Y/SUB--96-99069C(427)/1
RECEIVED Y/SUB/96-99069C(Y27)/1

AUG 21 1997

OSTI

Y-12

OAK RIDGE Y-12 PLANT

LOCKHEED MARTIN

FISCAL YEAR 1996 WELL INSTALLATION PROGRAM SUMMARY Y-12 PLANT, OAK RIDGE, TENNESSEE

APRIL 1997

Prepared by

Science Applications International Corporation
P.O. Box 2501, 800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830

Under Purchase Order 91B-99069C-Y27

for the

Water Compliance Department
Environmental Compliance Organization
Oak Ridge Y-12 Plant
Oak Ridge, Tennessee

MASTER

Managed by

Lockheed Martin Energy Systems, Inc.
for the
U.S. Department of Energy
Under Contract Number DE-AC05-84OR21400

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

UCN-13572 (26 6-95)

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Y/SUB/96-99069C(Y27)/1

**FISCAL YEAR 1996 WELL INSTALLATION
PROGRAM SUMMARY
Y-12 PLANT
OAK RIDGE, TENNESSEE**

SEPTEMBER 1996

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

CONTENTS

TABLES.....	v
FIGURES.....	v
ACRONYMS.....	vii
EXECUTIVE SUMMARY.....	ix
1. INTRODUCTION.....	1-1
1.1 FISCAL YEAR 1996 WELL INSTALLATION PROGRAM SUMMARY	1-1
2. GENERAL GEOLOGY AND HYDROLOGY.....	2-1
2.1 STRATIGRAPHY.....	2-1
2.2 HYDROLOGY.....	2-5
2.3 FIELD OBSERVATIONS.....	2-5
3. FISCAL YEAR 1996 WELL INSTALLATIONS.....	3-1
3.1 SCREENED WELL INSTALLATION METHODS.....	3-1
3.1.1 Screened Wells with Surface Casing.....	3-1
3.1.2 Screened Wells in the Unconsolidated Zone.....	3-3
3.1.3 Flush-Mounted Screened Wells.....	3-3
3.2 WELL DEVELOPMENT.....	3-3
3.3 WELL INSTALLATION SUMMARIES.....	3-5
3.3.1 Lake Reality Area.....	3-5
3.3.2 Ash Disposal Basin.....	3-7
3.4 WELL REHABILITATION.....	3-7
3.5 WASTE MANAGEMENT PRACTICES.....	3-8
4. QUALITY ASSURANCE.....	4-1
5. HEALTH AND SAFETY.....	5-1
6. REFERENCES.....	6-1
APPENDIXES	
A ACTIVITY/PROGRESS REPORTS.....	A-1
B LITHOLOGIC LOGS.....	B-1
C WELL CONSTRUCTION DIAGRAMS.....	C-1
D WELL DEVELOPMENT DATA.....	D-1
E WASTE MANAGEMENT PLAN FOR DRILLING ACTIVITIES.....	E-1
F WASTE MANAGEMENT SCREENING DATA.....	F-1
G EQUIPMENT DECONTAMINATION SUMMARIES.....	G-1
H WELL REHABILITATION/RE-DEVELOPMENT REPORTS.....	H-1
I WELL LOCATION MAP.....	I-1

TABLES

1.1	FY 1996 monitoring wells and functional areas.....	1-2
3.1	FY 1996 well development data summary.....	3-5
3.2	FY 1996 well construction data summary.....	3-6
3.3	FY 1996 rehabilitated wells and functional areas.....	3-8
3.4	FY 1996 well development summary, rehabilitated wells	3-8

FIGURES

2.1	Generalized geologic cross section through the Y-12 Plant area.....	2-2
2.2	Generalized geologic map of the Y-12 Plant area.....	2-3
2.3	Stratigraphic units in the vicinity of the Y-12 Plant.....	2-4
3.1	Typical screened well schematic.....	3-2
3.2	Typical flush-mounted screened well schematic.....	3-4

ACRONYMS

ADB	Ash Disposal Basin
BGS	below ground surface
DOT	U.S. Department of Transportation
EFPC	East Fork Poplar Creek
Energy Systems	Lockheed Martin Energy Systems, Inc. (formerly Martin Marietta Energy Systems, Inc.)
ESP	Environmental Surveillance Procedure
FY	fiscal year
gpm	gallons per minute
GWPP	Groundwater Protection Program
HSEA	Health, Safety, Environment, and Accountability Organization
ID	inside diameter
OD	outside diameter
ORR	Oak Ridge Reservation
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
SAIC	Science Applications International Corporation
TD	total depth
TOFR	top of fresh rock
TOWR	top of weathered rock
UEFPC	Upper East Fork Poplar Creek

EXECUTIVE SUMMARY

This report summarizes the well installation activities conducted during the federal fiscal year (FY) 1996 drilling program at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Synopses of monitoring well construction/well development data, well location rationale, geological/hydrological observations, quality assurance/quality control methods, and health and safety monitoring are included.

Two groundwater monitoring wells were installed during the FY 1996 drilling program. One of the groundwater monitoring wells was installed in the Lake Reality area and was of polyvinyl chloride screened construction. The other well, installed near the Ash Disposal Basin, was of stainless steel construction.

Eight well rehabilitation/redevelopment efforts were undertaken during FY 1996 at the Y-12 Plant.

Four new wells installed under a separate contract were developed under Groundwater Protection Program supervision.

All new monitoring wells and wells targeted for redevelopment were developed by either a 2.0-in. diameter swab rig, a submersible pump, or by hand bailing until nonspecific parameters (pH and specific conductance) attained steady-state levels. Turbidity levels were lowered, if required, to the extent practicable by continued development beyond a steady-state level of pH and conductance.

All well installation was conducted following industry-standard methods and approved procedures in the *Environmental Surveillance Procedures Quality Control Program* (Energy Systems 1988), the *Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Technical Enforcement Guidance Document* (EPA 1986), and *Guidelines for Installation of Monitoring Wells at the Y-12 Plant* (Geraghty & Miller 1985).

Health and safety monitoring and field screening of drilling returns and development waters were conducted in accordance with approved Lockheed Martin Energy Systems, Inc. guidelines.

1. INTRODUCTION

In September 1995, Science Applications International Corporation (SAIC) was authorized by Lockheed Martin Energy Systems, Inc. (Energy Systems) to provide hydrogeologic oversight for the Oak Ridge Y-12 Plant Groundwater Protection Program (GWPP) during the installation and rehabilitation of groundwater monitoring wells from October 1, 1995 through September 30, 1996. As part of this effort, SAIC supervised drilling activities, directed monitoring well construction and development, and provided well-site health and safety monitoring. The federal fiscal year (FY) 1996 drilling program included the installation and development of two groundwater monitoring wells, the development of four newly installed wells installed under a separate contract by Law Engineering Co., and the redevelopment of eight existing groundwater wells (Appendix H).

This report presents a summary of the activities and observations that took place during the FY 1996 drilling program. The report is organized in the following manner:

- general introduction and FY 1996 drilling program summary (Chap. 1);
- general geologic and hydrologic settings of the Y-12 Plant and vicinity, including field observations (Chap. 2);
- discussion of well installations during the FY 1996 drilling program, well construction methods, and waste management practices (Chap. 3) (a Waste Management Plan for Drilling Activities is included in Appendix E); and
- quality assurance/quality control (QA/QC) and health and safety protocols used during the FY 1996 drilling program (Chaps. 4 and 5).

Copies of the well installation Activity/Progress Reports, Lithologic Logs, Well Construction Diagrams, Well Development Data, Waste Management Screening Data, Equipment Decontamination Summaries, and Well Rehabilitation/Redevelopment Reports are included in Appendixes A, B, C, D, F, G, and H, respectively. Appendix I contains a map showing locations of new wells installed in FY 1996.

1.1 FISCAL YEAR 1996 WELL INSTALLATION PROGRAM SUMMARY

The FY 1996 drilling program included the installation of two groundwater monitoring wells. One of the monitoring wells (GW-832) was installed through the Second Street bridge over the concrete diversion channel at Lake Reality for the purpose of examining the potential for contaminant migration in the french drain underneath the diversion channel. The other well (GW-831) is a plume delineation well for the Chestnut Ridge Security Pits that replaces well GW-321, which was decommissioned to make way for repairs to the Ash Disposal Basin (ADB) retention dam.

Well GW-832 was installed in a borehole that had been augered through gravel back-fill material to refusal at 11.9 ft below ground surface (BGS). The well monitors groundwater in a french drain underneath the Upper East Fork Poplar Creek (UEFPC) diversion channel.

Well GW-831 was installed in a borehole drilled to a total depth (TD) of 200.0 ft BGS. The top of weathered rock (TOWR) and top of fresh rock (TOFR) occurred at 134.8 ft and 140.8 ft BGS, respectively. The well monitors two small fractures at 182.6 ft and 187.8 ft BGS.

Four new unconsolidated zone wells (GW-834, GW-835, GW-836, and GW-837) that had been installed by Law Engineering Co. under a separate subcontract were developed under supervision by the Y-12 Plant GWPP.

Eight existing wells (55-6A, GW-142, GW-170, GW-228, GW-229, GW-692, GW-786, and GW-830) were redeveloped to remove excess sediment accumulation.

Table 1.1 presents a list of the wells installed during the FY 1996 drilling program, and includes location coordinates.

Table 1.1. FY 1996 monitoring wells and functional areas

Well	Functional area	Y-12 Plant Grid Northing coordinate	Y-12 Plant Grid Easting coordinate
GW-831	Ash Disposal Basin	26653.53	56593.48
GW-832	Lake Reality	29141.95	64133.61

2. GENERAL GEOLOGY AND HYDROLOGY

The Y-12 Plant is located in Bear Creek Valley on the U.S. Department of Energy Oak Ridge Reservation (ORR) in the southwestern corner of Anderson County. The ORR, occupying an area of approximately 55 square miles, lies in a portion of the Tennessee section of the Valley and Ridge Physiographic Province (McMaster 1963). This province is characterized by narrow, elongated ridges and valleys trending northeast-southwest. Resistant sandstone, siltstone, and siliceous limestone and dolostone typically form the ridges; valleys are commonly underlain by less resistant shale and soluble carbonates (Rodgers 1953). Bear Creek Valley is bounded by Pine Ridge to the north and Chestnut Ridge to the south (Fig. 2.1). Elevations within the ORR range from approximately 900 ft to just over 1200 ft above mean sea level.

2.1 STRATIGRAPHY

Three major stratigraphic units, classified according to lithology, fossils, and age, underlie the Bear Creek Valley area. From oldest to youngest, these units are the Rome Formation, Conasauga Group, and Knox Group. Figures 2.1 and 2.2 are a generalized geologic cross section and map, respectively, that illustrate the locations and stratigraphic positions of the major stratigraphic groups and formations that occur in the Bear Creek Valley area.

The Rome Formation, which forms Pine Ridge, is of Lower Cambrian age and consists of interbedded sandstone, shale, and siltstone with local beds of dolostone (McMaster 1963).

The Conasauga Group, of Middle to Upper Cambrian age, has been subdivided into six formations of alternating, predominantly shale and limestone lithologies. The six formations, from oldest to youngest, are the Pumpkin Valley Shale, Rutledge Limestone, Rogersville Shale, Maryville Limestone, Nolichucky Shale, and Maynardville Limestone. Detailed lithologic descriptions of these formations are given in King and Haase (1987). The Conasauga Group formations are overlain by unconsolidated deposits of fill, alluvium, colluvium, and in situ weathered bedrock (residuum and saprolite) up to 30 ft. in thickness.

Chestnut Ridge, to the south of Bear Creek Valley, is underlain by siliceous dolostones of the Knox Group. This upper Cambrian to lower Ordovician-aged unit is divided into five formations that are, from oldest to youngest, the Copper Ridge Dolomite, Chepultepec Dolomite, Longview Dolomite, Kingsport Formation, and Mascot Dolomite. Detailed lithologic descriptions of the Knox Group formations are published in Milici (1973). Unconsolidated deposits overlying the Knox Group on Chestnut Ridge, in the vicinity of the Y-12 Plant, are considerably thicker than the unconsolidated deposits in the adjacent valleys.

Figure 2.3 is a generalized stratigraphic column of the major stratigraphic units and accepted subdivisions of the Y-12 Plant area bedrock formations.

Formations in Bear Creek Valley generally strike N47°E to N67°E. Regional dips are from 30° to 50° to the southeast (King and Haase 1987). Joints are reported to be common features in the strata of Bear Creek Valley. Orientation and spacing in Bear Creek Valley are quite variable. However, three primary joint sets: (1) parallel to lithologic bedding planes and strike, (2) perpendicular to bedding planes and parallel to strike, and (3) perpendicular to lithologic bedding planes and strike have been observed to dominate (Dreier, Solomon, and Beaudoin 1987). Small-scale folds, produced from thrust faulting, are common in the Bear Creek Valley formations and contribute to the varied bedding orientations in the area (Rothschild et al. 1984).

Fig. 2.1. Generalized geologic cross-section through the Y-12 Plant area.

Age	Group	Formation	Approximate Thickness (ft)		
			King and Haase 1987	Milici 1973	McMaster 1963
Lower Ordovician	Knox	Mascot Dolomite	Not Determined	400-800	3000 (undivided)
		Kingsport Formation		200-320	
		Longview Dolomite		250-450	
		Chepultepec Dolomite		725-880	
		Copper Ridge Dolomite		900-1000	
Middle & Upper Cambrian	Conasauga	Maynardville Limestone	418-450		1500 (undivided)
		Nolichucky Shale	422-550		
		Maryville Limestone	346-445		
		Rogersville Shale	90-120		
		Rutledge Limestone	90-120		
		Pumpkin Valley Shale	260-320		
Lower Cambrian		Rome	Not Determined		800+

Fig. 2.3. Stratigraphic units in the vicinity of the Y-12 Plant.

2.2 HYDROLOGY

Three distinct hydrologic regimes exist (Bear Creek, UEFPC, and Chestnut Ridge) in the Y-12 Plant vicinity. Within Bear Creek Valley, the UEFPC Regime encompasses the UEFPC drainage channel and shallow groundwater in most of the Y-12 Plant vicinity and to the east. The Bear Creek Regime encompasses the Bear Creek drainage channel and shallow groundwater west of the Y-12 Plant to Highway 95. The flow path systems within the Maynardville Limestone that underlie the streams provide the principal conduits for groundwater movement. Although the surface and subsurface hydrologies have been altered by construction and recontouring of the topography, the original drainage still plays an important role in the subsurface movement of water. Major components of groundwater flow include movement through unconsolidated weathered rock and fill under unconfined conditions, and flow along bedding planes, fractures, and solution channels in the consolidated rock, generally under confined conditions (Kamp 1985). In Bear Creek Valley, recharge occurs predominantly by infiltrating precipitation through unconsolidated material downward to the underlying bedrock. In general, groundwater flow in bedrock appears to be predominantly within solution cavities and fractures in the bedrock.

The Chestnut Ridge Regime contains most of the recharge area to Bear Creek Valley and contributes strike-normal flow to the UEFPC and Bear Creek regimes (Geraghty & Miller 1990). Groundwater flow within this regime is also principally in fractures and cavities within consolidated bedrock or in the weathered bedrock zone under unconfined conditions. Flow in this regime is under substantial topographic influence with the principal pathways both parallel and normal to strike. Discharge is primarily to springs in Bear Creek Valley to the north and Bethel Valley to the south and potentially springs and effluent areas along Scarboro Creek east of the Y-12 Plant.

2.3 FIELD OBSERVATIONS

The wellbore, drilled for the installation of well GW-831, penetrated 138.4 ft of light to moderate brown and moderate yellowish-brown clay with varying concentrations of residual chert before encountering bedrock. Bedrock at GW-831 site consisted predominantly of pale yellowish brown to brownish-gray, massive, very finely crystalline dolostone of the Knox Group (probably of the Chepultepec Dolomite member). Groundwater was not observed in the GW-831 wellbore until the bedrock interval was encountered where numerous small, water bearing fractures provided inflow to the well.

The wellbore for GW-832 was augered entirely through gravel backfill. The location overlies the Maynardville Limestone. While the gravel was moist beginning at 2 ft BGS, the gravel was not saturated until the french drain system and channel underfill was encountered at approximately 8.5 ft BGS.

3. FISCAL YEAR 1996 WELL INSTALLATIONS

Two groundwater monitoring wells were installed at the Y-12 Plant during FY 1996 under the Y-12 GWPP supervision. Both wells were of screened construction, one was polyvinyl chloride (PVC) and the other was stainless steel. Highland Drilling Company, Inc. was the well drilling contractor used on the two installations. Four other wells were installed at the Y-12 Plant in FY 1996 by Law Engineering Co. under a separate contract. The Y-12 Plant GWPP supervised the development of these four wells.

3.1 SCREENED WELL INSTALLATION METHODS

Screened wells installed during FY 1996 targeted the water table or groundwater at shallow depths. One of the groundwater monitoring wells installed at the Y-12 Plant in FY 1996 was installed in bedrock, and surface casing was utilized in its construction. The second well was an unconsolidated zone well. The following sections present the standard well installation methods used at the Y-12 Plant, applicable to wells installed in FY 1996.

3.1.1 Screened Wells with Surface Casing

To maintain the integrity of the borehole until well construction/installation is completed and to prevent cross-contamination with surface water and shallow groundwater sources, steel surface casing is used on "deeper" monitoring wells. Figure 3.1 presents a typical schematic of a screened well with surface casing. A pilot bore of 8 7/8- to 10 5/8-in. diameter is usually advanced to approximately 10 ft into competent bedrock to obtain information on the unconsolidated and weathered bedrock horizons. Surface casing set points are ideally located about 3 to 5 ft into competent bedrock. The pilot bore is reamed using a two-stage hole-opener bit to a diameter of 15.0 to 17.0 in. to the set-point depth. A short section of steel conductor casing is often used to preserve the borehole collar while drilling/reaming operations progress. Once the pilot bore has been reamed to the casing set point depth, steel casing [10.0-in. inside diameter (ID), 10.75-in. outside diameter (OD)] is installed. The surface casing is cemented in place with a cement grout either by pouring the mixture directly into the annulus or by the tremie method if the annulus is water-filled. This ensures a competent cement seal at the bottom of the casing. Additional cement grout is subsequently poured or tremied into the annulus to ensure that the annulus is sealed to the ground surface where needed. Grout curing time for this phase of well construction is a minimum of 24 hrs. Once an adequate cure time has been achieved, the borehole is advanced to the target zone in 10- to 15-ft increments, with an approximate 0.5-hr observation period after each increment to determine if a water-bearing zone has been intersected. Upon encountering sufficient water for sampling, the borehole is advanced so that the specific transmissive feature is approximately centered in the screened interval. At TD, the borehole is thoroughly cleaned to remove all cuttings.

Stainless steel screen and riser casings are installed in the borehole. Screen segments are usually 10-ft length, No. 10 (0.01-in.) openings, continuous wire wound, 4.5-in. OD, 4.25-in. ID, 2- or 4-pitch, flush-threaded stainless steel. Riser segments are 10-ft long, Schedule 5, Number 304, 4.5-in. OD, 4.25-in. ID, flush-threaded stainless steel. Stainless steel centralizers are installed on the riser casing at approximately 60-ft intervals. Approximately 1 ft of J-20 high-purity sand is usually placed in the borehole on which to set the screen.

Fig. 3.1. Typical screened well schematic.

3.1.2 Screened Wells in the Unconsolidated Zone

Figure 3.2 presents a schematic of a typical screened well installed in unconsolidated material. Note: the figure illustrates a flush-mount completion, which is the GW-832 configuration. Wells installed in unconsolidated material generally target the water table.

In general, the borehole is advanced to the target depth using either a 9 7/8-in. or 10 5/8-in. diameter tricone bit. In the case of well GW-832, a 12-in. OD hollow-stem auger was used. PVC or stainless-steel screen and riser casing of the same specifications described in Sect. 3.1.1 are installed in the borehole, ideally with the top of the screen at the level of the permanent groundwater table. If mud or cuttings remained in the wellbore after final cleaning, approximately 1 ft of J-20 high-purity sand, on which to set the screen, is placed in the borehole. With unstable ground conditions, as in the case of GW-832, the screen and riser casing are inserted inside the augers with the sand pack added as the augers are withdrawn from the borehole. Because of the shallow depths of unconsolidated zone wells, centralizers are normally not used.

A high-purity sand pack is placed around the screen to a level approximately 1 ft above the top of the screen. The sand pack level is monitored during installation by continuous sounding with a weighted tape. A bentonite pellet seal, of a minimum thickness of 2 ft, is placed on the sand and allowed to hydrate per manufacturer's recommendations prior to cementing. The remaining annulus is cemented using a neat cement grout, usually in one stage, and allowed to cure for 24 hrs.

3.1.3 Flush-Mounted Screened Wells

Wells to be installed in locations of high traffic require a flush-mounted design. Construction of flush-mounted, screened monitoring wells is identical to that of the screened wells discussed above with the exception that, when finished, the surface casing (if applicable) and riser casing are cut off even with or below the ground surface. The wellhead is subsequently protected by a man-hole-type cover installed flush with the ground surface.

3.2 WELL DEVELOPMENT

Upon completion of well construction, all wells installed at the Y-12 Plant are developed. Development involves removing all foreign sediment from the well and restoring the groundwater source to its original condition. Wells deeper than 50 ft are generally developed by the swab method. This procedure involves the installation of 2 3/8-in. OD, 2-in. ID steel tubing with a bottom check valve to the full depth of the well. A swab tool attached to a stainless steel wireline was then moved repeatedly up and down the length of the tubing evacuating water to the surface through an outlet. Very shallow, unconsolidated zone wells are developed by hand bailing, or by using a submersible pump. Development water obtained by all methods was placed in a drum where volumes are noted and field observations made.

Prior to development, a water level is taken in each well and a casing volume is calculated. An excess of one well volume, depending on recharge rates, was removed from each well for several consecutive days. Specific conductance, pH, temperature, and turbidity are monitored daily during development. A minimum total of three well volumes was removed from each well; however, the principal acceptance criteria are stable values for pH and conductance for three consecutive samples. If the nonspecific indicator parameters (specific conductance, pH, and temperature) stabilize but turbidity levels remain high, then the well continues to be developed until no further turbidity improvements are noted. Appendix D contains well development data for each of the FY 1996 monitoring wells. Table 3.1 summarizes the development data from the wells installed in FY 1996 as well as the wells installed by Law Engineering Co. for the Environmental Restoration Program.

NOT TO SCALE

Figure 3.2. Typical flush-mounted screened well schematic.

Table 3.1. FY 1996 well development data summary

Well	Water level (ft BGS)	TD ^a (ft BGS)	Well volume (gal)	Development water		Development method	Aquifer
				(gal)	(well volumes)		
GW-831	120.8	194.2	54.2	340	6.3	Swab	B
GW-832	8.0	11.1	4.6	35	7.6	Pump	U
GW-834 ^b	10.8	16.7	3.8	13.5	3.6	Bailer	U
GW-835 ^b	10.4	19.5	6.0	48	8.0	Bailer	U
GW-836 ^b	10.0	24.2	9.3	10.8	1.2	Bailer	U
GW-837 ^b	8.2	27.0	12.9	55	4.3	Bailer	U

^aDepth to bottom of open interval or screen.

^bInstalled under separate contract by Law Engineering Co., but developed under Y-12 Plant GWPP supervision.

3.3 WELL INSTALLATION SUMMARIES

This section presents a brief summary of each of the FY 1996 monitoring wells, including pertinent drilling data, geologic and hydrologic observations, and rationale for the well location. The descriptions are presented in numerical order, grouped by functional areas. Details of well installation activities, lithology, and well construction elements may be found in Appendices A through C. Table 3.2 presents a data summary for the FY 1996 drilling program.

3.3.1 Lake Reality Area

Well GW-832 was installed through the Second Street bridge over UEFPC, and completed in a french drain running beneath the UEFPC diversion channel.

GW-832

Well GW-832 is located on the south side of Second Street, between the pavement surface and the guardrail on the bridge over the UEFPC diversion channel. A 12-in. OD hollow-stem auger was used to drill the wellbore. Auger refusal was reached at 11.9 ft BGS. The wellbore was drilled through 1- to 2-in. diameter, undifferentiated gravel with varying amounts of clay from collar to total depth.

