Y-12

OAK RIDGE Y-12 PLANT

MARTIN MARIETTA

SAMPLING AND ANALYSIS PLAN FOR GROUNDWATER AND SURFACE WATER MONITORING AT THE Y-12 PLANT DURING CALENDAR YEAR 1996

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Prepared by:

HSW ENVIRONMENTAL CONSULTANTS, INC.
Under Purchase Order 70Y-EAQ10C

for the

Environmental Management Department
Health, Safety, Environment, and Accountability Organization
Oak Ridge Y-12 Plant
Oak Ridge, Tennessee 37831

Managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract
DE-AC05-84OR21400

MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
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DEPARTMENT OF ENERGY

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LIST OF ACRONYMS AND ABBREVIATIONS

AAS	Atomic Absorption Spectroscopy
BC	Bear Creek Hydrogeologic Regime
CR	Chestnut Ridge Hydrogeologic Regime
CY	Calendar Year
DOE	U.S. Department of Energy
EF	Upper East Fork Poplar Creek Hydrogeologic Regime
GWPP	Groundwater Protection Program
HSEA	Health, Safety, Environment, and Accountability (Organization)
ICP	Inductively Coupled Plasma Spectrometry
RCRA	Resource Conservation and Recovery Act

1.0 INTRODUCTION

This plan provides a description of the groundwater and surface-water quality monitoring activities planned for calendar year (CY) 1996 at the Department of Energy (DOE) Y-12 Plant. Included in this plan are the monitoring activities managed by the Y-12 Plant Health, Safety, Environment, and Accountability (HSEA) Organization through the Y-12 Plant Groundwater Protection Program (GWPP). Other groundwater and surface water monitoring activities, such as selected Environmental Restoration Program activities, and National Pollution Discharge Elimination System monitoring, not managed through the Y-12 Plant GWPP are not addressed in this report.

The requirements of several monitoring drivers will be implemented in one comprehensive monitoring program during CY 1996. These drivers may be regulatory (e.g., Resource Conservation and Recovery Act [RCRA]), DOE Orders, or best-management practices. The CY 1996 monitoring program will encompass three hydrogeologic regimes: the Bear Creek Hydrogeologic Regime (Bear Creek Regime), the Upper East Fork Poplar Creek Hydrogeologic Regime (East Fork Regime), and the Chestnut Ridge Hydrogeologic Regime (Chestnut Ridge Regime). The Bear Creek and East Fork regimes are located within Bear Creek Valley, and the Chestnut Ridge Regime is located south of the Y-12 Plant (Figure 1).

For various reasons, modifications to the CY 1996 monitoring program may be necessary during implementation. For example, changes in regulatory requirements may alter the parameters specified for selected wells, or wells could be added to or deleted from the monitoring network. All modifications to the monitoring program will be approved by the Y-12 Plant GWPP manager and documented as addenda to this sampling and analysis plan.

2.0 MONITORING LOCATIONS

Groundwater samples will be collected from monitoring wells located in each hydrogeologic regime. Samples of groundwater discharging from springs will be collected in the Bear Creek and Chestnut Ridge regimes. Surface water samples will be collected at several locations in the Bear Creek Regime and one location in the East Fork Regime.

2.1 Monitoring Wells

Monitoring wells in the 1996 monitoring programs include those recommended in Part II of the CY 1994 Groundwater Quality Report prepared for each regime (HSW Environmental Consultants, Inc. 1995a, 1995b, and 1995c). A total of 200 monitoring wells will be sampled; 52 wells in the Bear Creek Regime (Figure 2), 69 wells in the Chestnut Ridge Regime (Figure 3), and 79 wells in the East Fork Regime (Figure 4).

2.2 Springs and Surface Water Sampling Stations

Surface water quality monitoring also will be performed in each regime. Samples will be collected from three springs and seven surface water stations in the Bear Creek Regime (Figure 2). The springs, located south of Bear Creek along the base of Chestnut Ridge, contribute significant year-round flow to Bear Creek. Surface water monitoring in the Bear Creek Regime includes six sampling stations along Bear Creek, located from about 0.6 to 12 kilometers upstream from the confluence of Bear Creek with East Fork Poplar Creek (BCK-00.63 to BCK-11.97), and one sampling station on a northern tributary to Bear Creek (NT-01). In the Chestnut Ridge Regime, samples will be collected from one spring (CBS-1) located south of the Construction/Demolition Landfill VII (Figure 3). In the East Fork Regime, samples will be collected at the Lake Reality Emergency Spillway (LRSPW, Figure 4).

