSERVER SIGNATURE: _____</p> <p>DATE: _____</p>

ERC / EDGE
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WELL No. GW-630

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT
BEGAN DATE: 5/7/90

DEVELOPMENT
ENDING DATE: 5/14/90

DEVELOPMENT
OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 26.3 GALLONS

TOTAL GALLONS PUMPED: 123 TOTAL WELL VOLUMES PUMPED: 4.7

INITIAL pH: 8.6 FINAL pH: 8.4

INITIAL DISSOLVED SOLIDS (μ S): 380 FINAL DISSOLVED SOLIDS (μ S): 355

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Bruce McMaster

ODOR
OF WATER: None

WATER
DISCHARGED
TO:

☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 9.0' from ground surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Bruce McMaster 5/14/90
Bruce McMaster

ERC / EDGE
Environmental
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WELL No. GW-636

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Workover Rig w/steel cable and swab.

DEVELOPMENT
BEGAN DATE: 6/6/90

DEVELOPMENT
ENDING DATE: 6/12/90

DEVELOPMENT
OBSERVED BY: B. McMaster

ONE WELL VOLUME: 75 GALLONS

TOTAL GALLONS PUMPED: 375 TOTAL WELL VOLUMES PUMPED: 5

INITIAL pH: 10.1 FINAL pH: 9.3
INITIAL Specific conductance 450 FINAL Specific conductance 440

DESCRIPTION OF INITIAL TURBIDITY: slightly cloudy

DESCRIPTION OF FINAL TURBIDITY: clear

FINAL MEASURED TURBIDITY: 440

WELL APPROVED BY: Bruce McMaster

ODOR
OF WATER: None

WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: well at ground surface

DEVELOPMENT OBSERVATIONS

Tested water using head space test w/OVA meter. No show of
organics; No smells. Instruced to go ahead and dump barrels
after filling.

OBSERVER SIGNATURE/DATE Bruce W. McMaster

Bruce McMaster 6/12/90

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-637

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Workover Rig w/steel cable and swab.

DEVELOPMENT
BEGAN DATE: 6/13/90

DEVELOPMENT
ENDING DATE: 6/19/90

DEVELOPMENT
OBSERVED BY: B. McMaster

ONE WELL VOLUME: 14.7 GALLONS

TOTAL GALLONS PUMPED: 77 TOTAL WELL VOLUMES PUMPED: 5

INITIAL pH: 9.4

FINAL pH: 8.4

INITIAL Specific Conductance 390 FINAL Specific Conductance 540

DESCRIPTION OF INITIAL TURBIDITY: cloudy - opaque

DESCRIPTION OF FINAL TURBIDITY: slightly cloudy

FINAL MEASURED TURBIDITY: 540

WELL APPROVED BY: Bruce McMaster

ODOR
OF WATER: None

WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 5.5' below land surface

DEVELOPMENT OBSERVATIONS

Tested water using Head Space test w/OVA meter. No show
of organics; No smells. Instructed to go ahead and dump
barrels after filling.

OBSERVER SIGNATURE/DATE

Bruce W. McMaster

Bruce McMaster 6/19/90

ERC / EDGE
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WELL No. GW-638

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig with steel cable and swab

DEVELOPMENT
BEGAN DATE: 6/20/90

DEVELOPMENT
ENDING DATE: 6/25/90

DEVELOPMENT
OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 6 GALLONS

TOTAL GALLONS PUMPED: 48 TOTAL WELL VOLUMES PUMPED: 8

INITIAL pH: 8.1 FINAL pH: 7.7

INITIAL CONDUCTANCE 940 FINAL CONDUCTANCE 985

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: 96

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER
DISCHARGED
TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 4.6 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE _____

Bruce McMaster 6/22/90

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-639

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT:

Work over rig with steel cable and swab

DEVELOPMENT
BEGAN DATE:

6/21/90

DEVELOPMENT
ENDING DATE:

6/26/90

DEVELOPMENT
OBSERVED BY:

Bruce McMaster

ONE WELL VOLUME: 80 GALLONS

TOTAL GALLONS PUMPED: 645 TOTAL WELL VOLUMES PUMPED: 8

INITIAL pH: 9.9

FINAL pH: 9.8

INITIAL CONDUCTANCE 90 FINAL CONDUCTANCE 403

DESCRIPTION OF INITIAL TURBIDITY: Slitely cloudy

DESCRIPTION OF FINAL TURBIDITY: Slitely cloudy

FINAL MEASURED TURBIDITY: 24

WELL APPROVED BY: Bruce McMaster

ODOR

OF WATER: None

WATER

DISCHARGED

TO:

☒ GROUND SURFACE

☐ STORM SEWERS

☐ DRUMS

☐ TANK TRUCK

☐ STORAGE TANKS

☐ OTHER _____

INITIAL PRE-DEVELOPMENT

WATER DEPTH: _____

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE _____

Bruce McMaster 6/21/90

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-640

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig with steel cable and swab

DEVELOPMENT
BEGAN DATE: 6/26/90

DEVELOPMENT
ENDING DATE: 7/3/90

DEVELOPMENT
OBSERVED BY: Tim A. Lee

ONE WELL VOLUME: 20.6 GALLONS

TOTAL GALLONS PUMPED: 170 TOTAL WELL VOLUMES PUMPED: 8.2

INITIAL pH: 8.1 FINAL pH: 8.0

INITIAL DISSOLVED SOLIDS (μ S): 100 FINAL DISSOLVED SOLIDS (μ S): 35

DESCRIPTION OF INITIAL TURBIDITY: cloudy

DESCRIPTION OF FINAL TURBIDITY: clear

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: Timothy A. Lee

ODOR

OF WATER: No odor detected

WATER

DISCHARGED

TO:

☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER

INITIAL PRE-DEVELOPMENT
WATER DEPTH:

21.2 feet below ground level

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

Timothy A. Lee

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-641

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig with steel cable and swab.

DEVELOPMENT
BEGAN DATE: 7-03-90

DEVELOPMENT
ENDING DATE: 7-11-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 4.8 GALLONS

TOTAL GALLONS PUMPED: 75.0 TOTAL WELL VOLUMES PUMPED: 15.6

INITIAL pH: 8.0 FINAL pH: 7.4

INITIAL DISSOLVED SOLIDS (μ S): 47 FINAL DISSOLVED SOLIDS (μ S): 12

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: _____

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 17.3' below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Timothy A. Lee 7/11/90
Timothy A. Lee

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-642

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Work over rig with teflon coated cable and swab.

DEVELOPMENT BEGAN DATE: 6-29-90

DEVELOPMENT ENDING DATE: 7-10-90

DEVELOPMENT OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 25 GALLONS

TOTAL GALLONS PUMPED: 120 TOTAL WELL VOLUMES PUMPED: 4.8

INITIAL pH: 8.7 FINAL pH: 7.0

INITIAL DISSOLVED SOLIDS (uS): 45 FINAL DISSOLVED SOLIDS (uS): 26

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: Not Measured

WELL APPROVED BY: Timothy A. Lee

ODOR OF WATER: None

WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT WATER DEPTH: 18.2 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Timothy A. Lee 7/10/90
Timothy A. Lee

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-643

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swabbing through 2 3/8" tubing.

DEVELOPMENT
BEGAN DATE: 7/12/90

DEVELOPMENT
ENDING DATE: 7/20/90

DEVELOPMENT
OBSERVED BY: Michael L. Ebers

ONE WELL VOLUME: 31.4 GALLONS

TOTAL GALLONS PUMPED: 210 TOTAL WELL VOLUMES PUMPED: 6.7

INITIAL pH: 8.8 FINAL pH: 6.9

INITIAL DISSOLVED SOLIDS (μ S): 500 FINAL DISSOLVED SOLIDS (μ S): 310

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Michael L. Ebers

ODOR

OF WATER: None

WATER

DISCHARGED

TO:

☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 16.7 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Michael L. Ebers 7/20/90

Michael L. Ebers, CPGS, PG

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-644

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab through 2 3/8" tubing.