One 5-ft section of 6 5/8-in. OD, 6-in. ID, #20 slot PVC screen with end cap and a total of 10.0 ft of 6 5/8-in. OD, 6-in. ID, schedule 40 PVC casing were installed in the borehole. The screen, located between 11.1 ft and 5.9 ft BGS, encounters the french drain below the diversion structure.

Five, 50-lb sacks of #2 filter sand were poured into the annulus as the augers were removed from the bore. When the last auger was removed from the bore, the sides collapsed filling the remaining annulus to 1.3 ft BGS with gravel. The top of the sand filter pack was estimated at 4.0 ft BGS. No bentonite seal or annular grout was placed due to lack of space. The wellhead was completed with a flush-mounted box.

Well GW-832 was developed using a 2-in. diameter submersible pump. A total of 35 gallons of water (7.6 well volumes) was removed from the well (initial water level was measured at 8.0 ft BGS). The water was clear throughout development, and the water quality indicators varied by less than 3% during development.

Table 3.2. FY 1996 well construction data summary

Well number	Ground elevation (ft)	Top of casing elevation (ft)	Unconsolidated/weathered bedrock thickness (ft)	Depth of surface casing (ft BGS)	Construction type	Interval monitored	Total depth (ft BGS)	Collar/target formation
GW-831	1088.04	1091.09	134.8/6.0	138.3	Screened	183.2-194.2	200.0	Knox/Knox
GW-832	906.83	906.18	-NA-	-NA-	Screened	5.9-11.1	11.9	Emy/Emy

NA - Not applicable

Emy: Maynardville Limestone

At the conclusion of well installation, a pump test of the aquifer (french drain) was performed. A compressed air-powered pump was used to pump the well at a rate of 74 to 79 gallons per minute (gpm). A total of 9697 gallons of water over a period of 2.25 hours were removed from the well during the pump test. Water level in the well was lowered 0.91 ft during the pump test.

3.3.2 Ash Disposal Basin

Well GW-831 was installed in Chestnut Ridge near the ADB retention dam to replace well GW321 that had been decommissioned to make way for repairs to the dam and to comply with terms of the RCRA post-closure permit for the Chestnut Ridge Security Pits.

GW-831

Well GW-831 is located on a hill situated on the southeastern flank of Chestnut Ridge, overlooking the ADB to the east. A 10 5/8-in. diameter tricone roller bit was used to drill the pilot bore into bedrock. Weathered bedrock and fresh bedrock were encountered at 134.8 ft and 140.8 ft BGS, respectively. The pilot hole was reamed to 15-in. diameter. Surface casing (10-in. ID, 10 3/4-in. OD) was run into the borehole to 138.3 ft BGS and grouted (grout came up to only 94.8 ft outside of the casing).

A 9 7/8-in. diameter tricone roller bit was used to extend the pilot hole through bedrock, where numerous small fractures were encountered to 200.0 ft BGS. An 11.0-ft section of 4 1/2-in. OD stainless steel screen and 190.3 ft of 4 1/2-in. OD, schedule 5 stainless steel casing were installed in the hole with the screen located from 194.2 ft to 183.2 ft BGS to monitor two of the aforementioned fractures (182.6 ft and 187.8 ft BGS). A total of 14, 50-lb sacks of #2 filter sand were tremmied into the borehole from 199.6 ft to 182.0 ft BGS. Three, 50-lb sacks of 3/8-in. bentonite aggregate were used to create an annular bentonite seal from 182.0 ft to 175.0 ft BGS. The well annulus was grouted to 0.9 ft BGS by pumping approximately 3 1/4 cubic yds of neat, Type I Portland cement into the annulus. The surface casing annulus was sealed by pouring 33, 50-lb sacks of 3/8-in. bentonite aggregate into annulus to bridge a void. The surface casing annulus was grouted from 37.6 ft to 1.3 ft BGS by pouring 18, 94-lbs sacks of neat, Type I Portland cement into the annulus.

Well GW-831 was developed using the swab method. A total of 340 gallons of water (6.3 well volumes) were removed from the well. The initial water level was measured at 120.8 ft BGS. Development continued until water quality parameters stabilized. The water cleared significantly during development, though not entirely (typical of Knox aquifer wells).

3.4 WELL REHABILITATION

Well rehabilitation is requested when Energy Systems' well maintenance and inspection program has identified wells with discrepancies between measured depths and reported depths. Well rehabilitation (redevelopment) is performed in an attempt to remove silt/sediment accumulations, which may be the source of the measurement difference. Eight monitoring wells at the Y-12 Plant underwent rehabilitation during FY 1996 (Table 3.3). Development of these wells was by swabbing, hand bailing, or bailing with a sand bailer. A minimum total of three well volumes were removed from each well, unless circumstances dictated otherwise, undergoing rehabilitation. Specific conductance, pH, temperature, and turbidity were monitored daily for these wells just as for newly installed wells. Appendix H contains well development data and rehabilitation Activity/Progress reports for wells that underwent redevelopment in FY 1996. Detailed construction information for the wells rehabilitated during FY 1996 can be found in Jones, Thompson, and Field (1995) and is included in Table 3.4.

Table 3.3. FY 1996 rehabilitated wells and functional areas

Well	Functional area	Northing coordinate	Easting coordinate
55-6A	Y-12 Plant Site	30667.00	55907.00
GW-142	Kerr Hollow Quarry	24524.00	64030.00
GW-170	Union Valley	28545.00	66843.00
GW-228	Oil Landfarm	29171.00	47791.00
GW-229	Oil Landfarm	29256.00	47017.00
GW-692	Coal Pile Trench	29653.12	56001.20
GW-786	Y-12 Plant Site (Grid Well)	30456.28	58589.75
GW-830	TSD Facility	18280.35 ^a	33332.61 ^a

^aAdministrative Grid Coordinates

Table 3.4. FY 1996 well development summary, rehabilitated wells

Well	Water level (ft BGS)	TD ^a (ft BGS)	Well volume (gal)	Development water		Development method	Aquifer
				(gal)	(well volumes)		
55-6A	5.8	12.9	4.6	30	6.5	Bailer	U
GW-142	131.6	295.0	258.9	710	2.7	Swab	B
GW-170	29.3	156.9	83.3	373	4.5	Swab	B
GW-228	8.7	100.0	59.6	90	1.5	Bailer	B
GW-229	18.5	55.0	23.8	299	12.6	Swab/Bailer	B
GW-692	9.5	53.0	28.4	220	7.8	Swab	B
GW-786	6.2	64.1	42.8	170	4.0	Swab	B
GW-830	47.3	>387.4	251.2	825	3.3	Swab	B

^aDepth to bottom of open interval or screen

3.5 WASTE MANAGEMENT PRACTICES

A waste management plan for the well installation program was supplied by Energy Systems (Appendix E). Drilling cuttings and water were discharged to the ground surface or to an excavated cuttings pit, provided that field screening criteria for radioactivity, volatile organics, and pH were not exceeded. In the event that drill cuttings exceeded acceptable disposal limits, Health, Safety, Environment, and Accountability Organization (HSEA) personnel directed subcontractor personnel in the proper disposal techniques. With the exception of wells GW-228 and GW-229, at no time did the cuttings or development water of any of the wells installed, developed, or redeveloped in FY 1996 exceed acceptable disposal limits. A description of the exceptions follows:

GW-228

Every sample of water collected during the redevelopment of well GW-228 exceeded disposal limits for pH, specific conductance, and organic vapors (the well is down-gradient from the Oil Landfarm, and a substance resembling bentonite was observed in the water). All development water from GW-228 was collected into U.S. Department of Transportation (DOT)-approved, 55-gal. drums.

GW-229

All of the water samples collected during the redevelopment of well GW-229 exceeded the disposal limits for specific conductance and organic vapors (the well is immediately down-gradient from the Oil Landfarm). All development water from GW-229 was collected into DOT-approved, 55-gal. drums.

4. QUALITY ASSURANCE

All FY 1996 monitoring wells were installed and developed following procedures and technical guidelines in Environmental Surveillance Procedure (ESP)-600, *Well Installation, Development, and Abandonment* (Energy Systems 1988), the *Resource Conservation and Recovery Act (RCRA) Technical Enforcement Guidance Document* (EPA 1986), and *Guidelines for Installation of Monitor Wells at the Y-12 Plant* (Geraghty & Miller 1985). Details of well construction were recorded by SAIC oversight geologists in bound field books, and the information was compiled into a final well installation activity/progress report (Appendix A). Any deviations from standard well installation guidelines, such as the use of bentonite Hole Plug™ for the annular sealant, were pre-approved by the Energy Systems GWPP Manager or designee and were recorded in the activity report. Independent verification of well depths and wellhead completion was conducted by Energy Systems.

All well construction materials and drilling equipment were decontaminated or certified as precleaned before use at each well and as needed during well installation. Inspection of all materials and equipment before use at each well site was conducted by the oversight geologist. Equipment was periodically checked during drilling activities to ensure sound mechanical operation and to avoid detrimental impact to well quality from equipment failure. A nonpetroleum (beeswax)-based lubricant (Well-Guard™) was used for all drilling and steel casing installation activities.

Lithologic control during well installation was maintained by continuously collecting and logging drill cutting samples over 2- to 5-ft intervals. The presence of cavities, fractures, and soft drilling zones was denoted by continuous observation of drilling characteristics, such as penetration rate. This information was also recorded in bound field books and compiled into a final well log for each well (Appendix B). All carbonate lithologic descriptions were accomplished following the system of classification established by Folk (1980), where applicable, and color notations were standardized through use of the Geological Society of America Rock Color Chart (GSA 1980).

All well installation reports underwent internal technical and editorial reviews prior to being issued to Energy Systems.

5. HEALTH AND SAFETY

Health and safety monitoring during each well installation was conducted in accordance with the *Health and Safety Plan for Well Installation and Plugging and Abandonment Activities, Y-12 Plant, Oak Ridge, Tennessee* (SAIC 1992). All personnel working on site were required to have completed the 40-hr hazardous waste site operations training in accordance with 29 CFR 1910.120, and satisfied annual refresher requirements. Oversight personnel were required to have been Red Cross-certified in first aid and CPR techniques and to maintain that certification throughout the task. All personnel had undergone an occupational physical examination and respirator fit test within one year before drilling operations. On-site personnel attended a site-specific health and safety briefing before commencement of drilling activities to discuss potentially hazardous materials, potentially dangerous activities and situations, protective equipment, and decontamination procedures. Site-specific waste management plans and excavation/penetration permits were obtained prior to drilling at each well site.

Based on reviews of the hazard potential that were conducted at each specific site before drilling operations, Level D personnel protective equipment was selected for each site. At this level, individual protection consists of either Tyvek™ suits or individual work clothes, steel-toed safety boots, gloves, hard hats, ear plugs, and safety glasses.

Air quality in the breathing zone was monitored throughout the drilling program using an HNu™ photoionization detector, or a Century Foxboro OVA™ flame ionization detector. Radioactivity was measured using a Ludlum Model 3 survey meter and G-M pancake probe for beta and gamma activity, and a Ludlum Model 12 Count Ratemeter with a scintillation tube probe for alpha activity. Thermoluminescent detector badges for long-term radiological monitoring were worn by all personnel at all times.

In addition to the health and safety screening outlined above, composite samples of drilling cuttings and well development waters were screened on a daily basis for organic vapors in headspace samples, pH, and specific conductance (in development water only) according to a general waste management plan (Appendix E). Screening data for well cuttings and development water (Appendix F) provided further information on the presence or absence of hazardous compounds and characteristics of drilling cuttings or fluids to which site personnel might be exposed.

6. REFERENCES

- Dreier, R. B., D. K. Solomon, and C. M. Beaudoin. 1987. "Fracture characterization in the unsaturated zone of a shallow land burial facility," in: *Flow and Transport through Fractured Rock*, American Geophysical Union Monograph 42, pp. 51-59.
- Energy Systems (Martin Marietta Energy Systems, Inc.). 1988. *Environmental Surveillance Procedures Quality Control Program*, ESH/SUB/87-21706/1, September.
- EPA (U.S. Environmental Protection Agency). 1986. *Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Technical Enforcement Guidance Document*, September.
- Folk, R. L. 1980. *Petrology of Sedimentary Rocks*, Hemphill Publishing Company, Austin, Texas.
- Geraghty & Miller, Inc. 1985. *Guidelines for Installation of Monitoring Wells at the Y-12 Plant*, Y/SUB/85-00206C/6, prepared for Martin Marietta Energy Systems, Inc., November.
- Geraghty & Miller, Inc. 1990. *Summary of 1990 Groundwater Quality Assessment Monitoring Program at the Y-12 Plant*, prepared for Martin Marietta Energy Systems, Inc., June.
- GSA (Geological Society of America). 1980. *Rock-Color Chart*, Boulder, Colorado.
- Jones, S. B., B. K. Thompson, and S. M. Field. 1995. *Updated Subsurface Data Base for Bear Creek Valley, Chestnut Ridge, and Parts of Bethel Valley on the U.S. Department of Energy Oak Ridge Reservation*, Y/TS-881/R3, June.
- Kamp, G. E. 1985. *The Relation of Groundwater to Mercury Migration at the Y-12 Plant and the Hydrologic Effect of Proposed Clean-up Measures*, Y/SUB/85-00206C/5, Martin Marietta Energy Systems, Inc., Y-12 Plant, Oak Ridge, Tennessee.
- King, H. L. and C. S. Haase. 1987. *Subsurface-Controlled Geologic Map for the Y-12 Plant and Adjacent Area of Bear Creek Valley*, ORNL/TM-10112, Martin Marietta Energy Systems, Inc., Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- McMaster, W. M. 1963. *Geologic Map of the Oak Ridge Reservation*, Tennessee, ORNL-TM-713, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, November.
- Milici, R. C. 1973. "The Stratigraphy of Knox County, Tennessee," in: *Geology of the Knox County, Tennessee*, Tennessee Division of Geology, Bulletin 70.
- Rodgers, J. 1953. *Geologic Map of East Tennessee With Explanatory Text*, Tennessee Division of Geology, Bulletin 58, Part II.
- Rothschild, R. T., T. T. Turner, S. H. Stow, M. A. Boyle, L. K. Hyder, O. M. Sealand, and H. J. Wyrick. 1984. *Investigation of Subsurface Mercury at the Oak Ridge Y-12 Plant*, ORNL/TM-9092, Martin Marietta Energy Systems, Inc., Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- SAIC (Science Applications International Corporation). 1992. *Health and Safety Plan for Well Installation and Plugging and Abandonment Activities, Y-12 Plant, Oak Ridge, Tennessee*, Y/SUB/92-99928C(Y11)/1, prepared for Martin Marietta Energy Systems, Inc., July.

APPENDIX A
ACTIVITY/PROGRESS REPORTS

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-831

WELL INSTALLATION ACTIVITY/PROGRESS REPORT

PAGE 1 of 14

LOCATION: Ash Disposal BasinDATE: START: 7-22-96DRILLERS: J. Young/H. Hall - Highland Drilling Co.FINISH: 8-15-96HELPERS: H. Hall/G. Shillings/J. Gallaher/J. MongerDRILL: Ingersoll-Rand XL-750LOGGED BY: Timothy Coffey - SAIC

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-22-96	0750	0859	Oversight arrives at GW-831 site; the drill rig is on site, positioned over the well location.
	0859	0952	S. Jones (HSEA) and J. Walker (AJA, Inc.) on site, inform oversight that Highland Drilling Co. will be approximately 1 hour late. J. Walker will be on site to observe/audit well installation procedures. S. Jones departs.
	0952	1038	Drill crew arrives and unloads supplies brought with them. Conduct pre-work equipment inspections. G. Shillings (Highland Drilling, site H&S officer) conducts a pre-work, site-specific health and safety briefing.
	1038	1110	Start drill rig; raise the mast. Rig up with a 9 7/8-in. diameter tricone roller bit on a stabilizer; total length = 16.2 ft. Table height = 3.0 ft.
	1110	1139	Remove the 9 7/8-in. bit from the stabilizer. Thread a 10 5/8-in. diameter tricone roller bit onto the stabilizer; total length = 17.3 ft, table height remains at 3.0 ft. Background radiological scan of location: alpha = 0 cpm, beta/gamma = 40-60 cpm.
	1139	1222	Connection made. Use dozer to cut a small trench to divert water/cuttings to the pit.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 2 of 14
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-22-96	1222	1228	Commence drilling using compressed air only. Drill from 0.0 ft to
(cont.)			3.5 ft below ground surface (BGS).
	1228	1238	At 3.5 ft BGS. Trip out tools. Push in a 4-ft section of 11-in. inside
			diameter (ID), 11 7/8-in. outside diameter (OD) steel conductor
			casing. Casing stick-up = 0.9 ft.
	1238	1300	Break for lunch.
	1300	1318	The water truck arrives on site; crew positions it alongside the drill
			rig.
	1318	1530	Continue drilling using compressed air and water. Drill from 3.5 ft
			to 114.3 ft BGS. Ratty drilling 12.5 ft to 13.5 ft BGS and 33.3 ft to
			37.3 ft BGS. Breathing zone analysis (BZA) at 17.3 ft and 41.3 ft
			BGS both read 0.0 ppm. Ratty drilling 48.8 ft to 51.8 ft BGS. BZA
			at 74.3 ft BGS = 0.0 ppm. Significant rig chatter (bouncing tools)
			80.0 ft to 83.0 ft BGS, suspect a fairly solid chert ledge/bed.
			Circulation lost at 105.0 ft BGS. Have spotty air circulation to
			114.3 ft BGS, but no cuttings.
	1530	1559	At 114.3 ft BGS, have no more drill rods. Have not yet encountered
			bedrock. Trip out tools. Clean up, secure site, and depart.
7-23-96	0818	1016	Oversight arrives at GW-831 site.
	1016	1039	Drill crew arrives with auxiliary compressor; move into position.
	1039	1054	Crew departs to load dozer on flat-bed for another job.
	1054	1120	Crew returns, and sets up auxiliary compressor.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-831WELL INSTALLATION ACTIVITY/PROGRESS REPORT
continued

PAGE 3 of 14

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-23-96	1120	1137	Start drill rig. Trip in tools.
(cont.)			
	1137	1154	At 114.3 ft BGS, add a 25-ft drill rod.
	1154	1208	Suspect that the last rod added to the string is plugged. Remove rod using P-tong wrench and blow clear using compressed air.
			Re-connect drill rod to string.
	1208	1318	Continue drilling using compressed air, water, and soap (to raise cuttings). Drill from 114.3 ft to 149.3 ft BGS. Still without circulation; tools appear to drop unobstructed. BZA at 125.3 ft
			BGS = 0.0 ppm. Rig chatter at 134.8 ft BGS, becomes more erratic
			with depth. Top of weathered bedrock at 134.8 ft BGS. Drilling
			becoming more solid. Top of fresh bedrock at 140.8 ft BGS. Still
			no returns. BZA at 144.3 ft and 141.3 ft BGS both read 0.0 ppm.
	1318	1332	At 149.3 ft BGS (8.5 ft into competent bedrock). Determine surface casing set-point to be at approximately 146 ft BGS. Break for
			lunch.
	1332	1410	Trip out tools. Rig down stabilizer/bit assembly.
	1410	1427	Pull out the conductor casing. Rig up with a 15-in. diameter hole opener; length to reaming cones = 18.6 ft, total length = 20.1 ft,
			table height remains at 3.0 ft.
	1427	1437	Commerce reaming the pilot hole using compressed air only.
			Ream from 0.0 ft to 3.2 ft BGS. Trip out tools.
	1437	1444	Push in a 3.5-ft section of 15 1/4-in. ID, 16-in. OD steel conductor casing. Casing stick-up = 0.6 ft.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 4 of 14
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-23-96	1444	1517	Shut off drill rig; will not do any more reaming today. Fuel drill rig.
(cont.)			Secure site and depart.
7-24-96	0857	0937	Arrive at GW-831 site. Crew fuels the auxiliary compressor and conducts pre-work equipment inspections.
	0937	1206	Start drill rig. Commence reaming pilot hole using compressed air, water, and soap (to maintain good circulation). Ream from 3.2 ft to 140.0 ft BGS. Very few cuttings getting to the surface by 20.6 ft BGS. Rig up to add water to borehole above the bit. Clean out borehole in one blast; good circulation; drilling rate increases. Lose circulation at 66.6 ft BGS. Trip out tools and clean out the borehole. Confirm chert ledge between 80.0 ft and 83.0 ft BGS. Circulation of air only (no cuttings) below chert ledge. Confirm top of weathered bedrock at 134.8 ft BGS.
	1206	1224	At 140.0 ft BGS. Plan to stop here since casing is not at the location. Begin to trip out the tools.
	1224	1243	Anchor plate for the hydraulic carousel swing cylinder that pivots carousel in and out breaks, unable to trip out any further. Call for welder to make repairs.
	1243	1333	Break for lunch.
	1333	1434	Surface casing delivery arrives at location; still waiting on welding truck for rig repairs. A. Dinger (MK-F) brings burn/hot work permit to location. Grout delivery for surface casing scheduled for tomorrow afternoon. Oversight departs.
7-25-96	0841	0918	Oversight arrives at GW-831 site. Repairs appear to have been made to the carousel swing cylinder, and more rods pulled out of