3.0 SAMPLE COLLECTION

Groundwater samples will be collected by personnel from the Sampling and Environmental Support Department (SESD) of the Oak Ridge K-25 Site Analytical Services Organization. Samples from surface water and spring sampling stations will be collected by personnel from the Y-12 Plant Compliance Monitoring Section of the HSEA Organization. Sample collection will follow the most recent version of the technical procedure for groundwater (SESD-TP-8204) and surface water sampling approved by the Y-12 Plant GWPP Manager. Descriptions of the field methods and procedures used to collect the groundwater and surface water samples are contained in *Environmental Surveillance Procedures Quality Control Program, Martin Marietta Energy Systems, Inc.* (Kimbrough et al. 1990). Sample collection, handling, analysis, and surveillances will be performed in accordance with the GWPP Quality Program Plan (Science Applications International Corporation 1994).

Monitoring wells located in the Bear Creek (BC), Chestnut Ridge (CR), and East Fork (EF) regimes will be sampled in the sequence shown on Table 1. The sampling sequence is generally from least contaminated wells to most contaminated wells within each sampling group. The sampling groups generally are arranged from hydraulically upgradient to downgradient areas in each regime. Some sampling groups consist of wells that are widely scattered, but are grouped by monitoring requirements (e.g., RCRA post-closure monitoring in BC-1). For surface water and springs along Bear Creek, sampling is from the furthest downstream locations to the upstream location closest to the S-3 Site (Table 1).

Groundwater samples will be collected semiannually from 104 of the monitoring wells (52 BC wells and 52 CR wells). Samples from 89 of the remaining wells will be collected quarterly (17 CR wells and 66 EF wells). Furthermore, 15 older wells (two CR wells and 13 EF wells) that have not been sampled in several years will be sampled once during CY 1996 to determine current contaminant concentrations. Samples from springs and surface water stations in each regime will be collected semiannually. Sampling of springs and surface water stations in each regime will coincide with the sampling of nearby monitoring wells: BC-9 with BC-4, CBS-1 with CR-12, and LRSPW with EF-4. As shown in the following table, the number of samples to be collected during each quarterly sampling event is fairly consistent, ranging from 128 to 141, for an annual total of 533 samples in CY 1996:

Regime	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
BC	52		52	
CR	13	62	15	62
EF	66	79	66	66
Total	131	141	133	128

In addition to the groundwater and surface water samples, equipment rinsate and field blank samples will be collected and analyzed for the parameters specified on Table 1. Equipment rinsate samples will be collected from each pump used in sampling groups that have inorganic analyses specified for the rinsate. The rinsate sample will be collected at the last well sampled with each pump, immediately following the field cleaning procedure. Rinsate samples for volatile organics will be collected from a clean bailer before sampling the last well of each sampling group. Field blank samples will be collected from at least 10% of the sampling groups.

Trip blank samples, field duplicate samples, and laboratory quality assurance samples will be prepared and analyzed as specified in the *Groundwater Sampling and Analysis Plan* (Burnett and Dill, 1990) using applicable analytical procedures. The location (building and room number) where the blank samples are prepared will be recorded on the field data sheets. Trip blank samples will be prepared for each cooler used to transport samples for volatile organic analyses. Duplicate samples will be collected from at least one well in each sampling group.

4.0 ANALYTICAL PARAMETERS

The various monitoring programs for CY 1996 require an extensive list of analytical parameters. Analytes commonly grouped for monitoring purposes are assembled into administrative parameter groups. Table 2 provides a detailed listing of the analytes included in each administrative parameter group. Most groundwater and surface water samples will be analyzed for the following standard suite of parameters: field measurements (water level, temperature, pH, specific conductance, dissolved oxygen, and oxidation-reduction potential); laboratory determinations of pH, specific conductance, turbidity, total suspended solids, and total dissolved solids; major anions; trace metals (total and dissolved concentrations); a target list of volatile organic compounds; and gross alpha and gross beta activity. Monitoring drivers for several wells require other specific compounds or parameter groups in addition to the analytes included in an administrative parameter group. For example, regulations governing groundwater monitoring at several sites in the Chestnut Ridge Regime require analyses for specialized parameters (e.g., phenols or total petroleum hydrocarbons), or require replicate analyses for specific parameters.