DEVELOPMENT
BEGAN DATE: 7-16-90

DEVELOPMENT
ENDING DATE: 7-23-90

DEVELOPMENT
OBSERVED BY: Michael L. Ebers

ONE WELL VOLUME: 19.8 GALLONS

TOTAL GALLONS PUMPED: 120 TOTAL WELL VOLUMES PUMPED: 6.1

INITIAL pH: 7.8 FINAL pH: 6.7

INITIAL DISSOLVED SOLIDS (μ S): 450 FINAL DISSOLVED SOLIDS (μ S): 270

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Michael L. Ebers

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 6.75 feet from ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Michael L. Ebers 7-23-90

Michael L. Ebers, PG

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-645

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Swab with workover rig and steel swab.

DEVELOPMENT
BEGAN DATE: 7-23-90

DEVELOPMENT
ENDING DATE: 8-02-90

DEVELOPMENT
OBSERVED BY: Mike Ebers and Timothy A. Lee

ONE WELL VOLUME: 11.5 GALLONS

TOTAL GALLONS PUMPED: 60 TOTAL WELL VOLUMES PUMPED: 5.2

INITIAL pH: 8.3 FINAL pH: 8.4

INITIAL DISSOLVED SOLIDS (μ S): 510 FINAL DISSOLVED SOLIDS (μ S): 490

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: --

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER
DISCHARGED
TO:

☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 75.7' below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

Timothy A. Lee 8-02-90
Timothy A. Lee

ERC / EDGE
Environmental
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Services Co.

WELL No. GW-646

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Workover Rig and Swab

DEVELOPMENT
BEGAN DATE: 8/02/90

DEVELOPMENT
ENDING DATE: 8/13/90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 37.0 GALLONS

TOTAL GALLONS PUMPED: 215 TOTAL WELL VOLUMES PUMPED: 5.8

INITIAL pH: 11.7 FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (µS): 2000 FINAL DISSOLVED SOLIDS (µS): 790

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER
DISCHARGED
TO:

☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 37.5 Feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Timothy A. Lee 8/13/90
Timothy A. Lee

ERC / EDGE
Environmental
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Services Co.

WELL No. GW-647

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig and swab.

DEVELOPMENT
BEGAN DATE: 8-31-90

DEVELOPMENT
ENDING DATE: 9-13-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 24.0 GALLONS

TOTAL GALLONS PUMPED: 205 TOTAL WELL VOLUMES PUMPED: 8.5

INITIAL pH: 12.2 FINAL pH: 8.1

INITIAL DISSOLVED SOLIDS (μ S): 6700 FINAL DISSOLVED SOLIDS (μ S): 670

DESCRIPTION OF INITIAL TURBIDITY: Slightly Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER
DISCHARGED
TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: Water level at 65.9 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Timothy A. Lee 9/13/90
Timothy A. Lee

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-6-8

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Stainless steel swab and cable with workover rig

DEVELOPMENT
BEGAN DATE: 9/20/90

DEVELOPMENT
ENDING DATE: 10/05/90

DEVELOPMENT
OBSERVED BY: B. McMaster

ONE WELL VOLUME: 33.7 GALLONS

TOTAL GALLONS PUMPED: 335 TOTAL WELL VOLUMES PUMPED: 10.6 Vols.

INITIAL PH: 8.2 FINAL PH: 7.2

INITIAL DISSOLVED SOLIDS (μ S): 490 μ s FINAL DISSOLVED SOLIDS (μ S): 390(K)

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: ----

WELL APPROVED BY: B. McMaster

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER <u> </u>

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 45' below land surface

DEVELOPMENT OBSERVATIONS

Water never completely cleaned up.

OBSERVER SIGNATURE/DATE B. McMaster 10/5/90

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WELL No. GW-649

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig and swab.