Y-12 PLANT GROUNDWATER PROTECTION PROGRAMWELL NO. GW-831**WELL INSTALLATION ACTIVITY/PROGRESS REPORT
continued**

PAGE 5 of 14

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-25-96			the borehole. Drill crew arrives, starts drill rig, and begins tripping
(cont.)			back into borehole. Have to re-drill through chert ledge (80.0 ft to
			83.0 ft BGS). Surface casing moved to site. Talley: 7 sections of
			10-in. ID, 10 3/4-in. OD steel casing totalling 149.8 ft. Restore air
			circulation. Rig begins to chatter at 136.6 ft BGS (bedrock).
	0918	0959	At 140.0 ft BGS, had to drill through approximately 1 ft of fill at
			bottom of the hole. Continue reaming the pilot hole using
			compressed air, water, and soap. Ream from 140.0 ft to 148.0 ft
			BGS (casing set point).
	0959	1014	At 148.0 ft BGS. Have maintained air circulation throughout this
			interval, but no cuttings to surface. Clean out borehole.
	1014	1052	Trip out tools.
	1052	1235	Thread a clevis into drill head and begin running surface casing
			into the borehole. Casing hangs up near the top of bedrock.
	1235	1333	Shut off the drilling with approximately 15 ft of casing sticking up
			(bottom of casing at approximately 135 ft BGS). Will try to force air
			down through casing to clear the hole. Rig up compressed air line
			to port on lifting bell.
	1333	1400	Turn on auxiliary compressor; blow air down inside the casing.
			Push casing in another couple of ft. Stick-up is now 12.3 ft (bottom
			of casing is at 137.5 ft BGS).
	1400	1421	Shut off drill rig. Break for lunch.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 6 of 14
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-25-96	1421	1518	Connect hose to water truck and flush borehole with water.
(cont.)			Alternate blowing the hole with compressed air, or flushing the hole with water while trying to push casing in further.
	1518	1548	Stop with surface casing stick-up at 11.5 ft (bottom of casing is at 138.3 ft BGS). The casing will go no further. Dismantle air/water line. Secure site and depart.
7-26-96	0853	1040	Arrive at GW-831 site. Crew cuts off 10.7 ft of the casing stick-up. New stick-up = 0.8 ft. Tag bottom of borehole inside casing at 137.2 ft BGS (bottom of borehole filled with debris). Wait on grout delivery scheduled for 1000 hrs.
	1040	1118	Cement truck arrives with 3 1/4 cubic yards of 3% bentonite-cement grout. Pour cement into surface casing. The weight of the cement should push any debris/mud back into the formation, and approximately equalize inside and outside of the casing. Weight of the cement is 12.1 lbs/gal.
	1118	1137	Clean up cement truck. Cement level appears to be at least 80 ft BGS. Depart site.
7-29-96	0806	0938	Oversight arrives at GW-831 site. Tag cement level inside casing at 110.2 ft BGS. Tag (suspected) cement level in casing annulus at 94.8 ft BGS. K. Jago (HSEA) approves deviation allowing well installation to continue without grouting the casing to the surface.
	0938	1012	Crew arrives, conducts pre-work equipment inspections. Start drill rig. Break clevis loose from drillhead. Drillhead will not travel to top of the mast; a pulley pin on the cylinder head has backed out, and is hanging up on the mast. Pin is re-inserted.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			
			PAGE 7 of 14
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-29-96	1012	1157	Crew departs to get welder to tack-weld the pin in place.
(cont.)			
	1157	1238	Crew returns, and welds the pin in place.
	1238	1303	Rig up with the 10 5/8-in. diameter bit/stabilizer assembly. Break the 10 5/8-in. bit loose from the stabilizer. Thread the 9 7/8-in. diameter bit back onto the stabilizer, and add a 1.5-ft long drilling subadapter with check valve to stabilizer; total length = 18.7 ft, table height remains at 3.0 ft.
	1303	1332	Trip in tools. Encounter water at 105.2 ft BGS.
	1332	1503	Encounter cement at 110.2 ft BGS. Commence drilling up cement using compressed air and water. Drill up cement from 110.2 ft to 138.6 ft BGS. Have good circulation. At 136.6 ft BGS bit drops 0.2 ft. Drilling becomes ratty at 138.6 ft BGS (very solid, hard). Behaves like it is drilling a new hole. Continue drilling to end of pilot hole.
	1503	1515	At 149.3 ft BGS (depth equivalent to end of pilot hole). Probably have drilled a new hole since the bottom of the casing. Clean out borehole, and blow the hole dry. Hole is dry.
	1515	1558	Continue drilling using compressed air only. Drill from 149.3 ft to 159.6 ft BGS. BZA at 150.8 ft and 158.4 ft BGS both read 0.0 ppm. A few fragments from this interval exhibit pale iron oxide staining on edges.
	1558	1615	At 159.6 ft BGS. Flush out borehole well with water. Trip out 2 rods. Secure site and depart.
7-30-96	0757	0851	Oversight arrives at GW-831 site.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 8 of 14
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-30-96 (cont.)	0851	0911	Crew arrives, fuels drill rig and conducts pre-work equipment inspections.
	0911	0924	Start drill rig. Trip in tools. Encounter water at approximately 132 ft BGS.
	0924	1127	At bottom of borehole (159.6 ft BGS). Commence drilling using compressed air only. Drill from 159.6 ft to 190.6 ft BGS. Borehole appears to dry up rapidly. BZA at 162.0 ft BGS = 0.2 ppm. Drilled through a possible fracture from 162.8 ft to 164.0 ft BGS; no obvious water, but a sulfurous odor noted (BZA = 0.0 ppm). Few cuttings coming out of the hole; adding water at 168.0 ft BGS. Another possible fracture from 171.0 BGS to 172.0 ft BGS. BZA at 175.4 ft BGS = 0.0 ppm. Still having trouble raising cutting; adding soap. Returns finally come to the surface with bit at 177.4 ft BGS. Drilling rate improves. Ratty drilling areas (suspected fractures): 182.6 ft and 187.8 ft BGS. BZA at 184.4 ft BGS = 0.2 ppm.
	1127	1206	At 190.6 ft BGS. Clean out borehole thoroughly. Trip out 2 rods.
	1206	1240	Break for lunch.
	1240	1250	Fuel drill rig.
	1250	1312	Trip back into borehole. Encounter water at 169.6 ft BGS (21 ft of water in the borehole).
	1312	1350	At bottom of borehole (190.6 ft BGS). Continue drilling using compressed air, water, and soap. Drill from 190.6 ft to 200.0 ft BGS. Possible fracture from 192.0 ft to 192.4 ft BGS. BZA at 193.2 ft BGS = 0.0 ppm.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			
			PAGE 9 of 14
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-30-96	1350	1502	At 200.0 ft BGS. Clean out borehole. Try to dry up the borehole;
(cont.)			cannot dry completely. Trip out 3 rods, wait on water to accumulate
			in hole. Report status to K. Jago (HSEA) who directs to set screen
			to monitor fractures at 182.6 ft and 187.8 ft BGS since they appear
			to be most likely to produce water.
	1502	1538	Start drill rig and trip in tools. Water level at approximately 182 ft
			BGS (28 ft of water in bore). Have picked up only slightly more
			water by drilling the extra 10 ft. Trip out tools until bit is safely inside
			the surface casing. Secure site and depart.
7-31-96	0935	1010	Oversight arrives at GW-831 site. Crew is on site conducting pre-
			work equipment inspections. Start drill rig, and trip in tools. Water
			level is at 122.6 ft BGS (77.4 ft of water in the bore). Continue to
			bottom, clean the borehole one more time.
	1010	1054	Trip out the tools, rig down the bit/stabilizer assembly. Tag bottom
			of borehole at 199.6 ft BGS (0.4 ft of fill).
	1054	1151	Pour 4, 50-lb sacks of #2 filter sand into the borehole, and 1, 5-gal
			bucket of potable water to wash it down. Tag sand level at 194.6 ft
			BGS (5.0 ft of sand). Well construction materials tally:
			Screen: 1, 11.0-ft section of 4 1/2-in. OD, 4-in. ID, single-wire
			wound stainless steel screen with a 0.6-ft cap on bottom
			(included in length).
			Casing: total of 201.3 ft of 4 1/2-in. OD, 4-in. ID, schedule 5,
			stainless steel casing.
	1151	1342	Begin running the casing and screen into the borehole. Three
			centralizers placed: the bottom centralizer is centered on connection
			9.9 ft above top of screen, 60 ft above the bottom centralizer, and
			60 ft above the middle centralizer. Set screen and casing string on

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 10 of 14
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
7-31-96 (cont.)			bottom. Casing stick-up = 1.1 ft. Bottom of screen is at 194.2 ft BGS (0.4 ft of debris fell in on sand while running the well string), and the top of the screen is at 183.2 ft BGS. The centralizers are located at 173.3 ft, 113.3 ft, and 53.3 ft BGS.
	1342	1437	Break for lunch.
	1437	1454	Run 1 5/8-in. OD PVC tremie pipe into well annulus to 175.0 ft BGS.
	1454	1510	Tremie 10, 50-lb sacks of #2 filter sand into annulus. Tag sand level at 182.0 ft BGS (sand pack extends 1.2 ft above top of screen). Used approximately 30 gallons of potable water to tremie the sand.
	1510	1527	Slowly pour 3, 50-lb sacks of 3/8-in. bentonite aggregate into the annulus. Tag level of unhydrated bentonite at 176.4 ft BGS. Bentonite to hydrate overnight. Plan to perform bail and recharge test on well prior to grouting. Remove 1 section of the tremie, and leave remaining tremie in annulus. Depart site.
8-1-96	0754	0920	Oversight arrives at GW-831 site. Measure water level inside well casing at 121.4 ft BGS. Water level outside well casing is at 123.1 ft BGS. Tag hydrated bentonite level at 175.0 ft BGS (bentonite swelled 1.4 ft). Total thickness of bentonite seal is 7.0 ft. Tag cuttings level in surface casing annulus at 93.2 ft BGS (1.6 ft higher than after grouting).
	0920	0941	Crew arrives. Conduct pre-work equipment inspections. Start drill rig. Thread a clevis into drillhead. Rig up a pulley to pull bailer up and down.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>		
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 11 of 14		
DATE	TIME		ACTIVITY/COMMENTS		
	START	FINISH			
8-1-96	0941	1016	Commence bailing the well and monitoring the water level as		
(cont.)			follows:		
			Water Level Below		
			<u>Gallons Removed</u>	<u>Top of Casing (BTOC)</u>	<u>Water Level drop/total</u>
			5	134.8 ft	6.3 ft/6.3 ft
			10	139.6 ft	4.8 ft/11.1 ft
			15	144.1 ft	4.5 ft/15.6 ft
			Measure water level outside of well at 123.2 ft BGS (rose 0.1 ft).		
	1016	1216	Allow well to recharge and monitor the water level with the		
			following results:		
			<u>Time</u>	<u>Elapsed Time</u>	<u>Water Level (ft BTOC)</u>
			1016	0 min	144.1 ft
			1026	10 min	141.9 ft
			1036	20 min	140.2 ft
			1046	30 min	138.7 ft
			1056	40 min	137.4 ft
			1106	50 min	136.2 ft
			1116	60 min (1 hr)	135.2 ft
			1126	70 min	134.4 ft
			1136	80 min	133.6 ft
			1146	90 min	132.9 ft
			1156	100 min	132.3 ft
			1216	120 min (2 hrs)	131.4 ft
			Well exhibits relatively good recharge. With HSEA concurrence,		
			plan to grout well annulus, and attempt to fill possible void in casing		
			annulus.		
	1216	1344	Break for lunch. Crew departs for cement and bentonite.		

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			
			PAGE 12 of 14
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-1-96	1344	1411	Crew returns. Slowly pour 8, 50-lb sacks of 3/8-in. bentonite
(cont.)			aggregate into the casing annulus. Tag bentonite level at 92.0 ft
			BGS (came up just 1.2 ft).
	1411	1444	Add 1 section of tremie, and lower the string to 175.0 ft BGS. Mix
			and pump-tremie 4 sacks (4.7 cubic ft) of neat, Type I Portland
			cement (grout weight of 11.7 lbs/per gal) into the annulus.
			S. Kennedy and A. Dinger (MK-F) safety and construction engineer,
			respectively, on site for safety-oriented visit.
	1444	1502	Pull off 2 sections of tremie pipe, leaving remaining tremie in
			annulus. Clean up, secure site, and depart.
8-2-96	1328	1528	Arrive at GW-831 site. Tag cement level in annulus at 162.4 ft
			BGS. With the tremie pipe to 156.0 ft BGS, mix and pump-tremie
			18 sacks (21.2 cubic ft) of neat, Type I Portland cement (average
			grout weight of 12.5 lbs per gal) into the annulus.
	1528	1534	Pull off 4 sections of tremie pipe, leaving remaining tremie in
			annulus. Clean up.
	1534	1600	Slowly pour 10, 50-lb sacks of 3/8-in. bentonite aggregate into the
			surface casing annulus. Tag bentonite level at 91.6 ft BGS
			(bentonite came up only 0.4 ft). Pour 10 gals of potable water into
			annulus to hydrate the bentonite. Depart site.
8-5-96	1230	1259	Arrive at GW-831 site, crew is on site in the process of demobilizing
			the drilling equipment. Tag cement level in well annulus at 119.4 ft
			BGS. Calculate an annular volume to the ground surface of
			52.1 cubic ft = 1.9 cubic yards.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			
			PAGE 13 of 14
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-5-96	1259	1330	Slowly pour 15, 50-lbs sacks of 3/8-in. bentonite aggregate into the
(cont.)			surface casing annulus. Tag bentonite level at 37.6 ft BGS
			(suspect that bentonite bridged). Calculate an annular volume to
			the ground surface of 22.4 cubic ft, equivalent to 19 sacks of Type I
			cement.
	1330	1442	Drill crew departs for cement to grout the surface casing annulus.
			Support crew remains and moves auxiliary compressor and drill rig
			off the location.
	1442	1603	Drill crew returns. Mix and pump-tremie 17 sacks (20.1 cubic ft) of
			neat, Type I Portland cement (average grout weight of 12.8 lbs per
			gal) into the surface annulus. Circulate 100% cement. Liquid
			cement fills the surface casing annulus to the ground surface.
	1603	1609	Clean up, secure site, and depart.
8-6-96	1233	1500	Arrive at GW-831 site. Grout delivery scheduled for 1300 hrs. Tag
			cement level in surface casing annulus at 4.8 ft BGS. Waiting on
			cement delivery.
	1500	1549	Cement truck at GW-831 site with tremie to 117.0 ft BGS, cement
			is off-loaded into a tub and then pump-tremied into the well
			annulus. Two cubic yards of cement (grout weight of 14.3 lbs per
			gal) are tremied. Cement/water level at approximately 7 ft BGS.
	1549	1602	Pull out tremie pipe. Clean up. Secure site and depart.
8-7-96	1243	1250	Arrive at GW-831 site. Tag cement level in well annulus at 17.1 ft
			BGS. Calculate an annular volume to the ground surface of
			7.4 cubic ft, equivalent to 6.3 sacks of Type I cement. Run 1 5/8-
			in. OD PVC tremie pipe into annulus to 16.0 ft BGS.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT			PAGE 1 of 11
LOCATION: <u>New Hope Pond</u>		DATE: START: <u>5-9-96</u>	
OPERATOR: <u>D. Key - Highland Drilling Co.</u>		FINISH: <u>5-21-96</u>	
HELPERS: <u>S. Gilbert/G. Shillings - Highland Drilling Co.</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>Hitachi EX 200LC Track-hoe with McMillan Diggerhead</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-9-96	0804	0909	At GW-832 site. K. Jago (HSEA) conducts a project kick-off meeting, including a site-specific health and safety briefing for participants. Important items include: discussion of boring, specifications, special concerns regarding any incidents in vicinity of East Fork Poplar Creek, and handling of development water.
	0909	0935	Drill crew departs for drums to contain possible wet cuttings, and caution signs. Driller's Services, Inc. onsite, delivers well construction materials.
	0935	1024	Wet cuttings drums on location. Rig auger motor to track-hoe bucket. Begin setting up the site. Background radiological scan of location: alpha = 0 cpm, beta/gamma = 40-60 cpm.
	1024	1050	Move the track-hoe to the site, and position to drill the well.
	1050	1100	Rig up with 12-in. outside diameter (OD), 8 1/4-in. inside diameter (ID), hollow-stem augers; lead flyte is 5.3 ft long, subsequent auger flytes are 5.0 ft long. Using a removable center bit to keep the center of the augers clear.
	1100	1218	Commence augering (drilling). Auger from 0.0 ft to 11.9 ft below ground surface (BGS). Breathing zone analysis (BZA) at initial ground penetration = 0.0 ppm. Radiological scan of cuttings at 0.5 ft BGS: alpha = 0 cpm, beta/gamma = 40-50 cpm. BZA at 1.0 ft BGS = 0.0 ppm. Radiological scan of cuttings at 2.0 ft BGS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			
			PAGE 2 of 11
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-9-96	1100	1218	alpha = 0 cpm, beta/gamma = 40-50 cpm. BZA at 3.6 ft BGS =
(cont.)			0.1 ppm. Cuttings are damp beginning at 4.8 ft BGS. Beta/
			gamma scan of cuttings at 6.0 ft BGS = 40 cpm (no alpha
			measurement due to the moisture). BZA at 6.8 ft and 8.7 ft BGS
			both read 0.0 ppm. Beta/gamma scan of cuttings at 9.0 ft BGS =
			40 cpm. Cuttings are now wet. BZA at 11.0 ft BGS = 0.0 ppm. On
			something hard at 11.2 ft BGS, augers are beginning to "walk" to
			the side. Beta/gamma scan of cuttings at 11.5 ft BGS = 40-50 cpm
			(wet). BZA at 11.8 ft BGS = 0.6 ppm (maximum), 0.0 ppm
			(sustained).
	1218	1240	Auger refusal at 11.9 ft BGS. Remove the auger head. Measure
			the water level inside the augers at 8.5 ft BGS. Plan to install the
			well through the augers. The upper end of the center bit rods was
			damaged, and will be unable to thread on a retraction attachment.
			Rig operator departs to get a welder.
	1240	1423	Break for lunch. Screen cuttings composite from 0.0 ft to 11.9 ft
			BGS (see Well Log). Well casing and screen tally:
			Screen: 1, 5-ft section of 6 5/8-in. OD, 6-in. ID, 20 slot
			PVC screen.
			Riser: 1, 10-ft section and 1, 5-ft section of 6 5/8-in. OD,
			6-in. ID, schedule 40, PVC casing.
			Total well casing and screen = 20.0 ft. Also have 2, 6 5/8-in. ID
			non-threaded caps.
			Measure water level inside augers once again at 1332 hrs: water
			level remains unchanged at 8.5 ft BGS.
	1423	1439	Weld a hook to the upper end of the center bit rods.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			
			PAGE 3 of 11
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-9-96	1439	1446	Pull out center bit and rods. Tag bottom of borehole at 11.8 ft BGS.
(cont.)			
	1446	1500	Attach one of the end caps to the bottom of the screen section, and assemble the screen and casing. Pour 1/2, 50-lb sack of #2 filter sand into the borehole.
	1500	1505	Run the entire well assembly into the borehole through the augers.
	1505	1540	Begin pulling augers out of the borehole while adding filter sand.
			Total sand used: 5, 50-lb sacks of #2 filter sand. Final auger flyte out of the borehole. The borehole walls slough in to 1.3 ft BGS.
			The top of the sand pack is at unknown depth. Casing stick-up = 4.3 ft. Bottom of the cap/screen is at 11.1 ft BGS, top of the screen section is at 5.9 ft BGS. Top of the sand pack is estimated to be at 4.0 ft BGS.
	1540	1613	Cut off 3.6 ft of the casing stick-up. Place the second cap over the stick-up. Clean up the site. Move the Track-hoe off the location.
			Secure the site, and depart.
5-13-96	1251	1314	Arrive at GW-832 site. Development crew is onsite, as are 2, 5000-gal. stainless steel tankers. Uncap well: organic vapors in casing headspace = 0.6 ppm. Measure water level in well at 8.6 ft below top of casing (BTOC) = 8.0 ft BGS. Calculate a well volume of 4.6 gallons of water. Water level in creek is 6.7 ft below top of bridge abutment.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 4 of 11
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-13-96	1314	1414	Insert suction hose of approximately 100-gpm centrifugal pump
(cont.)			into the well to the bottom. Prime the pump, and begin pumping:
			no water at discharge hose. Try priming pump several more times,
			plus filling suction hose with water. Still no water at discharge
			hose: pump is unable to pick up the water.
	1414	1505	Stop using the centrifugal pump. Crew trying to locate another
			pump. Report status to K. Jago (HSEA) at 1500 hrs. Decide to re-
			try development tomorrow at 0800 hrs. A small submersible pump
			is brought to the site.
	1505	1525	Clean up, secure site, and depart.
5-14-96	0731	0819	Arrive at GW-832 site. Uncap well: organic vapors in casing
			headspace = 0.4 ppm. Water level in well remains at 8.0 ft BGS.
			The water level in the creek remains at 6.7 ft below the top of the
			bridge abutment. Crew arrives, and sets up generator near well.
	0819	0825	Insert the pump, a 2-in. diameter, Grundfos MP1, 1/2 HP
			submersible pump, into the well. The pump is at the bottom of the
			well. Commence pumping. Pump 5 gallons of water out of the well:
			water sample is clear. Pumping rate is approximately 4 gpm.
	0825	0832	Screen water sample. Readings: pH = 7.5, conductance = 385
			µmhos/cm, temperature = 16.5°C.
	0832	0836	Continue pumping. Pump another 10 gallons of water out of the
			well: water sample is clear.
	0836	0842	Screen water sample. Readings: pH = 7.4, conductance = 379
			µmhos/cm, temperature = 17.1°C.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 5 of 11
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-14-96 (cont.)	0842	0847	Continue pumping. Pump another 10 gallons of water out of the well: water sample is clear.
	0847	0851	Screen water sample. Readings: pH = 7.4, conductance = 380 μ hos/cm, temperature = 17.2°C.
	0851	0856	Continue pumping. Pump another 10 gallons of water out of the well: water sample is clear.
	0856	0902	Screen water sample. Readings = pH = 7.3, conductance = 381 μ hos/cm, temperature = 17.1°C. Development of well GW-832 is complete.
	0902	0931	Extract pump from the well. Waiting on sample crew.
	0931	0935	Samplers arrive. Re-insert pump in well. Purge another 5 gallons of water out of the well.
	0935	1004	Sample the water in the well. Samples collected for: VOC's, pH/ conductivity/turbidity, anions, total metals, TDS, TSS, and radiochemistry. Sample crew departs.
	1004	1016	Increase pump rate of pump. Determine a pumping rate of 7.3 gpm. Measure water level prior to start at 8.62 ft BTOC.
	1016	1032	Conduct a brief pumping test at 7.3 gpm, measuring the drop in the well water level with the following results:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>	
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 6 of 11	
DATE	TIME		ACTIVITY/COMMENTS	
	START	FINISH		
5-14-96			Water Level (BTOC)	Time
(cont.)			8.65 ft	T + 2 min.
			8.65 ft	T + 5 min.
			8.65 ft	T + 10 min.
			8.65 ft	T + 15 min.
	1032	1038	End pump test. Set pump rate control to maximum. Determine a pumping rate of 9.7 gpm. Water level prior to start is 8.63 ft BTOC.	
	1038	1138	Conduct another brief pumping test at 9.7 gpm, measuring the drop in the well water level with the following results:	
			Water Level (BTOC)	Time
			8.66 ft	T + 1 min.
			8.66 ft	T + 2 min.
			8.67 ft	T + 5 min.
			8.68 ft	T + 10 min.
			8.68 ft	T + 15 min.
			8.68 ft	T + 20 min.
			8.68 ft	T + 25 min.
			8.69 ft	T + 30 min.
			8.69 ft	T + 35 min.
			8.70 ft	T + 40 min.
			8.70 ft	T + 45 min.
			8.70 ft	T + 50 min.
			8.70 ft	T + 55 min.
			8.71 ft	T + 60 min.
	1138	1152	End pump test. Plan to try pumping test with a pump that pumps at a higher rate. Crew trying to locate one in the area: one is located (a 2-in. submersible pump). One of the crew goes to rent it.	