The standard suite of parameters includes analysis of lead concentration by the inductively coupled plasma method (ICP). If the ICP results consistently exceed the MCL for lead (more than two quarterly samples or one semi-annual sample in a CY), then analysis by atomic absorption spectrometry (AAS) will be specified for that sampling point the following year. Conversely, if a sampling point has four quarterly or two consecutive semi-annual AAS results below the MCL, the AAS specification may be dropped for that sampling point, unless lead by AAS is a regulatory requirement.

5.0 REFERENCES

- Burnett, L.P. and M.S. Dill 1990. Groundwater Sampling and Analysis Plan. Prepared for Martin Marietta Energy Systems, Inc. (K/QT-167).
- HSW Environmental Consultants, Inc. 1995a. Calendar Year 1994 Groundwater Quality Report for the Bear Creek Hydrogeologic Regime, Y-12 Plant, Oak Ridge, Tennessee: 1994 Groundwater Quality Data Interpretations and Proposed Program Modifications. Prepared for Lockheed Martin Energy Systems, Inc. (Y/SUB/95-EAQ10C/1/P2).
- HSW Environmental Consultants, Inc. 1995b. Calendar Year 1994 Groundwater Quality Report for the Upper East Fork Poplar Creek Hydrogeologic Regime, Y-12 Plant, Oak Ridge, Tennessee: 1994 Groundwater Quality Data Interpretations and Proposed Program Modifications. Prepared for Lockheed Martin Energy Systems, Inc. (Y/SUB/95-EAQ10C/2/P2).
- HSW Environmental Consultants, Inc. 1995c. Calendar Year 1994 Groundwater Quality Report for the Chestnut Ridge Hydrogeologic Regime, Y-12 Plant, Oak Ridge, Tennessee: 1994 Groundwater Quality Data Interpretations and Proposed Program Modifications. Prepared for Lockheed Martin Energy Systems, Inc. (Y/SUB/95-EAQ10C/3/P2).
- Kimbrough, C.W., L.W. Long, and L.W. McMahon (eds.). 1987. Environmental Surveillance Procedures Quality Control Program, Martin Marietta Energy Systems, Inc. Prepared by Advanced Sciences, Inc. for the Environmental and Safety Activities Organization, Martin Marietta Energy Systems, Inc. (ESH/SUB/87-21706/1 Revision 1; January 1990).
- Science Applications International Corporation 1994. Groundwater Protection Program Quality Program Plan. Prepared for Martin Marietta Energy Systems, Inc. (Y/SUB/94-99069C/Y13/1).

APPENDIX A

Figures

LOCATION:	Y-12 PLANT OAK RIDGE, TN.	<div data-bbox="1047 1858 1177 1900">FIGURE 1</div> <div data-bbox="933 1942 1307 2005">HYDROGEOLOGIC REGIMES AT THE Y-12 PLANT</div>
DATE:	9-8-95	
DWG ID.:	OR321-HC

SPRINGS AND SURFACE WATER SAMPLING STATIONS

EXPLANATION

GW - ■ - Water Table Monitoring Well

GW - ● - Bedrock Monitoring Well

SS -

BCK - ▲ - Spring (SS) or Surface-Water (BCK or NT) Sampling Station

NT -

EXP-C - Exit Pathway, Maynardville Limestone Transverse

— - Surface Drainage Feature

NT-5 - North Tributary

AQT - Conasauga Shales

- - - - - Approximate Nolichucky Shale\Maynardville Limestone Contact

AQF - Maynardville Limestone

LOCATION:	Y-12 PLANT OAK RIDGE, TN.	FIGURE 2 SAMPLING LOCATIONS FOR GROUNDWATER AND SURFACE WATER MONITORING IN THE BEAR CREEK HYDROGEOLOGIC REGIME, CY 1996
DATE:	8-26-95	
DWG ID.:	OR608-HC