DEVELOPMENT
BEGAN DATE: 8/03/90

DEVELOPMENT
ENDING DATE: 8/10/90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 19.6 GALLONS

TOTAL GALLONS PUMPED: 150 TOTAL WELL VOLUMES PUMPED: 7.6

INITIAL pH: 7.9 FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (μ S): 340 FINAL DISSOLVED SOLIDS (μ S): 250

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER
DISCHARGED
TO:

☒ GROUND SURFACE
☐ STORM SEWERS
☐ DRUMS

☐ TANK TRUCK
☐ STORAGE TANKS
☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 7.3 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Timothy A. Lee 8/10/90
Timothy A. Lee

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WELL No. GW-651

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig and swab.

DEVELOPMENT
BEGAN DATE: 8-20-90

DEVELOPMENT
ENDING DATE: 8-30-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 35.2 GALLONS

TOTAL GALLONS PUMPED: 205 TOTAL WELL VOLUMES PUMPED: 5.8

INITIAL pH: 11.7 FINAL pH: 8.3

INITIAL DISSOLVED SOLIDS (μ S): 1700 FINAL DISSOLVED SOLIDS (μ S): 470

DESCRIPTION OF INITIAL TURBIDITY: Clear

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 3.7 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE 8-30-90
Timothy A. Lee

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WELL No. GW-652

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Workover rig and swab.

DEVELOPMENT
BEGAN DATE: 8-10-90

DEVELOPMENT
ENDING DATE: 8-20-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 29.1 GALLONS

TOTAL GALLONS PUMPED: 150 TOTAL WELL VOLUMES PUMPED: 5.1

INITIAL pH: 8.4 FINAL pH: 7.7

INITIAL DISSOLVED SOLIDS (μ S): 550 FINAL DISSOLVED SOLIDS (μ S): 530

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER	☒ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 4.2 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Timothy A. Lee 8/20/90
Timothy A. Lee

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WELL No. GW-653

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig and swab.

DEVELOPMENT
BEGAN DATE: 8-24-90

DEVELOPMENT
ENDING DATE: 9-04-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 21.4 GALLONS

TOTAL GALLONS PUMPED: 120 TOTAL WELL VOLUMES PUMPED: 5.6

INITIAL pH: 8.4 FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (μ S): 150 FINAL DISSOLVED SOLIDS (μ S): 90

DESCRIPTION OF INITIAL TURBIDITY: Slightly Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER DISCHARGED TO:	☒ GROUND SURFACE	☐ TANK TRUCK
	☐ STORM SEWERS	☐ STORAGE TANKS
	☐ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 18.3 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Timothy A. Lee 9/04/90
Timothy A. Lee

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WELL No. GW-654

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Workover rig and swab.

DEVELOPMENT
BEGAN DATE: 8-14-90

DEVELOPMENT
ENDING DATE: 8-24-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 15.3 GALLONS

TOTAL GALLONS PUMPED: 145 TOTAL WELL VOLUMES PUMPED: 9.4

INITIAL pH: 7.6 FINAL pH: 7.6

INITIAL DISSOLVED SOLIDS (μ S): 350 FINAL DISSOLVED SOLIDS (μ S): 340

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER
DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 4.3 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE Timothy A. Lee 8-24-90
Timothy A. Lee

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WELL No. GW-655

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig and swab

DEVELOPMENT
BEGAN DATE: 9-12-90

DEVELOPMENT
ENDING DATE: 9-21-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 33.4 GALLONS

TOTAL GALLONS PUMPED: 180 TOTAL WELL VOLUMES PUMPED: 5.4

INITIAL pH: 11.9 FINAL pH: 8.6

INITIAL DISSOLVED SOLIDS (μ S): 1500 FINAL DISSOLVED SOLIDS (μ S): 220

DESCRIPTION OF INITIAL TURBIDITY: Slightly Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER
DISCHARGED
TO:

☒ GROUND SURFACE	☐ TANK TRUCK
☐ STORM SEWERS	☐ STORAGE TANKS
☐ DRUMS	☐ OTHER

INITIAL PRE-DEVELOPMENT
WATER DEPTH: Water level at 28.7 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

Timothy A. Lee 9/21/90
Timothy A. Lee

ERC / EDGE
Environmental
and Energy
Services Co.