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 7 of 11
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-14-96	1152	1215	Waiting. Crew member returns: pump was not usable, it was greater than 6-in. diameter (the discharge hose was 2-in. diameter).
(cont.)			
	1215	1248	Break for lunch.
	1248	1340	Crew checking several vendors for a submersible pump with a pump rate greater than 10 gpm. One is located in Knoxville.
	1340	1500	Crew member departs to rent it.
	1500	1523	Crew member returns empty-handed: the pump was not a submersible. Locate a 20 gpm submersible pump. Plan to get it, and prepare to conduct pumping test tomorrow at 0800 hrs. Secure site, and depart.
5-15-96	0740	0910	Arrive at GW-832 site. It is raining hard. Pump planned for use is a 4-in. diameter Grundfos submersible pump. The water level in the creek is 5.8 ft below the top of the bridge abutment (the creek has risen 0.9 ft in response to the overnight rain). After some discussion, it is decided to postpone the pumping test because the recent precipitation event might interfere with or mask the results of the pumping test. Plan to re-try pumping test after hydraulic conditions have stabilized (possibly next week), with a pump capable of 50 to 100 gpm. Depart site.
5-20-96	1056	1152	Arrive at GW-832 site, planning to get everything ready for the pump test. Crew is off getting hoses, connections, fittings, etc. Uncap well: organic vapors in casing headspace = 0.0 ppm. Measure water level in well at 8.57 ft BTOC. Water level in creek is at 6.7 ft below the top of the bridge abutment.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 8 of 11
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-20-96 (cont.)	1152	1258	Crew returns with hoses (still need some connections). Depart again for more parts and lunch.
	1258	1308	Crew returns again. Thread check valve to suction hose. Run suction hose into well. Connect to pump.
	1308	1316	Begin pumping the well using a compressed air-driven diaphragm pump: discharge hose is full of holes. Discard discharge hose, and connect another one to pump.
	1316	1354	Begin pumping the well again: second discharge hose also full of holes. No more discharge hoses available. Was unable to measure a pump rate, but from what little pumping was accomplished, the pump seems to be adequate. Gather equipment, secure site. K. Jago (HSEA) onsite to check on progress. Plan to initiate pumping test tomorrow at approximately 0900 hrs. Begin spreading the word to participants. Depart site.
5-21-96	0731	0915	Arrive at GW-832 site. Water level in well is at 8.55 ft BTOC. Water level in creek is 6.7 ft below the top of the bridge abutment. Attach a water meter to pump (water meter reading: 26,607.5 gals). Connect PVC piping and valves to pump discharge port so that both tankers onsite can be filled without interrupting pumping. Run a discharge hose to each tanker. Insert suction hose in well. Water level immediately prior to start of pump test = 8.56 ft BTOC.
	0915	0925	Commence pumping test. PVC piping comes apart almost immediately. Shut off pump. Estimated spill of 3-5 gallons of water on the ground (most drained into well annulus), none of the water went into the creek.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 9 of 11
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-21-96	0925	0945	One member of Highland Drilling Co. crew goes to get parts to
(cont.)			repair the break. K. Jago (HSEA) is notified, who notifies the spill
			response people.
	0945	1000	Begin making repairs to PVC piping. Spill Response Coordinator:
			R.M. Shedden onsite, makes report.
	1000	1014	Crew uses plastic sheeting to create a shield for the creek against
			future spills. Decide to pump directly into the tankers to avoid the
			possibility of another spill. Disassemble the piping. Measure
			water level inside well at 8.56 ft BTOC.
	1014	1018	Re-start the pumping test. Pump rate is 16 gallons per minute
			(gpm).
	1018	1029	Stop test: compressed air hose appears ready to fail. Replace
			hose.
	1029	1050	Continue with pump test. Pump rate remains at 16 gpm. Measure
			the water level inside GW-832 with the following results:
			Time Elapsed Time Depth (BTOC)
			1034 5 min. 8.63 ft
			1039 10 min. 8.64 ft
			1049 20 min. 8.66 ft
	1050	1111	Stop pumping test: water level is not being drawn down significantly
			in well, there's no point in continuing. However, discover check
			valve was apparently on the bottom of the well, constricting the
			flow of water. Pull approximately 1-ft off bottom.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>		
WELL INSTALLATION ACTIVITY/PROGRESS REPORT continued			PAGE 10 of 11		
DATE	TIME		ACTIVITY/COMMENTS		
	START	FINISH			
5-21-96	1111	1202	Re-start pumping test. Pump rate is 76 gpm. Water level in		
(cont.)			selected wells surrounding GW-832 being monitored during		
			pumping test. Water level in GW-832 as follows:		
			Time	Elapsed Time	Depth (BTOC)
			1111	0 min.	8.56 ft
			1116	5 min.	8.85 ft
			1121	10 min.	8.89 ft
			1131	20 min.	9.00 ft
			1143	32 min.	9.18 ft
			1151	40 min.	9.28 ft
			1201	50 min.	9.32 ft
			The water level in the creek remains at 6.7 ft below the top of the		
			bridge abutment.		
	1202	1214	First tanker is full. Interrupt pumping test to move discharge hose		
			to second tanker.		
	1214	1324	Continue pumping test. Pump rate ranges 74-79 gpm throughout		
			remainder of test. Continue monitoring water levels in selected		
			surrounding wells. Water level in GW-832 measured as follows:		
			Time	Elapsed Time	Depth (BTOC)
			1214	1 hr, 3 min.	9.03 ft
			1220	1 hr, 9 min.	9.19 ft
			1224	1 hr, 13 min.	9.22 ft
			1231	1 hr, 20 min.	9.29 ft
			1244	1 hr, 33 min.	9.32 ft
			1258	1 hr, 47 min.	9.42 ft
			1314	2 hrs, 3 min.	9.46 ft
			1322	2 hrs, 11 min.	9.47 ft

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-832

WELL INSTALLATION ACTIVITY/PROGRESS REPORT
continued

PAGE 11 of 11

[illegible]

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-834</u>
WELL DEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 2
LOCATION: <u>S3 Ponds</u>		DATE: START: <u>8-15-96</u>	
BAILERS: <u>G. Shillings/J. Gallaher - Highland Drilling Co.</u>		FINISH: <u>8-16-96</u>	
HELPERS: <u>NA</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>NA</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-15-96	0928	0944	Arrive at GW-834 site. Don personal protective equipment (PPE).
	0944	0948	Enter exclusion zone. Uncap well, organic vapors in casing
			headspace = 0.0 ppm. Measure water level at 10.8 ft below
			ground surface (BGS). Calculate a well volume of 3.8 gallons.
	0948	0953	Commence bailing the well. Bail 4 gallons of water out of the well;
			water sample is turbid. Breathing zone analysis (BZA) while
			bailing = 0.0 ppm.
	0953	0959	Screen water sample. Readings: pH = 5.8, conductance
			= 7600 µmhos/cm, temperature = 20.5°C.
	0959	1002	Continue bailing the well. Bail another 2 gallons of water out of the
			well; water sample is turbid (silty). The well is nearly dry.
	1002	1007	Screen water sample. Readings: pH = 5.6, conductance
			= 12,300 µmhos/cm, temperature = 19.2°C.
	1007	1033	Wait for well to recharge.
	1033	1036	Continue bailing the well. Bail another 2 gallons of water out of the
			well; water sample is turbid. Well is now dry.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-834</u>
WELL DEVELOPMENT ACTIVITY/PROGRESS REPORT continued			
			PAGE 2 of 2
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-15-96	1036	1040	Screen water sample. Readings: pH = 5.5, conductance
(cont.)			= 13,000 μ mhos/cm, temperature = 20.0°C. Plan to let well
			recharge overnight and finish development tomorrow. Leave
			bailer and water handling equipment within the exclusion zone.
	1040	1051	Y-12 Plant RADCON representative, D.M. Smith, scans
			instruments and personnel out of the exclusion zone. Depart site.
8/16/96	0655	0721	Arrive at GW-834 site. Don PPE, and enter exclusion zone.
	0721	0724	Commence bailing the well. Bail 3.5 gallons of water out of the
			well; water sample is slightly turbid.
	0724	0732	Screen water sample. Readings: pH = 5.6, conductance
			= 13,300 μ mhos/cm, temperature = 18.5°C.
	0732	0736	Continue bailing the well. Bail another 2 gallons of water out of the
			well; water sample is turbid. Well is nearly dry.
	0736	0742	Screen water sample. Readings: pH = 5.6, conductance
			= 12,900 μ mhos/cm, temperature = 18.1°C. Terminate
			development.
	0742	0803	Decontaminate bailer and water handling equipment. D.M. Smith
			scans equipment and personnel out of the exclusion zone. Depart
			site.
			Development of GW-834 is complete.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-835</u>
WELL DEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 3
LOCATION: <u>S3 Ponds</u>		DATE: START: <u>8-13-96</u>	
BAILER: <u>G. Shillings - Highland Drilling Co.</u>		FINISH: <u>8-13-96</u>	
HELPERS: <u>NA</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>NA</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-13-96	0808	0825	Arrive at GW-835 site. This is the first of four wells to be developed; discuss project with Y-12 Plant Health-Physics representative D.M. Smith (a small exclusion zone will be established around each well, and work will be controlled by RWP 96-H-0155).
	0825	0850	S. Jones (HSEA) conducts a short project-specific health & safety briefing. Items worth mentioning include: <ul style="list-style-type: none"> Work must stop if beta/gamma counts reach 100 cpm. Headspace analyses for water samples (for disposal) will not be required because all development water is to be contained.
	0850	0854	Don personal protective equipment (PPE) consisting of Level D hooded Tyvek/Sardnex, rubber gloves, plastic and rubber boots, and eye protection.
	0854	0859	Enter exclusion zone. Uncap well, organic vapors: in casing headspace = 36 ppm (max), in breathing zone = 0 ppm. Measure water level at 10.4 ft below ground surface (BGS). Calculate a well volume of 6.0 gallons.
	0859	0908	Commence bailing the well. Bail 4 gallons of water out of the well; water sample is turbid (silty). Breathing zone analysis (BZA) while bailing = 0.0 ppm.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-835</u>
WELL DEVELOPMENT ACTIVITY/PROGRESS REPORT continued			
			PAGE 2 of 3
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-13-96	0908	0914	Screen water sample. Readings: pH = 6.5, conductance =
(cont.)			1350 μ mhos/cm, temperature = 15.0°C.
	0914	0920	Continue bailing the well. Bail another 4 gallons of water out of the
			well; water sample is turbid (water is beginning to clear slightly).
			BZA while bailing = 0.0 ppm.
	0920	0926	Screen water sample. Readings: pH = 6.5, conductance
			= 1200 μ mhos/cm, temperature = 19.0°C. (temperature
			instrument, YSI meter, is acting strangely; reading is jumping).
	0926	0930	Continue bailing the well. Bail another 4 gallons of water out of the
			well; water sample is turbid.
	0930	0934	Screen water sample. Readings: pH = 6.5, conductance
			= 1100 μ mhos/cm, temperature = 19.2°C (jumpy again).
	0934	0938	Continue bailing the well. Bail another 4 gallons of water out of the
			well; water sample is turbid.
	0938	0942	Screen water sample. Readings: pH = 6.5, conductance
			= 1010 μ mhos/cm, temperature = 19.0°C (jumpy).
	0942	0948	Continue bailing the well. Bail another 8 gallons of water out of the
			well; water sample is moderately turbid (water has cleared a great
			deal since beginning development).
	0948	0953	Screen water sample. Readings: pH = 6.6, conductance
			= 910 μ mhos/cm, temperature = 19.0°C.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-835</u>
WELL DEVELOPMENT ACTIVITY/PROGRESS REPORT continued			
			PAGE 3 of 3
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-13-96	0953	0959	Continue bailing the well. Bail another 8 gallons of water out of the
(cont.)			well; water sample is moderately turbid. First sign that well is
			beginning to dry up; water level has dropped significantly.
	0959	1004	Screen water sample. Readings: pH = 6.5, conductance
			= 980 μ mhos/cm, temperature = 19.0°C.
	1004	1011	Continue bailing the well. Bail another 8 gallons of water out of the
			well; water sample is slightly turbid. Water continues to clear, while
			water level continues to drop.
	1011	1015	Screen water sample. Readings: pH = 6.6, Conductance
			= 890 μ mhos/cm, temperature = 19.0°C.
	1015	1023	Continue bailing the well. Bail another 8 gallons of water out of the
			well; water sample is slightly turbid.
	1023	1027	Screen water sample. Readings: pH = 6.6, conductance
			= 890 μ mhos/cm, temperature = 19.0°C.
	1027	1055	S. Jones (HSEA) terminates development of GW-835: have
			removed 8.0 well volumes, parameters have stabilized and water
			has cleared significantly. Decontaminate bailer and other water
			handling items. D.M. Smith scans equipment and personnel out
			of the exclusion zone.
	1055	1101	Pack up equipment. Depart site.
			Development of GW-835 is complete.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-836</u>
WELL DEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 2
LOCATION: <u>S3 Ponds</u>		DATE: START: <u>8-14-96</u>	
BAILER: <u>G. Shillings - Highland Drilling Co.</u>		FINISH: <u>8-15-96</u>	
HELPERS: <u>NA</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>NA</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-14-96	0702	0725	Arrive at GW-836 site. Don personal protective equipment (PPE).
	0725	0733	Enter exclusion zone. Uncap well, organic vapors in casing headspace = 0.0 ppm. Measure water level at 10.0 ft. below ground surface (BGS). Calculate a well volume of 9.3 gallons.
	0733	0738	Commence bailing the well. Bail 4 gallons of water out of the well; water sample is turbid (silty). Breathing zone analysis (BZA) while bailing = 0.0 ppm.
	0738	0743	Screen water sample. Readings: pH = 7.1, conductance = 940 μ mhos/cm, temperature = 14.7°C.
	0743	0747	Continue bailing the well. Bail another 5.3 gallons of water out of the well; water sample is turbid (beginning to clear slightly) and has an odor of acetone. Well is dry.
	0747	0753	Screen water sample. Readings: pH = 7.3, conductance = 760 μ mhos/cm, temperature = 14.9°C.
	0753	0823	Wait for well to recharge.
	0823	0830	Continue bailing the well. Well is still dry. Plan to let well recharge overnight and continue tomorrow. Leave bailer and water handling equipment within the exclusion zone.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-837</u>
WELL DEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 4
LOCATION: <u>S3 Ponds</u>		DATE: START: <u>8-16-96</u>	
BAILER: <u>J. Gallaher - Highland Drilling Co.</u>		FINISH: <u>8-19-96</u>	
HELPERS: <u>NA</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>NA</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-16-96	0803	0838	Arrive at GW-837 site. Waiting for water containment tank to be brought to site.
	0838	0850	Don personal protective equipment (PPE).
	0850	0853	Enter exclusion zone. Uncap well, organic vapors: in casing
			headspace = 12 ppm (max), in breathing zone = 0.0 ppm.
			Measure water level at 8.2 ft below ground surface (BGS).
			Calculate a well volume of 12.9 gallons.
	0853	0900	Commence bailing the well. Bail 4 gallons of water out of the well;
			water sample is turbid. Water sample also has an indistinguishable
			chemical odor.
	0900	0904	Screen water sample. Readings: pH = 5.7, conductance
			= 8900 μ mhos/cm, temperature = 18.1°C.
	0904	0911	Continue bailing the well. Bail another 7 gallons of water out of the
			well; water sample is turbid, but appears to be clearing slightly.
			Water still has a chemical odor.
	0911	0915	Screen water sample. Readings: pH = 5.6, conductance
			= 8900 μ mhos/cm, temperature = 18.9°C.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-837</u>
WELL DEVELOPMENT ACTIVITY/PROGRESS REPORT continued			
			PAGE 2 of 4
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-16-96	0915	0919	Continue bailing the well. Bail another 3 gallons of water out of the
(cont.)			well; water sample is turbid with a sweet, chemical odor. Well is
			beginning to dry up.
	0919	0924	Screen water sample. Readings: pH = 5.5, conductance
			= 9100 μ mhos/cm, temperature = 14.9°C (temperature instrument,
			YSI meter, acting strangely; reading is jumpy).
	0924	0930	Continue bailing the well. Bail another 6 gallons of water out of the
			well; water sample is turbid with a sweet, chemical odor.
	0930	0936	Screen water sample. Readings: pH = 5.5, conductance
			= 9300 μ mhos/cm, temperature = 14.8°C.
	0936	0939	Continue bailing the well. Bail another 3 gallons of water out of the
			well; water sample is turbid with a sweet, chemical odor. Well is
			nearly dry.
	0939	0943	Screen water sample. Readings: pH = 5.5, conductance
			= 9800 μ mhos/cm, temperature = 14.8°C.
	0943	0955	Wait on well to recharge.
	0955	0957	Continue bailing the well. Bail another 3 gallons of water out of the
			well; water sample is slightly turbid. Well is nearly dry again.
	0957	1002	Screen water sample. Readings: pH = 5.5, conductance
			= 9800 μ mhos/cm, temperature = 18.1°C (jumpy). Plan to let well
			recharge over the weekend. Leave bailer and water handling
			equipment within the exclusion zone.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-837</u>
WELL DEVELOPMENT ACTIVITY/PROGRESS REPORT continued			
			PAGE 3 of 4
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
8-16-96	1002	1009	Y-12 Plant RADCON representative, D.M. Smith, scans instruments
(cont.)			and personnel out of the exclusion zone. Depart site.
8-19-96	0701	0720	Arrive at GW-837 site. Don PPE.
	0720	0726	Enter exclusion zone. Uncap well, organic vapors: in casing
			headspace = 6 ppm (max), in breathing zone = 0.0 ppm.
	0726	0734	Bail the well. Bail 6 gallons of water out of the well; water sample
			is slightly turbid and still has the unidentifiable chemical odor.
	0734	0738	Screen water sample. readings: pH = 5.6, conductance
			= 9500 μ mhos/cm, temperature = 17.0°C.
	0738	0744	Continue bailing the well. Bail another 6 gallons of water out of the
			well; water sample is slightly turbid and still has a chemical odor.
	0744	0748	Screen water sample. Readings: pH = 5.6, conductance
			= 9700 μ mhos/cm, temperature = 14.7°C (temperature instrument
			jumping around again).
	0748	0753	Continue bailing the well. Bail another 5 gallons of water out of the
			well; water sample is moderately turbid (well is nearly dry).
	0753	0758	Screen water sample. Readings: pH = 5.6, conductance
			= 9800 μ mhos/cm, temperature = 14.7°C.
	0758	0830	Wait on well to recharge.
	0830	0838	Continue bailing the well. Bail another 6 gallons of water out of the
			well; water sample is slightly turbid.

[illegible]

APPENDIX B
LITHOLOGIC LOGS

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-831</u>
WELL LOG - continued			PAGE 2 of 3
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
134.8	140.8		Weathered bedrock (no returns)
140.8	149.3	BZA at 141.3 ft BGS =	Competent bedrock (no returns)
		0.0 ppm	Note: While drilling the completion interval, the bit apparently left the pilot hole near the base of the surface casing (138.6 ft BGS).
		BZA at 144.3 ft BGS =	The lithologic description of bedrock from 138.6 ft to 149.3 ft is as follows:
		0.0 ppm	
			Pale yellowish-brown (10YR 6/2) to brownish-gray (5YR 4/1), massive, very fine crystalline dolostone with rare white (N9) and very light gray (N8), slightly opaque chert.
			Interval from 143.6 ft to 149.3 ft BGS also contains rare dark greenish-gray (5GY 4/1), thinly laminated shale.
149.3	169.6	BZA at 150.8 ft BGS =	Pale yellowish-brown (10YR 6/2) to very pale orange (10YR 8/2),
		0.0 ppm	massive, very fine crystalline dolostone. Below 159.6 ft BGS,
			white (N9) to very light gray (N8), sometimes oolitic, chert is
		BZA at 158.4 ft BGS =	observed. Amount of chert increases with depth. Minor iron oxide
		0.0 ppm	staining on some of the fragments.
		Cuttings composite	Possible fractures 162.8 ft to 164.0 ft BGS, and 171.0 ft to 172.0 ft
		(138.6 - 159.6 ft	BGS.
		BGS): alpha = 0 cpm,	
		beta/gamma = 40	
		cpm, pH = 9.5;	
		organic vapors =	
		0.0 ppm	
		BZA at 162.0 ft BGS =	
		0.2 ppm	

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-831

WELL LOG - continued

PAGE 3 of 3

DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION
FROM	TO		
169.6	190.6	BZA at 175.4 ft BGS =	Pale yellowish-brown (10YR 6/2) to brownish-gray (5YR 4/1),
(cont.)	(cont.)	0.0 ppm	massive, very fine crystalline dolostone with white (N9) and medium
			gray (N5), slightly opaque chert. The last 10 ft of the interval, the
		BZA at 184.4 ft BGS =	cuttings exhibit significant iron oxide staining. Fractures: 182.6 ft
		0.2 ppm	and 187.8 ft BGS.
190.6	194.6	BZA at 193.2 ft BGS =	Very pale orange (10YR 8/2) to medium light gray (N6), massive,
		0.0 ppm	very fine crystalline dolostone. Interval also contains rare white
			(N9) oolitic chert and rare greenish-gray (5GY 6/1), thinly lami-
			nated shale. A few fragments from this interval exhibit slight iron
			oxide staining. Possible fractures: 192.0 - 192.4 ft and 193.2 -
			193.5 ft BGS.
194.6	200.0	Cuttings composite	Dark yellowish-brown (10YR 4/2) and dark gray (N3); massive
		(159.6 - 200.0 ft BGS):	dolostone (dramatic change in color from overlying formations).
		alpha = 0 cpm, beta/	
		gamma = 40 cpm, pH	Total Depth = 200.0 ft
		= 9.5; organic vapors	
		= 0.7 ppm	SUBSURFACE DATA BASE SUMMARY*
		-	Rock Formation(s): KNOX: Chepultepec
			Aquifer: B
			Fractures, cavities, water breaks: fracture: 162.8 - 164.0 (mw),
			fracture: 171.0 - 172.0 (mw), fracture: 182.6 (mw), fracture: 187.8
			(mw), fracture: 192.0 - 192.4 (mw), fracture: 193.2 - 193.5 (mw)
			*Refer to the Updated Subsurface Data Base for Bear Creek
			Valley, Chestnut Ridge, and parts of Bethel Valley on the U.S.
			Department of Energy Oak Ridge Reservation, Y/TS-881/R3, for
			data base entry explanations.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-832</u>																																																																																																				
WELL LOG			PAGE 1 of 2																																																																																																				
LOCATION: <u>New Hope Pond</u>		DATE: START: <u>5-9-96</u>																																																																																																					
DRILLER: <u>D. Key - Highland Drilling Co.</u>		FINISH: <u>5-21-96</u>																																																																																																					
HELPERS: <u>S. Gilbert/G. Shillings - Highland Drilling Co.</u>		DRILLING METHOD: <u>Hollow-stem Auger</u>																																																																																																					
DRILL: <u>Hitachi EX 200LC Track-hoe with McMillan Diggerhead</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>																																																																																																					
NOTES: <u>PVC screened well monitoring the french drain located beneath the East Fork Poplar Creek concrete diversion, screened interval: 5.9 ft to 11.1 ft BGS.</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;">0.0</td> <td style="text-align: center;">0.2</td> <td>Breathing zone</td> <td>Light brownish-gray (5YR 6/1) to pale yellowish-brown (10YR 6/2),</td> </tr> <tr> <td></td> <td></td> <td>analysis (BZA) at</td> <td>dry, silty clay with medium light gray (N6) undifferentiated gravel.</td> </tr> <tr> <td></td> <td></td> <td>0.1 ft BGS = 0.0 ppm.</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">0.2</td> <td style="text-align: center;">1.7</td> <td>Rad at 0.5 ft BGS:</td> <td>Medium light gray (N6) undifferentiated gravel, as above. Gravel</td> </tr> <tr> <td></td> <td></td> <td>alpha = 0 cpm, beta/</td> <td>ranges from 0.5-in. to 2-in. diameter.</td> </tr> <tr> <td></td> <td></td> <td>gamma = 40-50 cpm.</td> <td></td> </tr> <tr> <td></td> <td></td> <td>BZA at 1.0 ft BGS =</td> <td></td> </tr> <tr> <td></td> <td></td> <td>0.0 ppm.</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">1.7</td> <td style="text-align: center;">11.9</td> <td>Rad at 2.0 ft BGS:</td> <td>Medium light gray (N6) undifferentiated gravel, as above plus olive</td> </tr> <tr> <td></td> <td></td> <td>alpha = 0 cpm, beta/</td> <td>gray (5Y 4/1), moist clay in varying amounts.</td> </tr> <tr> <td></td> <td></td> <td>gamma = 40-50 cpm.</td> <td></td> </tr> <tr> <td></td> <td></td> <td>BZA at 3.6 ft BGS =</td> <td>Gravel is damp at 9.5 ft BGS.</td> </tr> <tr> <td></td> <td></td> <td>0.1 ppm. Rad at 6.0 ft</td> <td></td> </tr> <tr> <td></td> <td></td> <td>BGS: alpha = 0 cpm,</td> <td>Total Depth = 11.9 ft (auger refusal).</td> </tr> <tr> <td></td> <td></td> <td>beta/gamma = 40--</td> <td></td> </tr> <tr> <td></td> <td></td> <td>cpm. BZA at 6.8 ft =</td> <td></td> </tr> <tr> <td></td> <td></td> <td>0.0 ppm. BZA at 8.7 ft</td> <td></td> </tr> <tr> <td></td> <td></td> <td>= 0.0 ppm. Rad at</td> <td></td> </tr> <tr> <td></td> <td></td> <td>9.0 ft BGS: beta/</td> <td></td> </tr> <tr> <td></td> <td></td> <td>gamma = 40-50 cpm.</td> <td></td> </tr> <tr> <td></td> <td></td> <td>BZA at 11.0 ft BGS =</td> <td></td> </tr> </tbody> </table>				DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION	FROM	TO			0.0	0.2	Breathing zone	Light brownish-gray (5YR 6/1) to pale yellowish-brown (10YR 6/2),			analysis (BZA) at	dry, silty clay with medium light gray (N6) undifferentiated gravel.			0.1 ft BGS = 0.0 ppm.						0.2	1.7	Rad at 0.5 ft BGS:	Medium light gray (N6) undifferentiated gravel, as above. Gravel			alpha = 0 cpm, beta/	ranges from 0.5-in. to 2-in. diameter.			gamma = 40-50 cpm.				BZA at 1.0 ft BGS =				0.0 ppm.						1.7	11.9	Rad at 2.0 ft BGS:	Medium light gray (N6) undifferentiated gravel, as above plus olive			alpha = 0 cpm, beta/	gray (5Y 4/1), moist clay in varying amounts.			gamma = 40-50 cpm.				BZA at 3.6 ft BGS =	Gravel is damp at 9.5 ft BGS.			0.1 ppm. Rad at 6.0 ft				BGS: alpha = 0 cpm,	Total Depth = 11.9 ft (auger refusal).			beta/gamma = 40--				cpm. BZA at 6.8 ft =				0.0 ppm. BZA at 8.7 ft				= 0.0 ppm. Rad at				9.0 ft BGS: beta/				gamma = 40-50 cpm.				BZA at 11.0 ft BGS =	
DEPTH (ft)		SAMPLE (NO. & INTERVAL)	SOIL/BEDROCK DESCRIPTION																																																																																																				
FROM	TO																																																																																																						
0.0	0.2	Breathing zone	Light brownish-gray (5YR 6/1) to pale yellowish-brown (10YR 6/2),																																																																																																				
		analysis (BZA) at	dry, silty clay with medium light gray (N6) undifferentiated gravel.																																																																																																				
		0.1 ft BGS = 0.0 ppm.																																																																																																					
0.2	1.7	Rad at 0.5 ft BGS:	Medium light gray (N6) undifferentiated gravel, as above. Gravel																																																																																																				
		alpha = 0 cpm, beta/	ranges from 0.5-in. to 2-in. diameter.																																																																																																				
		gamma = 40-50 cpm.																																																																																																					
		BZA at 1.0 ft BGS =																																																																																																					
		0.0 ppm.																																																																																																					
1.7	11.9	Rad at 2.0 ft BGS:	Medium light gray (N6) undifferentiated gravel, as above plus olive																																																																																																				
		alpha = 0 cpm, beta/	gray (5Y 4/1), moist clay in varying amounts.																																																																																																				
		gamma = 40-50 cpm.																																																																																																					
		BZA at 3.6 ft BGS =	Gravel is damp at 9.5 ft BGS.																																																																																																				
		0.1 ppm. Rad at 6.0 ft																																																																																																					
		BGS: alpha = 0 cpm,	Total Depth = 11.9 ft (auger refusal).																																																																																																				
		beta/gamma = 40--																																																																																																					
		cpm. BZA at 6.8 ft =																																																																																																					
		0.0 ppm. BZA at 8.7 ft																																																																																																					
		= 0.0 ppm. Rad at																																																																																																					
		9.0 ft BGS: beta/																																																																																																					
		gamma = 40-50 cpm.																																																																																																					
		BZA at 11.0 ft BGS =																																																																																																					

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-832

WELL LOG - continued

PAGE 2 of 2

[illegible]

APPENDIX C
WELL CONSTRUCTION DIAGRAMS

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-831

WELL INSTALLATION DIAGRAM

LOGGED BY: Timothy Coffey - SAIC

DRILLING DATES

DRILLING COMPANY: Highland Drilling CompanySTARTED: 7-22-96DRILLERS: J. Young/H. HallHELPERS: G. Shillings/J. Gallaher/J. Monger/R. CollinsFINISHED: 7-30-96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-832

WELL INSTALLATION DIAGRAM

LOGGED BY: Timothy Coffey - SAIC

DRILLING DATES

DRILLING COMPANY: Highland Drilling CompanySTARTED: 5-9-96DRILLER: D. Key HELPERS: S. Gilbert/G. ShillingsFINISHED: 5-9-96

NOT TO SCALE

APPENDIX D
WELL DEVELOPMENT DATA

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-831

MONITORING WELL DEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: Swab

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 8-8-96FINISH: 8-15-96ONE WELL VOLUME: 54.2 GALLONSTOTAL GALLONS PUMPED: 340 TOTAL WELL VOLUMES PUMPED: 6.3INITIAL pH: 11.2 FINAL pH: 7.7INITIAL SPECIFIC CONDUCTANCE: 2990 μ mhos/cm FINAL: 298 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: Slightly TurbidDESCRIPTION OF FINAL TURBIDITY: Slightly TurbidFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: None Discernable

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

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 120.8 ft BGS on 8-8-96

DEVELOPMENT OBSERVATIONS: Well is a moderate producer. Well easily produces 1 well volume daily, and recharges completely in less than 24 hours. Unable to completely clear up the well water (typical of Knox Group monitoring wells).

OBSERVER SIGNATURE: DATE: 8-15-96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-832

MONITORING WELL DEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: Pumping

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 5-13-96FINISH: 5-14-96ONE WELL VOLUME: 4.6 GALLONSTOTAL GALLONS PUMPED: 35 TOTAL WELL VOLUMES PUMPED: 7.6INITIAL pH: 7.5 FINAL pH: 7.3INITIAL SPECIFIC CONDUCTANCE: 385 μ mhos/cm FINAL: 381 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: ClearDESCRIPTION OF FINAL TURBIDITY: ClearFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: None Discernable

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

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 8.0 ft BGS on 5-13-96

DEVELOPMENT OBSERVATIONS: Well is an excellent producer, as evidenced by inability to draw water level down significantly during development.

OBSERVER SIGNATURE: DATE: 5-14-96

MONITORING WELL DEVELOPMENT PROGRESS

LOCATION: S3 Ponds

ONE WELL VOLUME: 3.8 GALLONS

WELL INSTALLATION

WELL INSTALLATION
COMPLETION DATE: 7-11-96

COMMENTS:

1. Well bailed to dryness.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-834

MONITORING WELL DEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: 4-liter bailer

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 8-15-96FINISH: 8-16-96ONE WELL VOLUME: 3.8 GALLONSTOTAL GALLONS PUMPED: 13.5 TOTAL WELL VOLUMES PUMPED: 3.6INITIAL pH: 5.8 FINAL pH: 5.6INITIAL SPECIFIC CONDUCTANCE: 7600 μ mhos/cm FINAL: 12,900 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: TurbidDESCRIPTION OF FINAL TURBIDITY: TurbidFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: None discernable

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

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 10.8 ft BGS on 8-15-96

DEVELOPMENT OBSERVATIONS: Well is a moderate to fair producer. Well always gave more than 1 well volume prior to drying up. Water cleared up fairly well, however, the last (sediment-laden) sample was turbid due to the higher ratio of sediments to water as the well dried up.

OBSERVER SIGNATURE: DATE: 8-16-96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-835

MONITORING WELL DEVELOPMENT PROGRESS

LOCATION: S3 Ponds ONE WELL VOLUME: 6.0 GALLONSWELL INSTALLATION
COMPLETION DATE: 7-11-96

DATE	GALLONS PUMPED	DESCRIPTION OF TURBIDITY	pH	DISSOLVED SOLIDS (μ S)	TOTAL GALLONS PUMPED	WELL VOLUMES PUMPED	COMMENTS
8-13-96	4	Turbid (silty)	6.5	1350	4	0.7	
8-13-96	4	Turbid	6.5	1200	8	1.3	
8-13-96	4	Turbid	6.5	1100	12	2.0	
8-13-96	4	Turbid	6.5	1010	16	2.7	
8-13-96	8	Moderately Turbid	6.6	910	24	4.0	
8-13-96	8	Moderately Turbid	6.5	980	32	5.3	
8-13-96	8	Slightly Turbid	6.6	890	40	6.7	
8-13-96	8	Slightly Turbid	6.6	890	48	8.0	
RESULTS AT END OF DEVELOPMENT		Slightly Turbid	6.6	890	48	8.0	

COMMENTS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-835

MONITORING WELL DEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: 4-liter bailer

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 8-13-96FINISH: 8-13-96ONE WELL VOLUME: 6.0 GALLONSTOTAL GALLONS PUMPED: 48 TOTAL WELL VOLUMES PUMPED: 8.0INITIAL pH: 6.5 FINAL pH: 6.6INITIAL SPECIFIC CONDUCTANCE: 1350 μ mhos/cm FINAL: 890 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: Turbid (silty)DESCRIPTION OF FINAL TURBIDITY: Slightly TurbidFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: None DiscernableWATER DISCHARGED TO: ☐ GROUND SURFACE☐ TANK TRUCK☐ STORM SEWERS☒ STORAGE TANKS☐ DRUMS☐ OTHER _____

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 10.4 ft BGS on 8-13-96DEVELOPMENT OBSERVATIONS: Well is an excellent producer, as judged by inability to dry the well up. The well water cleared significantly during development, though not entirely.OBSERVER SIGNATURE: DATE: 8-13-96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-836

MONITORING WELL DEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: 4-liter bailer

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 8-14-96FINISH: 8-15-96ONE WELL VOLUME: 9.3 GALLONSTOTAL GALLONS PUMPED: 10.8 TOTAL WELL VOLUMES PUMPED: 1.2INITIAL pH: 7.1 FINAL pH: 6.9INITIAL SPECIFIC CONDUCTANCE: 940 μ mhos/cm FINAL: 1530 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: Turbid (silty)DESCRIPTION OF FINAL TURBIDITY: Slightly TurbidFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: Acetone odorWATER DISCHARGED TO: ☐ GROUND SURFACE☐ TANK TRUCK☐ STORM SEWERS☒ STORAGE TANKS☐ DRUMS☐ OTHER _____

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 10.0 ft BGS on 8-14-96DEVELOPMENT OBSERVATIONS: Well is apparently a poor-producer. Well dried up rapidly during development, and appears to recharge extremely slowly.OBSERVER SIGNATURE: DATE: 8-15-96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-837

MONITORING WELL DEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: 4-liter bailer

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 8-16-96FINISH: 8-19-96ONE WELL VOLUME: 12.9 GALLONSTOTAL GALLONS PUMPED: 55 TOTAL WELL VOLUMES PUMPED: 4.3INITIAL pH: 5.7 FINAL pH: 5.7INITIAL SPECIFIC CONDUCTANCE: 8900 μ mhos/cm FINAL: 9700 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: TurbidDESCRIPTION OF FINAL TURBIDITY: Moderately TurbidFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: Unidentifiable, sweet/pungent chemical odor

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

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 8.2 ft BGS on 8-16-96

DEVELOPMENT OBSERVATIONS: Well is a moderate to good producer. Well easily gave up more than 1 well volume during development sessions, and appears to recharge fairly quickly. Overall, the water cleared fairly significantly, but samples obtained prior to drying up were slightly more turbid (from sediment accumulation still at bottom of well).

OBSERVER SIGNATURE: DATE: 8-19-96

APPENDIX E
WASTE MANAGEMENT PLAN FOR DRILLING ACTIVITIES

E.1. INTRODUCTION

The ultimate objective of monitoring groundwater is gathering data to assess potential impacts to human health and the environment. It is also the objective of the Y-12 Groundwater Protection Program (GWPP) to handle drill cuttings from the installation of groundwater monitoring wells or borings in a manner that protects the environment. The Y-12 philosophy has been and continues to be consistent with the U.S. Environmental Protection Agency (EPA) and Lockheed Martin Energy Systems, Inc., (Energy Systems) guidance for managing well cuttings. Site-specific professional judgment is used to determine the potential for contamination prior to installation of each well. Factors considered in evaluating potential for site contamination include:

- previously collected sampling and analysis data,
- groundwater flow patterns,
- geologic and hydrogeologic setting, and
- purpose of well (contaminant plume assessment, background monitoring defining lines of compliance, etc.).

Based on the evaluation, one of two options is selected:

- stabilize material on site or
- collect for treatment or storage.

E.2. DRILL CUTTINGS DISPOSAL

There are two levels of drill cuttings management at the Y-12 Plant: (1) drill-site disposal and (2) containerization for waste disposal. Disposal of drill cuttings at the drill site following best management practices (BMP) is permitted if the cuttings do not exceed the field-screening criteria discussed below. If the field-screening criteria are exceeded, the cuttings must be containerized at the drill site, labeled, and handled according to Y-12 Plant waste disposal procedures. Sampling and field screening of the drill cuttings will be conducted in accordance with the procedures specified in the Energy Systems Environmental Surveillance Procedures Quality Control Program document (ESH/Sub/87/21706/1).

E.2.1 FIELD SCREENING

Field screening of drill cuttings will consist of measuring three parameters: radioactivity, volatile organics, and pH. The Energy Systems procedures specified in Table E.1 will be followed with some modification as described below.

Radioactivity will be measured using two separate meters: a survey meter with a pancake Geiger tube for determining beta and gamma activity and a scintillation counter with a zinc sulfide window for determining alpha activity. The meters will be passed over the surface area of the cuttings and the highest readings will be recorded.

Screening for organic vapors will be conducted on a composite sample from the cuttings generated at a single well. The sample will be collected with a hand trowel or similar tool to select cuttings from several depths. Enough cuttings will be placed in a clean 1-quart glass or metal container to half fill it. Aluminum foil will be placed over the mouth of the container to make an airtight seal. The sample will then be incubated for 1 h at 70°F or the ambient temperature, whichever is higher. Organic vapors in the headspace of the sample container will be measured by puncturing the aluminum foil and inserting the probe of an organic vapor analyzer. This instrument

will have a photoionization detector with a 10.2 eV lamp or a flame ionization detector and will be calibrated to isobutylene. The highest reading of the headspace vapors will be recorded.

Table E.1. Y-12 Plant field-screening criteria for drill cuttings and development water

Field analysis	Old Energy Systems Procedure No.	New Energy Systems Procedure No.	Limit
pH	ESP-307-2	ESP-307-1	4.0-10.5
Specific conductivity ^a	ESP-307-8	ESP-307-1	< 1000 μ mhos/cm
Organic	ESP-307-6	Same	< 5 ppm
Radioactivity	ESP-307-7	Same	
beta/gamma			< 600 dpm/100 cm ² (< 100 cpm)
alpha			< 1000 dpm/100 cm ² (< 500 cpm)

^a Not applicable to drill cuttings.

The pH of the cuttings will be estimated by adding one quart of deionized water to the composite sample used to determine the presence of organic vapors. The sample will be agitated until well mixed. The pH of the mixture will be determined by using an approved pH measuring instrument. This pH will be recorded.

E.2.2 CONTAINERIZATION FOR WASTE DISPOSAL

If the cuttings from a borehole exceed any one of the field screening limits, they will be containerized at the drill site and appropriately labeled with the contents (drill cuttings), borehole number, and date. The cuttings will then be handled according to Y-12 Plant waste management procedures.

An exception to the above may be made if the cuttings exceed the organic vapor limits. Weather permitting, those cuttings may be passively treated by aeration at the drill site to reduce the organic vapor content. Such treatment shall not exceed 5 working days. If reanalysis following aeration indicates the cuttings continue to exceed the organic vapor limits, they must be containerized and handled as above. In the case well plugging and abandonment, grout cuttings generated during drilling activities may result in elevated pH levels falsely indicative of contamination. If grout cuttings are observed and no other indicator exceeds containerization limits, then cuttings may be disposed at the drill site.

E.2.3 BEST MANAGEMENT PRACTICES FOR DRILL SITE DISPOSAL

Drill cuttings that do not exceed the field-screening criteria will be disposed of at the drill site, if practicable. BMP dictate that the cuttings be disposed in such a way as to not be unsightly or cause erosion/sedimentation impacts on nearby surface water. The cuttings shall therefore be used as part of the restoration of the drill site, to fill in low areas and tire tracks, or spread to conform to the natural topography. They will subsequently be seeded and mulched. If bedrock cuttings contain a liquid fraction, care shall be taken to ensure this liquid infiltrates or evaporates at the drill site and in no case runs off into surface waters, ephemeral drainages, or storm sewers. Drill cuttings that do not exceed the field-screening criteria but cannot be disposed of at the drill site due to its location (parking lot, yard, etc.) will be transported to a designated location and disposed of as clean fill, following BMP.

E.2.4 DOCUMENTATION

The results of all field-screening analyses and a description of the disposition of the drill cuttings from each borehole will be documented on a Drill Cuttings Field Screening/Disposal Sheet, (Figures E.1 and E.2). These forms will be completed for each borehole by the on-site geologist who conducts the screening. A copy of each form will be provided to the Project Manager of the GWPP within 2 days of its completion.

E.3. DEVELOPMENT WATER DISPOSAL

There are two levels of development water management at the Y-12 Plant: (1) drill-site disposal and (2) containerization for waste disposal. Disposal of development water at the drill site following BMP is permitted if the water does not exceed the field-screening criteria discussed below. If the field-screening criteria are exceeded, the water must be containerized at the drill site, labeled, and handled according to Y-12 Plant waste disposal procedures. Sampling and field screening of development water will be conducted in accordance with the procedures specified in the Energy Systems Environmental Surveillance Procedures Quality Control Program document (ESH/Sub/87/21706/1).

E.3.1 FIELD SCREENING

Initial development water will be containerized until it has been screened. This is accomplished by pumping the water into drums or other suitable container(s). Screening will be conducted on grab samples taken approximately every hour after the first one-half hour of development. (An alternative to the hourly grab samples is to totally contain all the development water produced at a well, then analyze a composite sample.) If initial grab samples do not exceed the limits specified in Table E.1, development water may be pumped directly on the ground (following BMP) unless or until a subsequent grab sample exceeds the limits.

Field screening of development water will consist of measuring four parameters: radioactivity, volatile organics, specific conductivity, and pH. The Energy Systems procedures specified in Table E.1 will be followed with some modification, as described below.

Radioactivity will be measured using two separate meters: a survey meter with a pancake Geiger tube for determining beta and gamma activity and a scintillation counter with a zinc sulfide window for determining alpha activity. The meters will be passed over the surface area of the sample and the highest readings will be recorded.

Y-12 PLANT GWPP WELL CUTTINGS FIELD SCREENING/DISPOSAL SHEET

WELL/BOREHOLE NO. _____ SITE: _____

APPROX. VOLUME OF CUTTINGS: _____

CALIBRATION OF INSTRUMENTS: Check those calibrated to manufacturer's specifications.

pH meter	_____	(model)	_____
Organic vapor meter	_____	(model)	_____
Beta/gamma meter	_____	(model)	_____
Alpha meter	_____	(model)	_____

FIELD SCREENING RESULTS (Highest Observed Values):

pH	_____	Date/Time	_____	(4.0-10.5)
Organic vapors	_____	Date/Time	_____	(<5 ppm)
Beta/Gamma	_____	Date/Time	_____	(<100 cpm)
Alpha	_____	Date/Time	_____	(<500 cpm)

N/A - Not analyzed

Weather: _____

Temp.: _____

DISPOSITION: Drill-site Disposal _____

Containerization _____
(Labeled?) y / n

Describe:

On-site Geologist (print): _____

Signature: _____

Date: _____

Figure E.1.

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. _____ SITE: _____

APPROX. VOLUME OF DEVELOPMENT WATER: _____

CALIBRATION OF INSTRUMENTS: Check those calibrated to manufacturer's specifications.

pH meter	_____	(model)	_____
Sp. Cond. meter	_____	(model)	_____
Organic vapor meter	_____	(model)	_____
Beta/gamma meter	_____	(model)	_____
Alpha meter	_____	(model)	_____

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
		(4.0-10.5)	(<1000 umhos/cm)	(<5 ppm)	(<100 cpm)	(<500 cpm)

Weather: _____

Temp.: _____

DISPOSITION: Drill-site Disposal _____

Containerization
(Labeled?) y/n _____

On-site Geologist (print): _____

Signature: _____

Date: _____

Screening for organic vapors will be conducted by placing enough development water in a clean 1-quart glass or metal container to half fill it. Aluminum foil will be placed over the mouth of the container to make an airtight seal. The sample will then be incubated for 1 h at 70°F or the ambient temperature, whichever is higher. Organic vapors in the headspace of the sample container will be measured by puncturing the aluminum foil and inserting the probe of an organic vapor analyzer. This instrument will have a photoionization detector with a 10.2 eV lamp or a flame ionization detector and will be calibrated to isobutylene. The highest reading of the headspace vapors will be recorded.

E.3.2 CONTAINERIZATION FOR WASTE DISPOSAL

If the development water from a well exceeds any one of the field screening limits, it will be containerized at the drill site and appropriately labeled with the contents (development water), well number, and date. The water will then be handled according to Y-12 Plant waste management procedures.

An exception to this may be made if the development water only exceeds the organic vapor limits. Weather permitting, the water may be passively treated at the drill site by leaving the containers open for aeration to reduce the organic vapor content. Such treatment shall not exceed 5 working days and shall not be conducted over weekends without supervision. If reanalysis following aeration indicates the development water continues to exceed the organic vapor limits, it must be containerized and handled as above.

E.3.3 BMP FOR DRILL-SITE DISPOSAL

Development water that does not exceed the field-screening criteria will be disposed of at the drill site if practicable. BMP dictates that the water be disposed in such a way as to not cause erosion or enter nearby surface water or storm sewers. Precautions shall therefore be taken to ensure that development water pumped onto the ground or released from containers at the drill site either infiltrates or evaporates at the site and in no case runs off into surface waters, ephemeral drainages, or storm sewers. Development water that does not exceed the field screening but cannot be disposed of at the drill site due to site limitations (i.e., within a drainage, near a storm sewer, etc.) will be transported to a designated location and disposed as clean water following BMP.

E.3.4 DOCUMENTATION

The results of all field-screening analyses and a description of the disposition of the development water from each well will be documented on a Development Water Field Screening/Disposal Sheet, an example of which is attached. These forms will be completed for each well by the on-site geologist who conducts the screening. A copy of each form will be provided to the Project Manager of the GWPP within 2 days of its completion.

APPENDIX F
WASTE MANAGEMENT SCREENING DATA

Y-12 PLANT GWPP WELL CUTTINGS FIELD SCREENING/DISPOSAL SHEET

WELL/BOREHOLE NO. GW-831 SITE: Ash Disposal Basin

APPROX. VOLUME OF CUTTINGS: 210 cubic ft.

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS (background/maximum observed values):

pH	<u>9.5</u>	Date/Time	<u>7-29-96/1703</u> <u>7-30-96/1552</u>	(4.0 - 10.5)
Organic vapors	<u>0.0 ppm/0.7 ppm</u>	Date/Time	<u>7-29-96/1701</u> <u>7-30-96/1550</u>	(<5.0 ppm above background)
Beta/Gamma	<u>40 cpm/40 cpm</u>	Date/Time	<u>All Readings</u>	(<100 cpm above background)
Alpha	<u>0 cpm/0 cpm</u>	Date/Time	<u>All Readings</u>	(<500 cpm above background)

Weather: Refer to field logbooks Temp.: Refer to field logbooks

Disposition: Drill-site Disposal X Containerization
(Labeled?) y/n

Describe: Cuttings discharged to onsite cuttings pit.

Onsite Geologist (print): Timothy Coffey - SAIC

Signature:

Date: 7-30-96

Y-12 PLANT GWPP WELL CUTTINGS FIELD SCREENING/DISPOSAL SHEET

WELL/BOREHOLE NO. GW-832 SITE: New Hope PondAPPROX. VOLUME OF CUTTINGS: 9.4 cubic ft.

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS (background/maximum observed values):

pH	<u>9.5</u>	Date/Time	<u>5-9-96/1352</u>	(4.0 - 10.5)
Organic vapors	<u>0.0 ppm/3.8 ppm</u>	Date/Time	<u>5-9-96/1350</u>	(<5.0 ppm above background)
Beta/Gamma	<u>40 cpm/40 cpm</u>	Date/Time	<u>5-9-96/1248</u>	(<100 cpm above background)
Alpha	<u>0 cpm/0 cpm</u>	Date/Time	<u>5-9-96/1247</u>	(<500 cpm above background)

Weather: Clear to partly cloudy Temp.: Upper-50's to mid-80's°FDisposition: Drill-site Disposal X Containerization
(Labeled?) y/n

Describe: "Clean" cuttings used to back-fill some low spots near the well location.

Onsite Geologist (print): Timothy Coffey - SAICSignature: Date: 5-9-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-831 SITE: Ash Disposal BasinAPPROX. VOLUME OF DEVELOPMENT WATER: 340 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>8-8-96</u>	<u>1324</u>	<u>11.2</u>	<u>2990 μmhos/cm</u>	<u>0.1 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>8-8-96</u>	<u>1400</u>	<u>10.2</u>	<u>899 μmhos/cm</u>	<u>0.7 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>8-8-96</u>	<u>1433</u>	<u>9.1</u>	<u>455 μmhos/cm</u>	<u>0.2 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>8-9-96</u>	<u>0921</u>	<u>8.4</u>	<u>350 μmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-12-96</u>	<u>1402</u>	<u>8.2</u>	<u>318 μmhos/cm</u>	<u>0.3 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>8-13-96</u>	<u>1316</u>	<u>8.0</u>	<u>300 μmhos/cm</u>	<u>0.0 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>8-14-96</u>	<u>1010</u>	<u>7.6</u>	<u>300 μmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
		<u>(4.0-10.5)</u>	<u>(<1000 μmhos/cm)</u>	<u>(<5 ppm)</u>	<u>(<100 cpm)</u>	<u>(<500 cpm)</u>

Weather: Refer to field logbookTemp.: Refer to field logbookDISPOSITION: Drill-site Disposal XContainerization _____
(Labeled?) y/n

Describe: Development water discharged to onsite cuttings pit.

On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 8-15-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-831 SITE: Ash Disposal BasinAPPROX. VOLUME OF DEVELOPMENT WATER: 340 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>8-15-96</u>	<u>1158</u>	<u>7.7</u>	<u>298 µmhos/cm</u>	<u>0.0 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
		(4.0-10.5)	(<1000 µmhos/cm)	(<5 ppm)	(<100 cpm)	(<500 cpm)

Weather: Refer to field logbookTemp.: Refer to field logbookDISPOSITION: Drill-site Disposal XContainerization _____
(Labeled?) y/n

Describe: Development water discharged to onsite cuttings pit.