WELL No. GW-656

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Air Lift

DEVELOPMENT
BEGAN DATE: 9-19-90

DEVELOPMENT
ENDING DATE: 9-21-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 12.3 GALLONS

TOTAL GALLONS PUMPED: 54 TOTAL WELL VOLUMES PUMPED: 4.4

INITIAL pH: 8.3 FINAL pH: 8.0

INITIAL DISSOLVED SOLIDS (µS): 930 FINAL DISSOLVED SOLIDS (µS): 860

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: Slight Petroleum Product

WATER	☐ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☒ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: Water level at 10.2 feet below ground surface.

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

Timothy A. Lee 9-21-90
Timothy A. Lee

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	WELL NO. <u>GW-657</u>
WELL DEVELOPMENT SUMMARY	
METHOD OF DEVELOPMENT: <u>Air Lift</u>	
DEVELOPMENT OBSERVED BY: <u>B. McMaster/Mike Elliott</u>	
DEVELOPMENT DATE: <u>10/15/90</u>	
FINISH: <u>10/18/90</u>	
ONE WELL VOLUME: <u>6.2</u> GALLONS	
TOTAL GALLONS PUMPED: <u>82</u> TOTAL WELL VOLUMES PUMPED: <u>13.2</u>	
INITIAL pH: <u>8.1</u> FINAL pH: <u>7.9</u>	
INITIAL SPECIFIC CONDUCTANCE: <u>500</u> FINAL: <u>560</u>	
DESCRIPTION OF INITIAL TURBIDITY: <u>Cloudy</u>	
DESCRIPTION OF FINAL TURBIDITY: <u>Slightly Cloudy</u>	
FINAL MEASURED TURBIDITY: _____	
WELL APPROVED BY: <u>B. McMaster</u>	
ODOR OF WATER: <u>Strong sewage smell</u>	
WATER DISCHARGED TO: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div> ☐ GROUND SURFACE ☐ STORM SEWERS ☒ DRUMS </div> <div> ☐ TANK TRUCK ☐ STORAGE TANKS ☐ OTHER _____ </div> </div>	
INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>6.6'</u>	
DEVELOPMENT OBSERVATIONS: <u>Bailed well initially, could detect no odor or hydrocarbon sheen. When pumped well got strong sewage smell. Need to wear gloves when handling. Well makes 8-10 gallons/minute.</u>	
OBSERVER SIGNATURE: <u>B. McMaster</u>	
DATE: <u>10/18/90</u>

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WELL No. GW-658

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Air Lifted

DEVELOPMENT
BEGAN DATE: 9-07-90

DEVELOPMENT
ENDING DATE: 9-14-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 13.9 GALLONS

TOTAL GALLONS PUMPED: 61 TOTAL WELL VOLUMES PUMPED: 4.3

INITIAL pH: 8.0 FINAL pH: 7.9

INITIAL DISSOLVED SOLIDS (μ S): 460 FINAL DISSOLVED SOLIDS (μ S): 660

DESCRIPTION OF INITIAL TURBIDITY: Slightly Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: Petroleum product odor

WATER
DISCHARGED TO: ☐ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☒ DRUMS ☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 8.9 feet below ground surface.

DEVELOPMENT OBSERVATIONS

Strong odor of petroleum encountered. Did not purge a full 5 well
volumes due to the decrease in photovac readings and also the fact
the pH and dissolved solids have leveled off.

OBSERVER SIGNATURE/DATE Timothy A. Lee 9-14-90
Timothy A. Lee

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WELL No. GW-659

LOCATION: Y-12

Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Air lifted

DEVELOPMENT
BEGAN DATE: 9-07-90

DEVELOPMENT
ENDING DATE: 9-14-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 10.7 GALLONS

TOTAL GALLONS PUMPED: 53 TOTAL WELL VOLUMES PUMPED: 4.9

INITIAL pH: 8.5 FINAL pH: 7.9

INITIAL DISSOLVED SOLIDS (µS): 500 FINAL DISSOLVED SOLIDS (µS): 690

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: Petroleum product odor

WATER	☐ GROUND SURFACE	☐ TANK TRUCK
DISCHARGED	☐ STORM SEWERS	☐ STORAGE TANKS
TO:	☒ DRUMS	☐ OTHER _____

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 8.9 feet below ground surface.

DEVELOPMENT OBSERVATIONS

Strong odor of petroleum encountered. Did not purge a full 5 well volumes
due to the decrease in photovac readings and also the fact the pH and
dissolved solids have leveled off.

OBSERVER SIGNATURE/DATE

Timothy A. Lee
Timothy A. Lee

9-14-90

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	WELL NO. <u>GW-683</u>
WELL DEVELOPMENT SUMMARY	
METHOD OF DEVELOPMENT: <u>Swab</u>	
DEVELOPMENT OBSERVED BY: <u>B. McMaster</u>	
ONE WELL VOLUME: <u>77</u> GALLONS	
TOTAL GALLONS PUMPED: <u>780</u> TOTAL WELL VOLUMES PUMPED: <u>10.1</u>	
INITIAL pH: <u>7.4</u> FINAL pH: <u>6.8</u>	
INITIAL SPECIFIC CONDUCTANCE: <u>450</u> FINAL: <u>400</u>	
DESCRIPTION OF INITIAL TURBIDITY: <u>Muddy</u>	
DESCRIPTION OF FINAL TURBIDITY: <u>Cloudy</u>	
FINAL MEASURED TURBIDITY: <u>N/A</u>	
WELL APPROVED BY: <u>B. McMaster</u>	
ODOR OF WATER: <u>No Odor</u>	
WATER DISCHARGED TO: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;"> ☒ GROUND SURFACE ☐ STORM SEWERS ☐ DRUMS </div> <div style="width: 45%;"> ☐ TANK TRUCK ☐ STORAGE TANKS ☐ OTHER _____ </div> </div>	
INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>87' below ground surface</u>	
DEVELOPMENT OBSERVATIONS: <u>Developed using workover rig with stainless steel swab with rubber cups in 2-1/8" diameter tubing. Headspace test on water sample showed less than 5 ppm organics. No odor noticed.</u>	
<u>Water nver completely cleaned up with swabbing.</u>	
<div style="text-align: right;"> OBSERVER SIGNATURE: _____ DATE: _____ </div>	

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	
WELL DEVELOPMENT SUMMARY	
WELL NO. <u>GW-684</u>	
METHOD OF DEVELOPMENT: <u>Stainless Steel Swab</u>	
DEVELOPMENT OBSERVED BY: <u>B. McMaster</u>	
DEVELOPMENT DATE: <u>11/6/90</u>	
FINISH: <u>11/28/90</u>	
ONE WELL VOLUME: <u>82</u> GALLONS	
TOTAL GALLONS PUMPED: <u>700</u> TOTAL WELL VOLUMES PUMPED: <u>8.5</u>	
INITIAL pH: <u>10.2</u> FINAL pH: <u>8.5</u>	
INITIAL SPECIFIC CONDUCTANCE: <u>1120</u> FINAL: <u>510</u>	
DESCRIPTION OF INITIAL TURBIDITY: <u>Muddy</u>	
DESCRIPTION OF FINAL TURBIDITY: <u>Slightly Silty</u>	
FINAL MEASURED TURBIDITY: <u>N/A</u>	
WELL APPROVED BY: <u>B. McMaster</u>	
ODOR OF WATER: <u>None</u>	
WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK	
☐ STORM SEWERS ☐ STORAGE TANKS	
☐ DRUMS ☐ OTHER _____	
INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>14' below ground surface</u>	
DEVELOPMENT OBSERVATIONS: <u>Head space test showed less than 5 ppm on</u>	
<u>HNU meter - No odors. pH went up on 4th day of development, not</u>	
<u>quite sure why. Recovered after several days of developing. All</u>	
<u>samples have what appears to be some organic material or fines.</u>	
OBSERVER SIGNATURE: _____	
DATE: _____	