On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 8-15-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-832 SITE: New Hope PondAPPROX. VOLUME OF DEVELOPMENT WATER: 35 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>5-14-96</u>	<u>0825</u>	<u>7.5</u>	<u>385 μmhos/cm</u>	<u>0.0 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>5-14-96</u>	<u>0836</u>	<u>7.4</u>	<u>379 μmhos/cm</u>	<u>0.1 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>5-14-96</u>	<u>0847</u>	<u>7.4</u>	<u>380 μmhos/cm</u>	<u>0.1 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>5-14-96</u>	<u>0856</u>	<u>7.3</u>	<u>381 μmhos/cm</u>	<u>0.1 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
		(4.0-10.5)	(<1000 μ mhos/cm)	(<5 ppm)	(<100 cpm)	(<500 cpm)

Weather: Clear to partly cloudy Temp.: Low-40's to upper-60's°FDISPOSITION: Drill-site Disposal Containerization X
(Labeled?) (v)nDescribe: Development water pumped into a stainless-steel tanker.On-site Geologist (print) Timothy Coffey - SAICSignature: Date: 5-14-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-834 SITE: S3 PondsAPPROX. VOLUME OF DEVELOPMENT WATER: 13.5 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century/Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors*	Beta/Gamma	Alpha
<u>8-15-96</u>	<u>0953</u>	<u>5.8</u>	<u>7600 µmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-15-96</u>	<u>1002</u>	<u>5.6</u>	<u>12,300 µmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-15-96</u>	<u>1033</u>	<u>5.5</u>	<u>13,000 µmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-16-96</u>	<u>0724</u>	<u>5.6</u>	<u>13,300 µmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-16-96</u>	<u>0736</u>	<u>5.6</u>	<u>12,900 µmhos/cm</u>	<u>NA</u>	<u>50 cpm</u>	<u>0 cpm</u>
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

(4.0-10.5) (<1000 µmhos/cm) (<5 ppm) (<100 cpm) (<500 cpm)

*No headspace analysis, all development water contained.

8-15-96: Clear.

Weather: 8-16-96: Early a.m. fog, then clear.

8-15-96: Upper-60s to low-70s°F

Temp.: 8-16-96: Mid- to upper-60s°FDISPOSITION: Drill-site DisposalContainerization X(Labeled?) Y/nDescribe: Development water placed in 330-gal. P-T Tank.On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 8-16-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-835 SITE: S3 PondsAPPROX. VOLUME OF DEVELOPMENT WATER: 48 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century/Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors*	Beta/Gamma	Alpha
<u>8-13-96</u>	<u>0908</u>	<u>6.5</u>	<u>1350 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-13-96</u>	<u>0920</u>	<u>6.5</u>	<u>1200 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-13-96</u>	<u>0930</u>	<u>6.5</u>	<u>1100 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-13-96</u>	<u>0938</u>	<u>6.5</u>	<u>1010 μmhos/cm</u>	<u>NA</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>8-13-96</u>	<u>0948</u>	<u>6.6</u>	<u>910 μmhos/cm</u>	<u>NA</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>8-13-96</u>	<u>0959</u>	<u>6.5</u>	<u>980 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-13-96</u>	<u>1011</u>	<u>6.6</u>	<u>890 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
		<u>(4.0-10.5)</u>	<u>(<1000 μmhos/cm)</u>	<u>(<5 ppm)</u>	<u>(<100 cpm)</u>	<u>(<500 cpm)</u>

*No headspace analysis, all development water contained.

Weather: Cloudy, breezyTemp.: Low- to upper-70s°FDISPOSITION: Drill-site DisposalContainerization X(Labeled?) Y/nDescribe: Development water placed in 330-gal. P-T Tank.On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 8-13-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-835 SITE: S3 PondsAPPROX. VOLUME OF DEVELOPMENT WATER: 48 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century/Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors*	Beta/Gamma	Alpha
<u>8-13-96</u>	<u>1023</u>	<u>6.6</u>	<u>890 μmhos/cm</u>	<u>NA</u>	<u>30 cpm</u>	<u>0 cpm</u>
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

(4.0-10.5) (<1000 μ mhos/cm) (<5 ppm) (<100 cpm) (<500 cpm)

*No headspace analysis, all development water contained.

Weather: Cloudy, breezyTemp.: Low- to upper-70s°FDISPOSITION: Drill-site DisposalContainerization X(Labeled?) ☒ nDescribe: Development water placed in 330-gal. P-T Tank.On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 8-13-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-836 SITE: S3 PondsAPPROX. VOLUME OF DEVELOPMENT WATER: 10.8 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century/Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors*	Beta/Gamma	Alpha
<u>8-14-96</u>	<u>0738</u>	<u>7.1</u>	<u>940 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-14-96</u>	<u>0747</u>	<u>7.3</u>	<u>760 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-15-96</u>	<u>0853</u>	<u>6.9</u>	<u>1530 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

*No headspace analysis, all development water contained.

8-14-96: Early a.m. fog, then clear.

Weather: 8-15-96: Early a.m. fog, then clear.

8-14-96: Low- to upper-60s°F

Temp.: 8-15-96: Low- to upper-60s°FDISPOSITION: Drill-site Disposal Containerization X(Labeled?) Y/n

Describe: Development water placed in 330-gal. P-T Tank.

On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 8-13-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-837 SITE: S3 PondsAPPROX. VOLUME OF DEVELOPMENT WATER: 55 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century/Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors*	Beta/Gamma	Alpha
<u>8-16-96</u>	<u>0900</u>	<u>5.7</u>	<u>8900 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-16-96</u>	<u>0911</u>	<u>5.6</u>	<u>8900 μmhos/cm</u>	<u>NA</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>8-16-96</u>	<u>0919</u>	<u>5.5</u>	<u>9100 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-16-96</u>	<u>0930</u>	<u>5.5</u>	<u>9300 μmhos/cm</u>	<u>NA</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>8-16-96</u>	<u>0939</u>	<u>5.5</u>	<u>9800 μmhos/cm</u>	<u>NA</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>8-16-96</u>	<u>0957</u>	<u>5.5</u>	<u>9800 μmhos/cm</u>	<u>NA</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>8-19-96</u>	<u>0734</u>	<u>5.6</u>	<u>9500 μmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>

*No headspace analysis, all development water contained.

8-16-96: Fog early, then clearing.

Weather: 8-19-96: Fog early, then clearing.

8-16-96: Mid-60s to mid-70s°F

Temp.: 8-19-96: Mid-60s to upper-70s°F

DISPOSITION: Drill-site Disposal

Containerization X(Labeled?) Y/n

Describe: Development water placed in 330-gal. P-T Tank.

On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 8-19-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-837 SITE: S3 PondsAPPROX. VOLUME OF DEVELOPMENT WATER: 55 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century/Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors*	Beta/Gamma	Alpha
<u>8-19-96</u>	<u>0744</u>	<u>5.6</u>	<u>9700 µmhos/cm</u>	<u>NA</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>8-19-96</u>	<u>0753</u>	<u>5.6</u>	<u>9800 µmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-19-96</u>	<u>0838</u>	<u>5.6</u>	<u>9700 µmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>8-19-96</u>	<u>0902</u>	<u>5.7</u>	<u>9700 µmhos/cm</u>	<u>NA</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
		(4.0-10.5)	(<1000 µmhos/cm)	(<5 ppm)	(<100 cpm)	(<500 cpm)

*No headspace analysis, all development water contained.

Weather: 8-16-96: Fog early, then clearing.Weather: 8-19-96: Fog early, then clearing.Temp.: 8-16-96: Mid-60s to mid-70s°FTemp.: 8-19-96: Mid-60s to upper-70s°FDISPOSITION: Drill-site Disposal Containerization X(Labeled?) Y/n

Describe: Development water placed in 330-gal. P-T Tank.

On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 8-19-96

APPENDIX G
EQUIPMENT DECONTAMINATION SUMMARIES

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-831</u>	
EQUIPMENT DECONTAMINATION INSPECTION SUMMARY		INSTALLATION ☒ P&A ☐	
LOCATION: <u>Ash Disposal Basin</u>		DATE: START: <u>7-22-96</u>	
DECONTAMINATION CREW: <u>H. Hall/J. Gallaher/</u> <u>J. Monger/G. Shillings</u>		FINISH: <u>8-15-96</u>	

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG <u>Intersoll-Rand XL-750</u> (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	7-18-96	7-22-96	Pass	TJC
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	7-18-96	7-22-96	Pass	TJC
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	7-19-96	7-22-96	Pass	TJC
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	7-24-96* 7-31-96	7-25-96* 7-31-96	Pass	TJC
WORKOVER RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Hoses, Etc.)	8-8-96	8-8-96	Pass	TJC
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	8-1-96** 8-8-96	8-1-96** 8-8-96	Pass	TJC
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				
Conductor Casings: 11-in. ID, 11 7/8-in. OD by 4.0 ft and 15 1/4-in. ID, 16-in. OD by 3.5 ft	7-19-96	7-22-96	Pass	TJC
Additional drill rods	7-23-96 7-29-96	7-23-96 7-29-96	Pass	TJC

COMMENTS:
* Surface casing
** 4-liter bailer used for bail-down test

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-832</u>	
EQUIPMENT DECONTAMINATION INSPECTION SUMMARY		INSTALLATION ☒ P&A ☐	
LOCATION: <u>New Hope Pond</u>		DATE: START: <u>5-9-96</u>	
DECONTAMINATION CREW: <u>G. Shillings/J. Gallaher/ J. Monger</u>		FINISH: <u>5-21-96</u>	

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG <u>Hitachi EX 200LC Track-hoe with McMillan Diggerhead</u> (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	NA*	—	—	—
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	5-8-96	5-9-96	Pass	TJC
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	5-8-96	5-9-96	Pass	TJC
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	NA**	—	—	—
WORKOVER RIG _____ (Mast, Chassis, Cables, Hoses, Etc.)	NA	—	—	—
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	See Below	See Below	See Below	See Below
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				
Cuttings pan	5-3-96	5-9-96	Pass	TJC
Center bit and rods	5-8-96	5-9-96	Pass	TJC
Suction hose from centrifugal pump	5-13-96	5-13-96	Pass	TJC
Grundfos MP1, 1/2 HP submersible pump	5-10-96	5-14-96	Pass	TJC
Suction hose and check valve for air-lift diaphragm pump	NA***	—	—	—
COMMENTS:				
* Hitachi track-hoe and auger motor decontaminated and "green-tagged" prior to leaving X-10 site on unknown date.				
** Well construction materials arrived from manufacturer packaged in plastic: no decontamination is necessary.				
***Suction hose and check valve are new from manufacturer, no decontamination is necessary.				

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-834</u>	
EQUIPMENT DECONTAMINATION INSPECTION SUMMARY		INSTALLATION ☐ P&A ☐ DEVELOPMENT ☒	
LOCATION: <u>S3 Ponds</u>		DATE: START: <u>8-15-96</u>	
DECONTAMINATION CREW: <u>G. Shillings</u>		FINISH: <u>8-16-96</u>	

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG _____ (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	NA	—	—	—
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	NA	—	—	—
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	NA	—	—	—
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	NA	—	—	—
WORKOVER RIG _____ (Mast, Chassis, Cables, Hoses, Etc.)	NA	—	—	—
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	8-15-96	8-15-96	Pass	TJC
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				

COMMENTS:

EQUIPMENT DECONTAMINATION INSPECTION SUMMARY

P&A ☐

DEVELOPMENT ☒

DATE: START: 8-13-96

FINISH: 8-13-96

COMMENTS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-836</u>	
EQUIPMENT DECONTAMINATION INSPECTION SUMMARY		INSTALLATION ☐ P&A ☐ DEVELOPMENT ☒	
LOCATION: <u>S3 Ponds</u>		DATE: START: <u>8-14-96</u>	
DECONTAMINATION CREW: <u>G. Shillings</u>		FINISH: <u>8-15-96</u>	

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG _____ (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	NA	—	—	—
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	NA	—	—	—
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	NA	—	—	—
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	NA	—	—	—
WORKOVER RIG _____ (Mast, Chassis, Cables, Hoses, Etc.)	NA	—	—	—
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	8-13-96	8-13-96	Pass	TJC
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				

COMMENTS:

EQUIPMENT DECONTAMINATION INSPECTION SUMMARY

INSTALLATION ☐
P&A ☐
DEVELOPMENT ☒

LOCATION: S3 Ponds

DATE: START: 8-16-96

DECONTAMINATION CREW: J. Gallaher

FINISH: 8-19-96

COMMENTS:

APPENDIX H
WELL REHABILITATION/RE-DEVELOPMENT REPORTS

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>55-6A</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 2
LOCATION: <u>Y-12 Plant Area</u>		DATE: START: <u>1-22-96</u>	
BAILER: <u>G. Shillings - Highland Drilling Co.</u>		FINISH: <u>1-22-96</u>	
HELPER: <u>NA</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>NA</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
1-22-96	0906	0917	Arrive at 55-6A site. Uncap well, organic vapors in casing headspace = 0.0 ppm. Measure water level at 5.8 ft below ground surface (BGS). Tag bottom of well (solid) at 12.8 ft BGS. Note: The subsurface data base (Y/TS-881/R3) reports the total depth of well 55-6A to be 12.9 ft. Calculate a well volume of 4.6 gallons of water.
	0917	0929	Begin bailing the well. Take a sample of the first water: water sample is turbid, rusty-brown water. Screen the initial water sample. Readings: pH = 7.9, conductance = 339 μ mhos/cm, temperature = 11.8°C. Continue bailing the well. Bail 5 gallons of water out of the well: water sample is turbid. Development water is being placed into a 55-gal. drum.
	0929	0936	Screen water sample. Readings: pH = 7.0, conductance = 312 μ mhos/cm, temperature = 11.8°C.
	0936	0944	Continue bailing the well. Bail another 5 gallons of water out of the well: water sample is moderately turbid.
	0944	0950	Screen water sample. Readings: pH = 7.0, conductance = 319 μ mhos/cm, temperature = 11.9°C.
	0950	1000	Wait on well to recharge.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>55-6A</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT continued			PAGE 2 of 2
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
1-22-96	1000	1004	Continue bailing well. Bail 5 more gallons of water out of the well:
(cont.)			water sample is moderately turbid.
	1004	1009	Screen water sample. Readings: pH = 6.5, conductance =
			314 μ mhos/cm, temperature = 11.8°C.
	1009	1051	Wait on well to recharge.
	1051	1059	Continue bailing well. Bail 5 gallons of water out of the well: water
			sample is slightly turbid.
	1059	1105	Screen water sample. Readings: pH = 6.4, conductance =
			316 μ mhos/cm, temperature = 12.3°C.
	1105	1116	Continue bailing well. Bail another 5 gallons of water out of the
			well: water sample is turbid (any sediment in the water appears to
			be settling, the first few bailers of water after waiting on recharge
			are fairly clear while the later bailers contain turbid water).
	1116	1120	Screen water sample. Readings: pH = 6.4, conductance =
			314 μ mhos/cm, temperature = 12.7°C.
	1120	1141	Continue to bail well. Bail another 5 gallons of water out of the
			well: water sample is slightly turbid. No noticeable improvement
			in turbidity is observed since previous bailing.
	1141	1147	Screen water sample. Readings: pH = 6.3, conductance =
			309 μ mhos/cm, temperature = 13.0°C.
	1147	1152	Seal the drum, and label it. Secure wellhead. Depart site.
			Well redevelopment for 55-6A is complete.

MONITORING WELL REDEVELOPMENT PROGRESS

LOCATION: Y-12 Plant Area

WELL INSTALLATION

NA

ONE WELL VOLUME: 4.6 GALLONS

COMMENTS:

1. Initial water sample.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. 55-6A

MONITORING WELL REDEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: Bailing

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 1-22-96FINISH: 1-22-96ONE WELL VOLUME: 4.6 GALLONSTOTAL GALLONS PUMPED: 30 TOTAL WELL VOLUMES PUMPED: 6.5INITIAL pH: 7.9 FINAL pH: 6.3INITIAL SPECIFIC CONDUCTANCE: 339 μ mhos/cm FINAL: 309 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: TurbidDESCRIPTION OF FINAL TURBIDITY: Slightly TurbidFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: None Discernable

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

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 5.8 ft BGS on 1-22-96

DEVELOPMENT OBSERVATIONS: No measureable amount of sediment removed from well (solid tag prior to development) during redevelopment even though the development water contained a small amount of suspended sediment. Well was bailed to dryness on several occasions, but recovered rapidly.

OBSERVER SIGNATURE: DATE: 1-22-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. 55-6A SITE: Y-12 Plant AreaAPPROX. VOLUME OF DEVELOPMENT WATER: 30 Gallons

CALIBRATION OF INSTRUMENTS: Check those calibrated to manufacturer's specifications.

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>1-22-96</u>	<u>0920</u>	<u>7.9</u>	<u>339 μmhos/cm</u>	<u>0.2 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>1-22-96</u>	<u>0929</u>	<u>7.0</u>	<u>312 μmhos/cm</u>	<u>0.0 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>1-22-96</u>	<u>0944</u>	<u>7.0</u>	<u>319 μmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>1-22-96</u>	<u>1004</u>	<u>6.5</u>	<u>314 μmhos/cm</u>	<u>0.0 ppm</u>	<u>60 cpm</u>	<u>0 cpm</u>
<u>1-22-96</u>	<u>1059</u>	<u>6.4</u>	<u>316 μmhos/cm</u>	<u>0.0 ppm</u>	<u>60 cpm</u>	<u>0 cpm</u>
<u>1-22-96</u>	<u>1116</u>	<u>6.4</u>	<u>314 μmhos/cm</u>	<u>0.1 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>1-22-96</u>	<u>1141</u>	<u>6.3</u>	<u>309 μmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
		<u>(4.0-10.5)</u>	<u>(<1000 μmhos/cm)</u>	<u>(<5 ppm)</u>	<u>(<100 cpm)</u>	<u>(<500 cpm)</u>

Weather: Mostly clear (high, thin clouds)Temp.: Low-20's to mid-40's FDISPOSITION: Drill-site DisposalContainerization X
(Labeled?) Y/nDescribe: Development water placed in a USDOT-approved 55-gal. bung-top drum pending disposal.Onsite Geologist (print): Timothy Coffey - SAICSignature: Date: 1/22/96

EQUIPMENT DECONTAMINATION INSPECTION SUMMARY

P&A ☐REDEVELOPMENT ☒DATE: START: 1-22-96

FINISH: 1-22-96

COMMENTS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-142</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 5
LOCATION: <u>Kerr Hollow Quarry</u>		DATE: START: <u>5-16-96</u>	
OPERATOR: <u>G. Shillings - Highland Drilling Co.</u>		FINISH: <u>5-23-96</u>	
HELPERS: <u>J. Gallaher/J. Monger - Highland Drilling Co.</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
RIG: <u>Smeal Swab Rig</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-16-96	0825	0909	Arrive at GW-142 site. Uncap well: organic vapors in the casing
			headspace = 0.0 ppm. Measure water level at 131.6 ft below
			ground surface (BGS). Tag bottom (solid) at 297.2 ft BGS. Note:
			The Subsurface Data Base (Y/TS-881/R3) reports the total depth
			of well GW-142 to be 295.0 ft. While measuring the depth, the
			weighted tape encounters a ledge at 251.5 ft BGS, which is
			probably the top of the open interval (open interval reported to
			begin at 248.5 ft BGS). Calculate one well volume of 258.9 gallons
			of water.
	0909	0928	Crew arrives with the workover rig. Position the rig over the well.
			Set up site. Raise the mast.
	0928	0945	Repair a small leak in the workover rig fuel tank. Leaking fuel
			collected on plastic sheeting spread beneath the rig, and sopped
			up with absorbant pads.
	0945	1045	Run 2 3/8-in. outside diameter (OD), 2-in. inside diameter (ID),
			steel swab tubing with check valve into the well to 295.0 ft BGS.
	1045	1105	Commence swabbing. Swab 55 gallons of water out of the well:
			water sample is slightly turbid.
	1105	1110	Screen water sample. Readings: pH = 7.7, conductance = 354
			µmhos/cm, temperature = 16.9°C.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-142</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT - continued			PAGE 2 of 5
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-16-96	1110	1216	Wait for 1-hour headspace sample incubation to ensure ground
(cont.)			surface disposal of development water. Break for lunch.
			Headspace analysis of initial water sample reads 0.4 ppm:
			discharge development water to the ground surface at the site.
	1216	1223	Add more swab tubing and lower the string to 296.8 ft BGS.
	1223	1326	Continue swabbing. Swab another 110 gallons of water out of the
			well: water sample is slightly turbid.
	1326	1330	Screen water sample. Readings: pH = 7.8, conductance = 367
			µmhos/cm, temperature = 19.2°C.
	1330	1400	Continue swabbing. Swab another 40 gallons of water out of the
			well (well swabbed to dryness): water sample is turbid.
	1400	1405	Screen water sample. Readings: pH = 8.0, conductance = 366
			µmhos/cm, temperature = 20.0°C.
	1405	1437	Lower mast on swab rig as a safety precaution. Secure site, and
			depart.
5-17-96	0740	0746	Arrive at GW-142 site. Raise the mast on swab rig.
	0746	0827	Commence swabbing. Swab 55 gallons of water out of the well:
			water sample is moderately turbid, contains a rust flocculent
			precipitate, and has a rusty, metallic odor. Well appears to be
			drying up.
	0827	0832	Screen water sample. Readings: pH = 7.6, conductance = 353
			µmhos/cm, temperature = 16.9°C.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-142</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT - continued			PAGE 3 of 5
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-17-96	0832	0930	Wait for well to recharge.
(cont.)			
	0930	1029	Continue swabbing. Well still appears to be nearly dry. Recover a nylon wire tie with the swab: well begins to produce more water with each swab. The tie may have been sucked into the check valve holding it open allowing water to drain out of the tubing. Swab another 55 gallons of water out of the well: water sample is slightly turbid, and still has a rusty, metallic odor.
	1029	1033	Screen water sample. Readings: pH = 7.5, conductance = 358 µmhos/cm, temperature = 17.2°C.
	1033	1050	Well is not dry, but production is decreasing. Will allow well to recharge more fully over the weekend. Lower mast on swab rig as a safety precaution. Secure site, and depart.
5-20-96	0747	0753	Arrive at GW-142 site. Raise the mast on the swab rig.
	0753	0829	Commence swabbing. Swab 110 gallons of water out of the well: water sample is fairly clear, and has a rusty, metallic odor.
	0829	0837	Screen water sample. Readings: pH = 7.7, conductance = 352 µmhos/cm, temperature = 16.9°C.
	0837	0947	Waiting on well to recharge (even though well was not swabbed entirely dry).
	0947	1040	Continue swabbing. Swab another 65 gallons of water out of the well: water sample is moderately turbid, and still has the rusty metallic odor. Well swabbed to dryness.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-142</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT - continued			
			PAGE 4 of 5
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-20-96	1040	1048	Screen water sample. Readings: pH = 8.5, conductance = 395
(cont.)			µmhos/cm, temperature = 22.2°C. Lower mast as safety precaution.
			Secure site, and depart.
5-21-96	1421	1428	Arrive at GW-142 site. Raise the mast on the swab rig.
	1428	1520	Commence swabbing. Swab 110 gallons of water out of the well:
			water sample is clear, and no longer has an odor.
	1520	1525	Screen water sample. Readings: pH = 7.6, conductance = 374
			µmhos/cm, temperature = 19.0°C. Lower mast on swab rig as
			safety precaution. Secure site, and depart.
			Note: Headspace analysis of this last sample read 16 ppm.
			Report to HSEA personnel: headspace analysis disagrees with
			analytical data. Development water will be allowed to aerate prior
			to discharge to ground surface.
5-23-96	0751	0808	Arrive at GW-142 site. Raise mast on the swab rig. HSEA directs
			to conclude development after this session whether 3 well volumes
			are obtained from well or not.
	0808	0859	Commence swabbing. Swab 110 gallons of water out of the well:
			water sample is clear.
	0859	0919	Screen water sample. Readings: pH = 7.5, conductance = 352
			µmhos/cm, temperature = 15.9°C.
			Redevelopment/rehabilitation of well GW-142 is complete.
	0919	0947	Trip out swab tubing.