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	
WELL NO. <u>GW-685</u>	
WELL DEVELOPMENT SUMMARY	
METHOD OF DEVELOPMENT: <u>Swab</u>	
DEVELOPMENT OBSERVED BY: <u>B. McMaster</u>	
DEVELOPMENT DATE: START: <u>11/29/90</u> FINISH: <u>12/28/90</u>	
ONE WELL VOLUME: <u>260</u> GALLONS	
TOTAL GALLONS PUMPED: <u>840</u> TOTAL WELL VOLUMES PUMPED: <u>3.2</u>	
INITIAL pH: <u>6.9</u> FINAL pH: <u>6.8</u>	
INITIAL SPECIFIC CONDUCTANCE: <u>550</u> FINAL: <u>440</u>	
DESCRIPTION OF INITIAL TURBIDITY: <u>Cloudy</u>	
DESCRIPTION OF FINAL TURBIDITY: <u>Slightly cloudy - minor iron precipitate</u>	
FINAL MEASURED TURBIDITY: <u>N/A</u>	
WELL APPROVED BY: <u>B. McMaster</u>	
ODOR OF WATER: <u>None</u>	
WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK ☐ STORM SEWERS ☐ STORAGE TANKS ☐ DRUMS ☐ OTHER _____	
INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>5' below ground surface</u>	
DEVELOPMENT OBSERVATIONS: <u>Well is fairly slow to recover: makes approximately 55 gallons overnight.</u>	
<u>Headspace test with HNU meter showed less than 5 ppm organics</u>	
OBSERVER SIGNATURE: _____	
DATE: _____	

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	WELL NO. <u>GW-703</u>
WELL DEVELOPMENT SUMMARY	
METHOD OF DEVELOPMENT: <u>Steel swab with rubber cups</u>	
DEVELOPMENT OBSERVED BY: <u>Bruce McMaster</u>	
DEVELOPMENT DATE: START: <u>1/10/91</u> FINISH: <u>1/18/91</u>	
ONE WELL VOLUME: <u>255</u> GALLONS	
TOTAL GALLONS PUMPED: <u>1145</u> TOTAL WELL VOLUMES PUMPED: <u>4.5</u>	
INITIAL pH: <u>9.0</u> FINAL pH: <u>7.7</u>	
INITIAL SPECIFIC CONDUCTANCE: <u>420</u> FINAL: <u>230</u>	
DESCRIPTION OF INITIAL TURBIDITY: <u>Slightly Cloudy</u>	
DESCRIPTION OF FINAL TURBIDITY: <u>Slightly Silty</u>	
FINAL MEASURED TURBIDITY: <u>N/A</u>	
WELL APPROVED BY: <u>Bruce McMaster</u>	
ODOR OF WATER: <u>None</u>	
WATER DISCHARGED TO: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div> ☒ GROUND SURFACE ☐ STORM SEWERS ☐ DRUMS </div> <div> ☐ TANK TRUCK ☐ STORAGE TANKS ☐ OTHER _____ </div> </div>	
INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>35' below ground surface</u>	
DEVELOPMENT OBSERVATIONS: _____	
Developed using stainless steel swab with rubber cups in 2-1/8" diameter tubing.	
Water has no odor, HNU meter shows less than 5 ppm volatiles with head space test.	
Well is an open hole completion: 7" casing to 135'; 6½" open hole 135'-182'.	
OBSERVER SIGNATURE: _____	
DATE: _____	