[illegible]

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM						WELL NO. <u>GW-142</u>	
MONITORING WELL REDEVELOPMENT PROGRESS							
LOCATION: <u>Kerr Hollow Quarry</u>				ONE WELL VOLUME: <u>258.9</u> GALLONS			
WELL INSTALLATION COMPLETION DATE: <u>10-3-85</u>							
DATE	GALLONS PUMPED	DESCRIPTION OF TURBIDITY	pH	DISSOLVED SOLIDS (µS)	TOTAL GALLONS PUMPED	WELL VOLUMES PUMPED	COMMENTS
5-16-96	55	Slightly turbid	7.7	354	55	0.2	1
5-16-96	110	Slightly turbid	7.8	367	165	0.6	2
5-16-96	40	Turbid	8.0	366	205	0.8	2, 3
5-17-96	55	Moderately turbid	7.6	353	260	1.0	2
5-17-96	55	Slightly turbid	7.5	358	315	1.2	2
5-20-96	110	Fairly clear	7.7	352	425	1.6	2
5-20-96	65	Moderately turbid	8.5	395	490	1.9	2, 3
5-21-96	110	Clear	7.6	374	600	2.3	2
5-23-96	110	Clear	7.5	352	710	2.7	2
RESULTS AT END OF DEVELOPMENT		Clear	7.5	352	710	2.7	
COMMENTS: 1. Swab tubing at 295.0 ft BGS.							
2. Swab tubing at 296.8 ft BGS.							
3. Well swabbed to dryness.							

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-142

MONITORING WELL REDEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: Swab

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 5-16-96FINISH: 5-23-96ONE WELL VOLUME: 258.9 GALLONSTOTAL GALLONS PUMPED: 710 TOTAL WELL VOLUMES PUMPED: 2.7INITIAL pH: 7.7 FINAL pH: 7.5INITIAL SPECIFIC CONDUCTANCE: 354 μ mhos/cm FINAL: 352 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: Slightly turbidDESCRIPTION OF FINAL TURBIDITY: ClearFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: Water had a rusty, metallic odor at times.

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

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 131.6 ft BGS on 5-16-96

DEVELOPMENT OBSERVATIONS: Well is a deep, large-volume well that dries up rapidly. Well requires more than 24 hrs. to recharge fully. Redevelopment removed a significant amount of iron oxide flocculent precipitate.

OBSERVER SIGNATURE: DATE: 5-23-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-142 SITE: Kerr Hollow QuarryAPPROX. VOLUME OF DEVELOPMENT WATER: 710 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>5-16-96</u>	<u>1105</u>	<u>7.7</u>	<u>354 μmhos/cm</u>	<u>0.4 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>5-16-96</u>	<u>1326</u>	<u>7.8</u>	<u>367 μmhos/cm</u>	<u>0.1 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>5-16-96</u>	<u>1400</u>	<u>8.0</u>	<u>366 μmhos/cm</u>	<u>0.0 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>5-17-96</u>	<u>0827</u>	<u>7.6</u>	<u>353 μmhos/cm</u>	<u>1.2 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>5-17-96</u>	<u>1029</u>	<u>7.5</u>	<u>358 μmhos/cm</u>	<u>0.1 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>5-20-96</u>	<u>0829</u>	<u>7.7</u>	<u>352 μmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>5-20-96</u>	<u>1040</u>	<u>8.5</u>	<u>395 μmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
		<u>(4.0-10.5)</u>	<u>(<1000 μmhos/cm)</u>	<u>(<5 ppm)</u>	<u>(<100 cpm)</u>	<u>(<500 cpm)</u>

Weather: Refer to field logbookTemp.: Refer to field logbookDISPOSITION: Drill-site Disposal XContainerization
(Labeled?) y/n

Describe: Development water discharged to the ground surface.

On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 5-23-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-142 SITE: Kerr Hollow QuarryAPPROX. VOLUME OF DEVELOPMENT WATER: 710 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>5-21-96</u>	<u>1520</u>	<u>7.6</u>	<u>374 μmhos/cm</u>	<u>16 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>5-23-96</u>	<u>0859</u>	<u>7.5</u>	<u>352 μmhos/cm</u>	<u>2.4 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
		(4.0-10.5)	(<1000 μ mhos/cm)	(<5 ppm)	(<100 cpm)	(<500 cpm)

Weather: Refer to field logbookTemp.: Refer to field logbookDISPOSITION: Drill-site Disposal XContainerization
(Labeled?) y/nDescribe: Development water discharged to the ground surface.On-site Geologist (print): Timothy Coffey - SAICSignature: Date: 5-23-96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-142</u>	
EQUIPMENT DECONTAMINATION INSPECTION SUMMARY		INSTALLATION ☐ P&A ☐ REDEVELOPMENT ☒	
LOCATION: <u>Kerr Hollow Quarry</u>		DATE: START: <u>5-16-96</u>	
DECONTAMINATION CREW: <u>G. Shillings/J. Gallaher</u>		FINISH: <u>5-23-96</u>	
<u>J. Monger</u>			

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG _____ (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	-NA-	—	—	—
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	-NA-	—	—	—
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	-NA-	—	—	—
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	-NA-	—	—	—
WORKOVER RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Hoses, Etc.)	5-15-96/ 5-16-96	5-16-96	Pass	TJC
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	5-15-96/ 5-16-96	5-16-96	Pass	TJC
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				

COMMENTS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-170</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 3
LOCATION: <u>Union Valley</u>		DATE: START: <u>3-13-96</u>	
OPERATOR: <u>H. Hall - Highland Drilling Co.</u>		FINISH: <u>3-14-96</u>	
HELPERS: <u>G. Shillings - Highland Drilling Co.</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>Smeal Swab Rig</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
3-13-96	0910	0924	Arrive at GW-170 site, position Smeal rig over the well. Set up the site. Uncap well: organic vapors in the casing headspace = 0.0 ppm. Background radiological scan of location: alpha = 0 cpm, beta/gamma = 60-70 cpm. Measure water level at 29.3 ft below ground surface (BGS). Tag bottom of the well (solid) at 154.7 ft BGS. Note: The Subsurface Data Base (Y/TS-881/R3) reports the total depth of GW-170 to be 156.9 ft. HSEA personnel report that a "Hydro-Lab" device is stuck at the bottom of the well. Calculate a well volume of 83.3 gallons. Raise the mast on the swab rig.
	0924	0929	Extract a Well Wizard™ sampling pump from the well.
	0929	1010	Tally the tubing, then run 155.5 ft of 2-in. inside diameter (ID), 2 3/8-in. outside diameter (OD) steel swab tubing with check valve into the borehole to 151.5 ft BGS.
	1010	1025	Commence swabbing the well. Swab 53 gallons of water out of the well; water sample is turbid. No discernable odor of the water sample itself but a sewage-like odor is noted during development.
	1025	1032	Screen water sample. Readings: pH = 9.9, conductance = 208 µmhos/cm, temperature = 14.6°C.
	1032	1040	Swab another 53 gallons of water out of the well; development water cleared significantly, water sample is slightly turbid.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-170</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT - continued			
			PAGE 2 of 3
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
3-13-96	1040	1044	Screen water sample. Readings: pH = 7.8, conductance =
(cont.)			348 µmhos/cm, temperature = 14.1°C.
	1044	1051	Swab another 53 gallons of water out of the well; water sample
			is clear.
	1051	1058	Screen water sample. Readings: pH = 7.8, conductance =
			322 µmhos/cm, temperature = 14.0°C.
	1058	1105	Swab another 53 gallons of water out of the well; water sample
			is clear.
	1105	1109	Screen water sample. Readings: pH = 7.6, conductance =
			354 µmhos/cm, temperature = 14.0°C. All of the drums at the site
			have been filled.
	1109	1200	Crew departs to get more drums.
	1200	1237	Crew returns with more drums. Break for lunch.
	1237	1245	Continue swabbing the well. Swab yet another 53 gallons of water
			out of the well; water sample is clear.
	1245	1249	Screen water sample. Readings: pH = 7.9, conductance =
			364 µmhos/cm, temperature = 14.9°C. The water has remained
			clear for more than a well volume now; greater than 3 total well
			volumes have been removed from the well, and the parameters
			have stabilized. Well rehabilitation is complete.
	1249	1323	Pull swab tubing out of the well.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-170</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT - continued			PAGE 3 of 3
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
3-13-96	1323	1349	Lower mast on swab rig. Re-insert Well Wizard™ sample pump
(cont.)			and tubing into well. Clean up site. Depart. Note: At approximately
			1600 hrs, HSEA directed that well GW-170 be swabbed of at least
			1 more well volume on 3-14-96 to ensure that the turbidity in well
			GW-170 is not a recurring event.
3-14-96	0903	0915	Arrive at GW-170 site. Extract the Well Wizard™ sampling pump
			from the well.
	0915	0947	Raise the mast, and re-run the swab tubing into the well. Swab
			tubing to 151.5 ft BGS.
	0947	0958	Begin swabbing the well. Swab 53 gallons of water out of the well;
			water sample is slightly turbid (rusty, probably from swab tubing).
	0958	1005	Screen water sample. Readings: pH = 8.0, conductance =
			342 µmhos/cm, temperature = 14.1°C.
	1005	1016	Swab another 55 gallons of water out of the well; water sample is
			clear.
	1016	1027	Screen water sample. Readings: pH = 7.7, conductance =
			361 µmhos/cm, temperature = 14.1°C. Report status to K. Jago
			(HSEA) who directs to stop redevelopment now.
	1027	1103	Pull swab tubing out of the well.
	1103	1123	Lower the mast on the swab rig. Re-insert the Well Wizard™
			sample pump and tubing into the well again. Clean up the site.
			Depart. Well rehabilitation is now complete.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-170

MONITORING WELL REDEVELOPMENT PROGRESS

LOCATION: Union Valley

ONE WELL VOLUME: 83.3 GALLONS

WELL INSTALLATION
COMPLETION DATE: 4-1-86

[illegible]

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM	WELL NO. <u>GW-170</u>
MONITORING WELL REDEVELOPMENT SUMMARY	

METHOD OF DEVELOPMENT: <u>Swab</u>	DEVELOPMENT DATE: START: <u>3-13-96</u> FINISH: <u>3-14-96</u>
DEVELOPMENT OBSERVED BY: <u>Timothy Coffey - SAIC</u>	
ONE WELL VOLUME: <u>83.3</u> GALLONS	
TOTAL GALLONS PUMPED: <u>373</u>	TOTAL WELL VOLUMES PUMPED: <u>4.5</u>
INITIAL pH: <u>9.9</u>	FINAL pH: <u>7.7</u>
INITIAL SPECIFIC CONDUCTANCE: <u>208 μmhos/cm</u>	FINAL: <u>361 μmhos/cm</u>
DESCRIPTION OF INITIAL TURBIDITY: <u>Turbid</u>	
DESCRIPTION OF FINAL TURBIDITY: <u>Clear</u>	
FINAL MEASURED TURBIDITY: <u>Not Analyzed</u>	
WELL APPROVED BY: <u>W.K. Jago - HSEA</u>	
ODOR OF WATER: <u>None Discernable - but a sewage-like odor of an unknown origin was detected during development</u>	
WATER DISCHARGED TO: <div style="display: flex; justify-content: space-between;"> <div> ☐ GROUND SURFACE ☐ STORM SEWERS ☒ DRUMS </div> <div> ☐ TANK TRUCK ☐ STORAGE TANKS ☐ OTHER _____ </div> </div>	
INITIAL PRE-DEVELOPMENT WATER DEPTH: <u>29.3 ft BGS on 3-13-96</u>	
DEVELOPMENT OBSERVATIONS: <u>Well is a good producer as indicated by the inability to lower the water level significantly during development. Development water cleared rapidly and remained clear through the end of redevelopment.</u>	
OBSERVER SIGNATURE:	DATE: <u>3-13-96</u>

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-170 SITE: Union ValleyAPPROX. VOLUME OF DEVELOPMENT WATER: 373 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Centry-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>3-13-96</u>	<u>1025</u>	<u>9.9</u>	<u>208 μmhos/cm</u>	<u>0.7 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>3-13-96</u>	<u>1040</u>	<u>7.8</u>	<u>348 μmhos/cm</u>	<u>0.1 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>3-13-96</u>	<u>1051</u>	<u>7.8</u>	<u>322 μmhos/cm</u>	<u>0.0 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>3-13-96</u>	<u>1105</u>	<u>7.6</u>	<u>354 μmhos/cm</u>	<u>0.2 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>3-13-96</u>	<u>1245</u>	<u>7.9</u>	<u>364 μmhos/cm</u>	<u>0.1 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>3-14-96</u>	<u>0958</u>	<u>8.0</u>	<u>342 μmhos/cm</u>	<u>0.0 ppm</u>	<u>60 cpm</u>	<u>0 cpm</u>
<u>3-14-96</u>	<u>1016</u>	<u>7.7</u>	<u>361 μmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
		<u>(4.0-10.5)</u>	<u>(<1000 μmhos/cm)</u>	<u>(<5 ppm)</u>	<u>(<100 cpm)</u>	<u>(<500 cpm)</u>

Weather: 3-13-96: Clear and pleasant.
3-14-96: Partly to mostly cloudy and breezy.

Temp.: 3-13-96: Low-30s to upper 50s °F.
3-14-96: Low-40s to low-50s °F.

DISPOSITION: Drill-site Disposal _____ Containerization X
 (Labeled?) Y

Describe: Development water swabbed directly into US DOT-approved, 55-gal, bung-top drums (7) pending analysis.

On-site Geologist (print): Timothy Coffey - SAIC

Signature:

Date: 3-14-96

EQUIPMENT DECONTAMINATION INSPECTION SUMMARY

REDEVELOPMENT ☒

FINISH: 3-14-96

COMMENTS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-228</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 2
LOCATION: <u>Oil Landfarm</u>		DATE: START: <u>2-9-96</u>	
OPERATOR: <u>H. Hall - Highland Drilling Co.</u>		FINISH: <u>2-9-96</u>	
HELPERS: <u>R. Phillips/G. Shillings - Highland Drilling Co.</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>Smeal Swab Rig</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
2-9-96	0952	1000	Arrive at GW-228 site. Position sméal rig over the well. Set up the
			site. Uncap the well: organic vapors in the casing headspace =
			4 ppm. Background radiological scan of location: alpha = 0 cpm,
			beta/gamma = 50 cpm.
	1000	1008	Measure water level at 8.7 ft below ground surface (BGS). Tag
			bottom of well (soft) at 87.5 ft BGS. Note: The subsurface data
			base (Y/TS-881/R3) reports the total depth of well GW-228 to be
			100.0 ft. Calculate a well volume (including the portion of well
			containing the accumulated sediment) of 59.6 gallons of water.
	1008	1020	Raise mast of sméal rig. Rig up with the sediment bailer, total
			length of the bailer is 22.6 ft.
	1020	1025	Run the bailer into the well.
	1025	1106	Commence bailing the well. Bail approximately 42 gallons of
			sediment-laden water out of the well: pulling out abundant quartz
			sand and some bentonite fragments; water sample is turbid, and
			has quartz sand and bentonite gel in it. Obtain a water sample.
			Tag bottom of well at 89.5 ft BGS (have removed 2.0 ft of sediment).
	1106	1154	Screen water sample. Readings: pH = 11.8, conductance =
			1020 μ mhos/cm, temperature = 12.0° C. Continue bailing water
			out of the well.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-228

WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT - continued

PAGE 2 of 2

[illegible]

MONITORING WELL REDEVELOPMENT PROGRESS

LOCATION: Oil Landfarm

WELL INSTALLATION
COMPLETION DATE: 10-23-85

ONE WELL VOLUME: 59.6 GALLONS

96-001MS(D)/061296

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-228

MONITORING WELL REDEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: Sediment Bailer

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 2-9-96FINISH: 2-9-96ONE WELL VOLUME: 59.6 GALLONSTOTAL GALLONS PUMPED: 90.0 TOTAL WELL VOLUMES PUMPED: 1.5INITIAL pH: 11.8 FINAL pH: 11.9INITIAL SPECIFIC CONDUCTANCE: 1020 μ mhos/cm FINAL: 1390 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: TurbidDESCRIPTION OF FINAL TURBIDITY: Moderately TurbidFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: None Discernable

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

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 8.7 ft BGS on 2-9-96

DEVELOPMENT OBSERVATIONS: Well is a poor producer: well bailed nearly to dryness, and did not recharge appreciably after almost 1-hr wait. Removed at least 3.9 ft of a total sediment (quartz sand and bentonite) accumulation of 12.5 ft using a sediment bailer. Well may be contaminated with bentonite (and possibly grout).

OBSERVER SIGNATURE: DATE: 2-9-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-228 SITE: Oil Landfarm

APPROX. VOLUME OF DEVELOPMENT WATER: 90 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Centry-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.		Beta/ Gamma	Alpha
<u>2-9-96</u>	<u>1106</u>	<u>11.8*</u>	<u>1020 µmhos/cm</u>	<u>20 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>2-9-96</u>	<u>1331</u>	<u>11.9*</u>	<u>1390 µmhos/cm</u>	<u>10 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
		(4.0-10.5)	(<1000 µmhos/cm)	(<5 ppm)	(<100 cpm)	(<500 cpm)

Weather: Clear and pleasant

Temp.: Low-30s to upper-50s °F

DISPOSITION: Drill-site Disposal

Containerization X

(Labeled?) Y

Describe: Development water (including sediment) placed in U.S. DOT-approved, 55-gal. open-top drums pending disposal.

*Explanation: Well has bentonite and possible grout contamination which will drive the pH up.

On-site Geologist (print): Timothy Coffey - SAIC

Signature:

Date: 2-9-96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-228</u>	
EQUIPMENT DECONTAMINATION INSPECTION SUMMARY		INSTALLATION ☐ P&A ☐ REDEVELOPMENT ☒	
LOCATION: <u>Oil Landfarm</u>		DATE: START: <u>2-9-96</u>	
DECONTAMINATION CREW: <u>R. Phillips/H. Hall/G. Shillings</u>		FINISH: <u>2-9-96</u>	

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	-NA-	—	—	—
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	-NA-	—	—	—
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	-NA-	—	—	—
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	-NA-	—	—	—
WORKOVER RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Hoses, Etc.)	1-22-96	2-9-96	Pass	TJC
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	2-9-96	2-9-96	Pass	TJC
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				

COMMENTS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-229</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 5
LOCATION: <u>Oil Landfarm</u>		DATE: START: <u>2-7-96</u>	
OPERATOR: <u>H. Hall - Highland Drilling Co.</u>		FINISH: <u>2-8-96</u>	
HELPERS: <u>R. Phillips/G. Shillings - Highland Drilling Co.</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>Smeal Swab Rig</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
2-7-96	1057	1109	Arrive at GW-229 site. Crew is onsite. Smeal swab rig is positioned over the well. Measure the water level at 18.5 ft below ground surface (BGS). Tag bottom of well (soft) at 47.5 ft BGS. Note: The subsurface data base (Y/TS-881/R3) reports the total depth of well GW-229 to be 55.0 ft. Calculate a well volume (including portion of well containing the accumulated sediment) of 23.8 gallons of water.
	1109	1123	Run 2 3/8-in. outside diameter (OD), 2-in. inside diameter (ID) steel swab tubing, with check valve, into the well to 44.8 ft BGS. Rig up fittings to pump water directly into drum.
	1123	1131	Begin swabbing the well. Swab 28 gallons of water out of the well: water is slightly turbid, and has an indistinguishable rotten/petroliferous odor.
	1131	1134	Screen water sample. Readings: pH = 6.7, conductance = 1100 µmhos/cm, temperature = 13.0° C.
	1134	1141	Lower swab tubing 3.0 ft to 47.8 ft BGS.
	1141	1203	Continue swabbing the well. Well appears to have dried up, only getting mud out of the well.
	1203	1302	Wait on well to recharge. Break for lunch. NOTE: Headspace analysis of first water sample reads in excess of 1000 ppm. Water

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-229WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT -
continued

PAGE 2 of 5

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
2-7-96			is being contained; no further action taken. Notify HSEA of
(cont.)			headspace results.
	1302	1330	Resume swabbing: still getting only mud. Measure water level in
			well at 18.5 ft BGS. Check valve is obviously plugged with mud.
			Continue swabbing until tubing is unplugged. Swab 24 gallons of
			water out of the well: water sample is moderately turbid, and has
			the indistinguishable rotten/petroliferous odor.
	1330	1334	Screen water sample. Readings: pH = 6.8, conductance =
			1080 μ mhos/cm, temperature = 11.9° C. Raise swab tubing to
			45.8 ft BGS.
	1334	1344	Continue swabbing the well. Swab another 50 gallons of water out
			of the well: water sample is slightly turbid with a strong petroliferous
			odor.
	1344	1353	Screen water sample. Readings: pH = 6.7, conductance =
			1090 μ mhos/cm, temperature = 13.0° C. Lower swab tubing to
			46.8 ft BGS.
	1353	1409	Continue swabbing the well. Lower swab tubing gradually another
			1 ft. Swab another 50 gallons of water out of the well: water sample
			is turbid. Water sample has a petroliferous odor, but not as strong
			as before. Also beginning to see quite a bit of sand-sized sediment
			coming from well.
	1409	1413	Screen water sample. Readings: pH = 6.8, conductance =
			1090 μ mhos/cm, temperature = 12.8° C. Lower swab tubing
			another 1 ft.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-229</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT - continued			PAGE 3 of 5
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
2-7-96	1413	1435	Continue swabbing the well. Swab another 50 gallons of water out
(cont.)			of the well: water sample is moderately turbid, and has a
			petroliferous odor. Sediment is becoming coarser, appears to be
			fine drill cuttings.
	1435	1440	Screen water sample. Readings: pH = 6.8, conductance =
			1100 μ mhos/cm, temperature = 12.2° C.
	1440	1500	All drums on location are filled, but the well is not yet cleaned of its
			sediment accumulation. R. Phillips (Highland) met with K. Jago
			(HSEA) regarding rehabilitation progress. Plan to use a bailer
			intended for cleaning out heavy sediment accumulations now.
	1500	1530	Trip out swab tubing, and load onto a truck. Tag bottom of well at
			48.6 ft BGS (have removed 1.1 ft of sediment). Rig down smeal
			rig, and move away from well. Seal and label drums. Secure site
			and depart. Crew to spend rest of day readying sediment bailer.
			NOTE: All water samples obtained today had headspace
			measurements in excess of 1000 ppm. Development water has
			a slight petroliferous odor, but no other evidence for high headspace
			readings.
2-8-96	0945	1008	Arrive at GW-229 site. Crew working to de-ice the steam cleaner.
	1008	1025	Steam clean the sediment bailer.
	1025	1040	Position the smeal rig over the well. Raise the mast, set up the site.
	1040	1112	Attempt to run bailer into the well: won't go due to welding slag on
			the inside of the casing. Use an iron bar to knock off the excess
			slag.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-229WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT -
continued

PAGE 4 of 5

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
2-8-96	1112	1117	Run sediment bailer into well, total length of bailer = 22.6 ft.
(cont.)			
	1117	1136	Commence bailing. Bail approximately 38 gallons of sediment-laden water out of the well (no sample taken).
	1136	1158	Tag bottom of well at 48.8 ft BGS (bailer does not seem to be picking up much sediment, perhaps it is too coarse grained).
			Contact B. McMaster (HSEA) who directs to conclude redevelopment after swabbing another couple of well volumes to clean up the water.
	1158	1207	Rig down sediment bailer, load on a truck, and get ready to swab.
	1207	1257	Crew goes to get swab tubing. Break for lunch.
	1257	1312	Crew returns. Re-insert the 2 3/8-in. OD, 2-in. ID steel swab tubing with check valve into the well to 48.8 ft BGS. Rig up plumbing.
	1312	1338	Commence swabbing the well. Swab 24 gallons of water out of the well: water sample is turbid, has a strong petroliferous odor, and contains sand-sized sediment.
	1338	1346	Screen water sample. Readings: pH = 6.7, conductance = 1090 μ mhos/cm, temperature = 13.0° C. Continue swabbing the well. Swab another 35 gallons of water out of the well: water sample is turbid, and has a petroliferous odor.
	1346	1353	Screen water sample. Readings: pH = 6.6, conductance = 1090 μ mhos/cm, temperature = 13.2° C.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-229

MONITORING WELL REDEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: Swab, sediment bailer

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAIC

START: 2-7-96

FINISH: 2-8-96

ONE WELL VOLUME: 23.8 GALLONS

TOTAL GALLONS PUMPED: 299 TOTAL WELL VOLUMES PUMPED: 12.6

INITIAL pH: 6.7 FINAL pH: 6.6

INITIAL SPECIFIC CONDUCTANCE: 1100 µmhos/cm FINAL: 1090 µmhos/cm

DESCRIPTION OF INITIAL TURBIDITY: Slightly Turbid

DESCRIPTION OF FINAL TURBIDITY: Turbid

FINAL MEASURED TURBIDITY: Not Analyzed

WELL APPROVED BY: W.K. Jago - HSEA

ODOR OF WATER: Indistinguishable rotten/petroliferous odors.