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	WELL NO. <u>GW-704</u>
WELL DEVELOPMENT SUMMARY	
<p>METHOD OF DEVELOPMENT: <u>Stainless steel swab with rubber cups</u></p> <p>DEVELOPMENT OBSERVED BY: <u>Bruce McMaster</u></p> <p>ONE WELL VOLUME: <u>445</u> GALLONS</p> <p>TOTAL GALLONS PUMPED: <u>2320</u> TOTAL WELL VOLUMES PUMPED: <u>5.6</u></p> <p>INITIAL pH: <u>7.3</u> FINAL pH: <u>7.2</u></p> <p>INITIAL SPECIFIC CONDUCTANCE: <u>470</u> FINAL: <u>440</u></p> <p>DESCRIPTION OF INITIAL TURBIDITY: <u>Muddy</u></p> <p>DESCRIPTION OF FINAL TURBIDITY: <u>Cloudy</u></p> <p>FINAL MEASURED TURBIDITY: <u>N/A</u></p> <p>WELL APPROVED BY: <u>Bruce McMaster</u></p> <p>ODOR OF WATER: <u>None</u></p> <p>WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK ☐ STORM SEWERS ☐ STORAGE TANKS ☐ DRUMS ☐ OTHER _____</p> <p>INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>20' below ground surface</u></p> <p>DEVELOPMENT OBSERVATIONS: _____ <u>Well developed using stainless steel swab with rubber cups in 2-1/8" diameter tubing.</u> <u>No odor to water, head space test with HNU meter showed less than 5 ppm volatiles.</u> <u>Well is an open hole completion type, water never completely cleaned up during development.</u></p> <p style="text-align: right;">OBSERVER SIGNATURE: _____ DATE: _____</p>	

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	WELL NO. <u>GW-707</u>
WELL DEVELOPMENT SUMMARY	
<div style="display: flex; justify-content: space-between;"> <div style="width: 65%;"> <p>METHOD OF DEVELOPMENT: <u>Air Lift</u></p> <p>DEVELOPMENT OBSERVED BY: <u>B. McMaster/Mike Elliott</u></p> <p>ONE WELL VOLUME: <u>7.3</u> GALLONS</p> <p>TOTAL GALLONS PUMPED: <u>69</u> TOTAL WELL VOLUMES PUMPED: <u>9.5</u></p> <p>INITIAL pH: <u>8.0</u> FINAL pH: <u>7.6</u></p> <p>INITIAL SPECIFIC CONDUCTANCE: <u>440</u> FINAL: <u>570</u></p> <p>DESCRIPTION OF INITIAL TURBIDITY: <u>Slightly Cloudy</u></p> <p>DESCRIPTION OF FINAL TURBIDITY: <u>Slightly Cloudy</u></p> <p>FINAL MEASURED TURBIDITY: _____</p> <p>WELL APPROVED BY: <u>B. McMaster</u></p> <p>ODOR OF WATER: <u>Slight sewage smell</u></p> <p>WATER DISCHARGED TO: ☐ GROUND SURFACE ☐ TANK TRUCK</p> <p style="padding-left: 100px;">☐ STORM SEWERS ☐ STORAGE TANKS</p> <p style="padding-left: 100px;">☒ DRUMS ☐ OTHER _____</p> <p>INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>6.6'</u></p> <p>DEVELOPMENT OBSERVATIONS: <u>Bailed well initially to check for free product, did not detect odor or hydrocarbon sheen.</u></p> <p><u>During pumping on 10/17, water began smelling like sewage.</u></p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p> </div> <div style="width: 30%; padding-top: 10px;"> <p>DEVELOPMENT DATE: START: <u>10/15/90</u> FINISH: <u>10/23/90</u></p> </div> </div>	
<div style="display: flex; justify-content: flex-end; align-items: flex-end;"> <div style="text-align: right;">OBSERVER SIGNATURE: <u>Bruce McMaster</u></div> <div style="text-align: right;">DATE: <u>10/23/90</u></div> </div>	

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