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

INITIAL PRE-DEVELOPMENT
 WATER DEPTH: 18.5 ft BGS on 2-7-96

DEVELOPMENT OBSERVATIONS: This well is an excellent producer as judged by inability to draw water level down during redevelopment. Development water generally had a strong petroliferous odor, and all samples yielded headspace analyses in excess of 1000 ppm. Removed only 1.2 ft of a total sediment accumulation of 7.5 ft using a sediment bailer and swab method.

OBSERVER SIGNATURE:

DATE: 2-8-96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-229</u>		
EQUIPMENT DECONTAMINATION INSPECTION SUMMARY		INSTALLATION ☐ P&A ☐ REDEVELOPMENT ☒		
LOCATION: <u>Oil Landfarm</u>		DATE: START: <u>2-7-96</u>		
DECONTAMINATION CREW: <u>R. Phillips/H. Hal/G. Shillings</u>		FINISH: <u>2-8-96</u>		

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	-NA-	—	—	—
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	-NA-	—	—	—
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	-NA-	—	—	—
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	-NA-	—	—	—
WORKOVER RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Hoses, Etc.)	1-22-96	2-7-96	Pass	TJC
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	1-18-96	2-7-96	Pass	TJC
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				
Sediment bailer	2-8-96	2-8-96	Pass	TJC

COMMENTS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-692</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 3
LOCATION: <u>Y-12 Plant Area</u>		DATE: START: <u>1-19-96</u>	
OPERATOR: <u>H. Hal/R. Phillips - Highland Drilling Co.</u>		FINISH: <u>1-19-96</u>	
HELPER: <u>G. Shillings - Highland Drilling Co.</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>Smeal Swab Rig</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
1-19-96	0948	1004	Arrive at GW-692 site. There are 2 unlabeled, flush-mounted wells at this location. Confirm well GW-692.
	1004	1014	Uncap well, organic vapors in casing headspace: 3 ppm. Measure water level at 9.5 ft below ground surface (BGS). Tag bottom of well (soft) at 48.0 ft BGS. Note: The subsurface data base (Y/TS-881/R3) reports the total depth of well GW-692 to be 53.0 ft.
	1014	1035	Set up location. Raise mast on Smeal rig. Run 2-in. inside diameter (ID), 2 3/8-in. outside diameter (OD) steel swab tubing into the well to 48.0 ft BGS. Calculate a well volume (including portion of well filled with sediment) of 28.4 gallons of water.
	1035	1059	Take a break to warm up.
	1059	1109	Begin swabbing the well. Take a sample of the first water: water sample is fairly clear. Screen the initial water sample. Readings: pH = 9.1, conductance = 244 µmhos/cm, temperature = 3.9°C. Development water is being swabbed directly into drums.
	1109	1118	Continue swabbing the well. Swab 50 gallons of water out of the well: water sample is turbid.
	1118	1126	Screen water sample. Readings: pH = 8.3, conductance = 318 µmhos/cm, temperature = 10.8°C. Lower swab tubing to 51.0 ft BGS.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-692</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT continued			
			PAGE 2 of 3
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
1-19-96	1126	1140	Swab another 50 gallons of water out of the well: water sample is turbid.
(cont.)			
	1140	1156	Screen water sample. Readings: pH = 8.0, conductance = 349 μ mhos/cm, temperature = 12.8°C. Lower swab tubing to bottom of well, then raise back to 52.7 ft BGS. Depart site.
	1156	1346	Break for lunch.
	1346	1404	Return to GW-692 site, and continue swabbing the well. Swab 50 gallons of water out of the well: water sample is turbid.
	1404	1408	Screen water sample. Readings: pH = 8.2, conductance = 359 μ mhos/cm, temperature = 12.5°C. Continue swabbing the well. Collect another sample after an additional 50 gallons had been swabbed from the well: water sample is moderately turbid.
	1408	1413	Screen water sample. Readings: pH = 7.8, conductance = 392 μ mhos/cm, temperature = 13.2°C.
	1413	1422	Continue swabbing the well. Swab another 20 gallons of water out of the well: water sample is moderately turbid. Water also has an indistinguishable solvent odor, plus a slight surface sheen. No noticeable improvement in turbidity since previous swabbing.
	1422	1426	Screen water sample. Readings: pH = 7.8, conductance = 385 μ mhos/cm, temperature = 10.5°C.
	1426	1456	Trip swab tubing out of the well. Tag bottom (solid) at 53.3 ft BGS (5.3 ft of accumulated sediment removed from the well).
	1456	1502	Lower mast on swab rig, and break down the site.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-692

WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT
continued

PAGE 3 of 3

[illegible]

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM						WELL NO. <u>GW-692</u>	
MONITORING WELL REDEVELOPMENT PROGRESS							
LOCATION: <u>Y-12 Plant Area</u>							
WELL INSTALLATION COMPLETION DATE: <u>11-15-90</u>				ONE WELL VOLUME: <u>28.4</u> GALLONS			
DATE	GALLONS PUMPED	DESCRIPTION OF TURBIDITY	pH	DISSOLVED SOLIDS (µS)	TOTAL GALLONS PUMPED	WELL VOLUMES PUMPED	COMMENTS
1-19-96	0	Fairly Clear	9.1	244	0	0	1, 2
1-19-96	50	Turbid	8.3	318	50	1.8	1
1-19-96	50	Turbid	8.0	349	100	3.5	3
1-19-96	50	Turbid	8.2	359	150	5.3	4
1-19-96	50	Moderately Turbid	7.8	392	200	7.0	4
1-19-96	20	Moderately Turbid	7.8	385	220	7.8	4, 5
RESULTS AT END OF DEVELOPMENT		Moderately Turbid	7.8	385	220	7.8	
COMMENTS:							
1. Swab tubing at 48.0 ft BGS.							
2. Initial water sample.							
3. Swab tubing at 51.0 ft BGS.							
4. Swab tubing at 52.7 ft BGS.							
5. Water sample had a slight, indistinguishable solvent odor.							

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-692

MONITORING WELL REDEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: Swab

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 1-19-96FINISH: 1-19-96ONE WELL VOLUME: 28.4 GALLONSTOTAL GALLONS PUMPED: 220 TOTAL WELL VOLUMES PUMPED: 7.8INITIAL pH: 9.1 FINAL pH: 7.8INITIAL SPECIFIC CONDUCTANCE: 244 μ mhos/cm FINAL: 385 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: Fairly ClearDESCRIPTION OF FINAL TURBIDITY: Moderately TurbidFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: Last sample had an indistinguishable solvent odor.

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

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 9.5 ft BGS on 1-19-96

DEVELOPMENT OBSERVATIONS: Well is a good producer as indicated by the inability to dry up the well during redevelopment. Removed 5.3 ft of accumulated sediment. No odor observed until last grab sample, which also had a slight surface sheen.

OBSERVER SIGNATURE: DATE: 1-19-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-692 SITE: Y-12 Plant Area

APPROX. VOLUME OF DEVELOPMENT WATER: 220 Gallons

CALIBRATION OF INSTRUMENTS: Check those calibrated to manufacturer's specifications.

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 108</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>1-19-96</u>	<u>1104</u>	<u>9.1</u>	<u>244 µmhos/cm</u>	<u>0.0 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>1-19-96</u>	<u>1118</u>	<u>8.3</u>	<u>318 µmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>1-19-96</u>	<u>1140</u>	<u>8.0</u>	<u>349 µmhos/cm</u>	<u>0.2 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>1-19-96</u>	<u>1404</u>	<u>8.2</u>	<u>359 µmhos/cm</u>	<u>0.1 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>1-19-96</u>	<u>1408</u>	<u>7.8</u>	<u>392 µmhos/cm</u>	<u>0.3 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>1-19-96</u>	<u>1422</u>	<u>7.8</u>	<u>385 µmhos/cm</u>	<u>0.5 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
_____	_____	_____	_____	_____	_____	_____
		(4.0-10.5)	(<1000 µmhos/cm)	(<5 ppm)	(<100 cpm)	(<500 cpm)

Weather: Partly to mostly cloudy, windy, and very cold

Temp.: Approx. 20°F down to 15°F

DISPOSITION: Drill-site Disposal

Containerization X
(Labeled?) Y/n

Describe: Development water placed in USDOT-approved 55-gal. bung-top drums and left on location pending disposal.

Onsite Geologist (print): Timothy Coffey - SAIC

Signature:

Date: 1/19/96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAMWELL NO. GW-692**EQUIPMENT DECONTAMINATION INSPECTION SUMMARY**INSTALLATION ☐P&A ☐REDEVELOPMENT ☒LOCATION: Y-12 Plant AreaDATE: START: 1-19-96DECONTAMINATION CREW: H. Hall/G. ShillingsFINISH: 1-19-96

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG _____ (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	-NA-	—	—	—
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	-NA-	—	—	—
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	-NA-	—	—	—
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	-NA-	—	—	—
WORKOVER RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Hoses, Etc.)	1-18-96	1-19-96	Pass	TJC
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	1-18-96	1-19-96	Pass	TJC
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				

COMMENTS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-786</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 3
LOCATION: <u>Y-12 Plant</u>		DATE: START: <u>5-23-96</u>	
OPERATOR: <u>G. Shillings - Highland Drilling Co.</u>		FINISH: <u>5-24-96</u>	
HELPERS: <u>D. Williford/J. Monger - Highland Drilling Co</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
RIG: <u>Smeal Swab Rig</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-23-96	1207	1232	Arrive at GW-786 site. Uncap well: organic vapors in casing
			headspace = 0.0 ppm. Measure water level at 8.7 ft below top of
			the casing (BTOC) = 6.2 ft below ground surface (BGS). Tag
			bottom of well (solid) at 64.3 ft BGS. Note: The Subsurface Data
			Base (Y/TS-881/R3) reports the total depth of GW-786 to be
			64.1 ft. Calculate a well volume of 42.8 gallons of water.
	1232	1318	Crew arrives on site. Unload tubing. Break for lunch.
	1318	1338	Position the swab rig over the well. Set up the site. Raise the mast
			on the swab rig.
	1338	1356	Run 2 3/8-in. outside diameter (OD), 2-in. inside diameter (ID)
			steel swab tubing with check valve into the well to 64.0 ft BGS.
	1356	1407	Commence swabbing. Swab 50 gallons of water out of the well:
			water sample is slightly turbid, milky-white.
	1407	1412	Screen water sample. Readings: pH = 7.7, conductance = 399
			µmhos/cm, temperature = 19.9°C.
	1412	1427	Wait for 1-hr headspace sample incubation period to ensure
			ground surface disposal of development water. Lower mast as a
			safety precaution. Depart site. Note: Headspace analysis of
			water sample reads 0.0 ppm: discharge water to ground surface.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-786</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT - continued			
			PAGE 2 of 3
DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
5-24-96	0731	0740	Arrive at GW-786 site. Raise the mast on the swab rig.
	0740	0756	Commence swabbing. Swab 50 gallons of water out of the well:
			water sample is slightly turbid, milky-white water, with minor very
			fine-grained sand. Well appears to be drying up.
	0756	0802	Screen water sample. Readings: pH = 8.0, conductance = 388
			µmhos/cm, temperature = 17.9°C.
	0802	0837	Wait on well to recharge.
	0837	0848	Continue swabbing. Swab another 20 gallons of water out of the
			well: water sample is slightly turbid, milky-white. Well has been
			swabbed nearly to dryness.
	0848	0852	Screen water sample. Readings: pH = 7.8, conductance = 399
			µmhos/cm, temperature = 18.0°C.
	0852	0913	Lower mast on swab rig as safety precaution. Secure site and
			depart. Plan to return this afternoon to continue development.
	1249	1251	Return to GW-786 site. Raise mast on swab rig.
	1251	1306	Continue swabbing. Swab another 50 gallons of water out of the
			well: water sample is slightly turbid, milky-white.
	1306	1311	Screen water sample. Readings: pH = 8.0, conductance = 415
			µmhos/cm, temperature = 19.9°C.
			Redevelopment/rehabilitation of well GW-786 is complete.

MONITORING WELL REDEVELOPMENT PROGRESS

LOCATION: Y-12 Plant ONE WELL VOLUME: 42.8 GALLONS

WELL INSTALLATION
COMPLETION DATE: 8-29-92

COMMENTS: Swab tubing to 64.0 ft BGS.

1. Water sample is milky-white.
2. Well swabbed nearly dry.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-786

MONITORING WELL REDEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: Swab

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 5-23-96FINISH: 5-24-96ONE WELL VOLUME: 42.8 GALLONSTOTAL GALLONS PUMPED: 170 TOTAL WELL VOLUMES PUMPED: 4.0INITIAL pH: 7.7 FINAL pH: 8.0INITIAL SPECIFIC CONDUCTANCE: 399 μ mhos/cm FINAL: 415 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: Slightly turbidDESCRIPTION OF FINAL TURBIDITY: Slightly turbidFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: None Discernable

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

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 6.2 ft BGS on 5-23-96

DEVELOPMENT OBSERVATIONS: Well is a fairly good producer. Well appears to recharge fully in a matter of hours. Removed greenish-gray sediment with first well volume. After that, the development water was generally clear. The water took on a slightly turbid, milky-white appearance after the removal of each subsequent well volume.

OBSERVER SIGNATURE: DATE: 5-24-96

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-786 SITE: Y-12 Plant

APPROX. VOLUME OF DEVELOPMENT WATER: 170 gallons

CALIBRATION OF INSTRUMENTS (check those instruments calibrated to manufacturer's specifications):

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Centry-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>5-23-96</u>	<u>1407</u>	<u>7.7</u>	<u>399 µmhos/cm</u>	<u>0.0 ppm</u>	<u>50 cpm</u>	<u>0 cpm</u>
<u>5-24-96</u>	<u>0756</u>	<u>8.0</u>	<u>388 µmhos/cm</u>	<u>0.2 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>5-24-96</u>	<u>0848</u>	<u>7.8</u>	<u>399 µmhos/cm</u>	<u>0.0 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>5-24-96</u>	<u>1306</u>	<u>8.0</u>	<u>415 µmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
		(4.0-10.5)	(<1000 µmhos/cm)	(<5 ppm)	(<100 cpm)	(<500 cpm)

Weather: Clear to partly cloudy, hot, and humid Temp.: Upper-60's to upper-80's°F

DISPOSITION: Drill-site Disposal X Containerization
(Labeled?) y/n

Describe: Development water discharged to the ground surface.

On-site Geologist (print): Timothy Coffey - SAIC

Signature:

Date: 5-24-96

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-786</u>	
EQUIPMENT DECONTAMINATION INSPECTION SUMMARY		INSTALLATION ☐ P&A ☐ REDEVELOPMENT ☒	
LOCATION: <u>Y-12 Plant</u>		DATE: START: <u>5-23-96</u>	
DECONTAMINATION CREW: <u>G. Shillings/J. Monger</u>		FINISH: <u>5-24-96</u>	

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG _____ (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	-NA-	—	—	—
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	-NA-	—	—	—
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	-NA-	—	—	—
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	-NA-	—	—	—
WORKOVER RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Hoses, Etc.)	5-23-96	5-23-96	Pass	TJC
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	5-23-96	5-23-96	Pass	TJC
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				

COMMENTS:

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM			WELL NO. <u>GW-830</u>
WELL REDEVELOPMENT ACTIVITY/PROGRESS REPORT			PAGE 1 of 2
LOCATION: <u>TSD Facility</u>		DATE: START: <u>9-13-95</u>	
OPERATOR: <u>E. Lyons-Highland Drilling Co.</u>		FINISH: <u>9-13-95</u>	
HELPER: <u>R. Jones-Highland Drilling Co.</u>		LOGGED BY: <u>Timothy Coffey - SAIC</u>	
DRILL: <u>Smeal Swab Rig</u>			

DATE	TIME		ACTIVITY/COMMENTS
	START	FINISH	
9-13-95	0855	1015	Arrive at GW-830 site. The well consists of 5-in. outside diameter (OD), 4 1/4-in. inside diameter (ID) PVC casing inside of 6 5/8-in. OD steel casing. The Smeal Swab Rig is on site, positioned over the well, having been used to extract the pump and pump tubing from the well yesterday. Measure the water level at 47.3 ft below ground surface (BGS). Attempt to tag bottom of well; well is deeper than weighted tape (295.0 ft). Attempt to tag bottom of well with water level indicator; probe gets hung in the well at approximately 218 ft BGS. Tag bottom of well with another weighted tape (soft) at 387.4 ft BGS. Calculate 1 well volume of 251.2 gallons of water.
	1015	1046	Run 2-in. inside diameter (ID), 2 3/8-in. OD steel swab tubing (with check valve) into the well to 198.1 ft BGS.
	1046	1055	Begin swabbing the well. Swab 55 gallons of water out of the well; water sample is fairly clear (has a very pale orange tint).
	1055	1059	Screen water sample. Readings: pH = 7.4, conductance = 229 µmhos/cm, temperature = 17.0° C.
	1059	1127	Continue swabbing the well. Swab 220 gallons of water out of the well; water sample is clear.
	1127	1136	Screen water sample. Readings: pH = 7.3, conductance = 236 µmhos/cm, temperature = 17.7° C.

COMPLETION DATE: Unknown

ONE WELL VOLUME: 251.2 GALLONS

DATE	GALLONS PUMPED	DESCRIPTION OF TURBIDITY	pH	DISSOLVED SOLIDS (µS)	TOTAL GALLONS PUMPED	WELL VOLUMES PUMPED	COMMENTS
9-13-95	55	Fairly Clear	7.4	229	55	0.2	
9-13-95	220	Clear	7.3	236	275	1.1	
9-13-95	275	Clear	7.4	237	550	2.2	
9-13-95	275	Clear	7.4	243	825	3.3	
RESULTS AT END		Clear	7.4	243	825	3.3	

COMMENTS: Swab tubing at 198.1 ft BGS. Development water was never very muddy.

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-830

MONITORING WELL REDEVELOPMENT SUMMARY

METHOD OF DEVELOPMENT: Swab

DEVELOPMENT DATE:

DEVELOPMENT OBSERVED BY: Timothy Coffey - SAICSTART: 9-13-94FINISH: 9-13-94ONE WELL VOLUME: 251.2 GALLONSTOTAL GALLONS PUMPED: 825 TOTAL WELL VOLUMES PUMPED: 3.3INITIAL pH: 7.4 FINAL pH: 7.4INITIAL SPECIFIC CONDUCTANCE: 229 μ mhos/cm FINAL: 243 μ mhos/cmDESCRIPTION OF INITIAL TURBIDITY: Fairly clearDESCRIPTION OF FINAL TURBIDITY: ClearFINAL MEASURED TURBIDITY: Not AnalyzedWELL APPROVED BY: W.K. Jago - HSEAODOR OF WATER: None Discernable

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

INITIAL PRE-DEVELOPMENT

WATER DEPTH: 47.3 ft BGS on 9-13-95

DEVELOPMENT OBSERVATIONS: Well is an excellent producer. At no time during development did well give any indication of drying up or even slowing production. Development water was fairly clear to clear, never very muddy.

OBSERVER SIGNATURE: DATE: 9-13-95

Y-12 PLANT GWPP DEVELOPMENT WATER FIELD SCREENING/DISPOSAL SHEET

WELL NO. GW-830 SITE: TSD FacilityAPPROX. VOLUME OF DEVELOPMENT WATER: 825 Gallons

CALIBRATION OF INSTRUMENTS: Check those calibrated to manufacturer's specifications.

pH meter	<u>X</u>	(model)	<u>Horiba Model U-7</u>
Sp. Cond. meter	<u>X</u>	(model)	<u>YSI S-C-T Meter Model 33</u>
Organic vapor meter	<u>X</u>	(model)	<u>Century-Foxboro OVA Model 128</u>
Beta/gamma meter	<u>X</u>	(model)	<u>Ludlum Model 3 Survey Meter with G-M Pancake Probe</u>
Alpha meter	<u>X</u>	(model)	<u>Ludlum Model 12 Count Ratemeter with Scintillation Tube Probe</u>

FIELD SCREENING RESULTS:

Date	Time	pH	Sp. Cond.	Organic Vapors	Beta/Gamma	Alpha
<u>9-13-94</u>	<u>1055</u>	<u>7.4</u>	<u>229 µmhos/cm</u>	<u>0.0 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>9-13-94</u>	<u>1127</u>	<u>7.3</u>	<u>236 µmhos/cm</u>	<u>1.5 ppm</u>	<u>40 cpm</u>	<u>0 cpm</u>
<u>9-13-94</u>	<u>1243</u>	<u>7.4</u>	<u>237 µmhos/cm</u>	<u>1.6 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u>9-13-94</u>	<u>1322</u>	<u>7.4</u>	<u>243 µmhos/cm</u>	<u>3.3 ppm</u>	<u>30 cpm</u>	<u>0 cpm</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
		(4.0-10.5)	(<1000 µmhos/cm)	(<5 ppm)	(<100 cpm)	(<500 cpm)

Weather: Mostly cloudy to cloudy and breezyTemp.: Mid-60s to low-80s°FDISPOSITION: Drill-site Disposal XContainerization
(Labeled?) y/n Describe: Development water discharged to the ground surface.Onsite Geologist (print): Timothy Coffey - SAICSignature: Date: 9/13/95

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM		WELL NO. <u>GW-830</u>	
EQUIPMENT DECONTAMINATION INSPECTION SUMMARY		INSTALLATION ☐ P&A ☐ REDEVELOPMENT ☒	
LOCATION: <u>TSD Facility</u>		DATE: START: <u>9-13-95</u>	
DECONTAMINATION CREW: <u>G. Shillings/E. Lyons</u>		FINISH: <u>9-13-95</u>	
<u>R. Jones</u>			

EQUIPMENT	DECON DATE	INSPECTION DATE	INSPECTION (PASS/FAIL)	INSPECTOR'S INITIALS
DRILL RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Carousel, Hoses, Etc.)	-NA-	—	—	—
DRILLING TOOLS (Pipe Wrenches, Hand Tools, Lifting Bells, Clevis, Chains, Etc.)	-NA-	—	—	—
DOWN HOLE TOOLS (Drilling Rods, Stabilizers, Washover Pipe, Bits, Etc.)	-NA-	—	—	—
WELL CONSTRUCTION MATERIALS (Casing, Screen, Centralizers, Etc.)	-NA-	—	—	—
WORKOVER RIG <u>Smeal Swab Rig</u> (Mast, Chassis, Cables, Hoses, Etc.)	9-10-95	9-13-95	Pass	TJC
DEVELOPMENT TOOLS (Tubing, Bailers, Pumps, Etc.)	9-13-95	9-13-95	Pass	TJC
OTHER EQUIPMENT OR RE-INSPECTIONS (SPECIFY)				

COMMENTS:

**APPENDIX I
WELL LOCATION MAP**

Bear Creek Road

LEGEND:

- BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- DIRT ROAD
- STREAM OR CREEK
- POND OR RIVER
- CONTOUR (100 FT. INTERVAL)
- CONTOUR (1000 FT. INTERVAL)
- GW-831 FY 1996 MONITORING WELL

DATA SOURCE:

- 1.) BASE MAP INFO. TAKEN FROM TVA S-16A MAP DATED 7-19-87.
- 2.) SUBSURFACE DATA TAKEN FROM LOCKHEED/MARTIN REPORT NO. Y/TS-881/R3.

SAIC

Science Applications
International Corporation

PLATE 1 FY 1996 MONITORING WELL LOCATIONS

REVISION	DRAWN BY:	CHKD. BY:	DATE:
0	P. HOLM	T. COFFEY	08-29-96

XREFERENCES	PLOT FILES
/95033/XREF/Y12/XRBLD	/95033/PLOT/224MAP1.PLT
/95033/XREF/Y12/XRRD	
/95033/XREF/Y12/XRHYD	
/95033/XREF/Y12/XRCNT	

SHT 1 OF 1
DRAWING #

/95033/DWGS/508MAP1.DWG
CAD FILE #