LOCATION:	Y-12 PLANT OAK RIDGE, TN.	<p align="center">FIGURE 3</p> <p align="center">SAMPLING LOCATIONS FOR GROUNDWATER MONITORING IN THE CHESTNUT RIDGE HYDROGEOLOGIC REGIME DURING CY 1996</p>
DATE:	9-8-95	
DWG ID.:	OR307-HC

EXPLANATION

- — Water Table Zone Monitoring Well
- — Bedrock Zone Monitoring Well
- ▲ — Surface Water Sampling Location
- ◇ — Well Proposed to be Sampled once for Plume
- — Well Proposed to be Dropped from the Monit
- LRSPW — Lake Reality Emergency Spillway

— Boundary of Site

K — 1 — Comprehensive Groundwater Monitoring Grid

Note: Wells GW-171, GW-172, and GW-230 are located about 2,500 feet east of well GW-169.

Characterization
ing Program

LOCATION:	Y-12 PLANT OAK RIDGE, TN.	FIGURE 4 SAMPLING LOCATIONS FOR GROUNDWATER AND SURFACE WATER MONITORING IN THE UPPER EAST FORK POPLAR CREEK HYDROGEOLOGIC REGIME, CY 1996
DATE:	9-29-95	
DWG ID.:	OR429-HC	

APPENDIX B

Tables

Table 1. Sampling Sequence, Frequency, and Analytical Parameters for Groundwater and Surface Water Monitoring at the Y-12 Plant in CY 1996

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
Bear Creek Hydrogeologic Regime				
BC-1 (Q1,Q3)	S3	GW-115	CMP	COMP
	S3	GW-613	CMP	COMP
	S3	GW-614	CMP	COMP
	OLF	GW-044	CMP	COMP
	OLF	GW-043	CMP	COMP
	OLF	GW-084	CMP	COMP
	OLF	GW-363	CMP	COMP
	S3	GW-276 ^a	CMP	COMP
		RINSATE SAMPLE		COMP
		FIELD BLANK		COMP
BC-2 (Q1,Q3)	BG	GW-079	CMP	COMP
	BG	GW-080	CMP	COMP
	BG	GW-040	CMP	COMP
	BG	GW-042	CMP	COMP
	BG	GW-162	CMP	COMP
	BG	GW-642	CMP	COMP
	BG	GW-372	CMP	COMP
	BG	GW-373	CMP	COMP
	BG	GW-069	CMP	COMP
		RINSATE SAMPLE		VOC(1)
BC-3 (Q1,Q3)	EXP-W	GW-710	CMP/EXP	COMP
	EXP-W	GW-711	CMP/EXP	COMP
	EXP-W	GW-712	CMP/EXP	COMP

Table 1 (cont'd)

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
BC-3 (cont'd)	EXP-W	GW-713	CMP/EXP	COMP
	EXP-W	GW-714	CMP/EXP	COMP
	EXP-W	GW-715	CMP/EXP	COMP
		RINSATE SAMPLE		VOC(1)
BC-4 (Q1, Q3)	EXP-A	GW-056	EXP	STD
	EXP-A	GW-685	EXP	STD
	EXP-B	GW-621	EXP	STD
	EXP-B	GW-695	EXP	STD
	EXP-A	GW-683 ^a	EXP	STD
	EXP-A	GW-684 ^a	EXP	STD
	EXP-B	GW-703 ^a	EXP	STD
	EXP-B	GW-704 ^a	EXP	STD
	EXP-B	GW-694 ^a	EXP	STD, RAD(2)
	EXP-B	GW-706 ^a	EXP	STD, RAD(2)
		RINSATE SAMPLE		VOC(1), MET(1), RAD(1), NO3
BC-5 (Q1, Q3)	EXP-C	GW-740 ^a	EXP	STD
	EXP-C	GW-723 ^a	EXP	STD
	EXP-C	GW-738 ^a	EXP	STD
	EXP-C	GW-724 ^a	EXP	STD
	EXP-C	GW-725 ^a	EXP	STD
		RINSATE SAMPLE		VOC(1)
BC-6 (Q1,Q3)	RS	GW-311 ^a	SMP	STD
	SPI	GW-315 ^a	SMP	STD
	OLF	GW-828 ^a	SMP	STD, MET(2)
	OLF	GW-085 ^a	SMP	STD, RAD(2)
	OLF	GW-829 ^a	SMP	STD, MET(2), RAD(2)
	OLF	GW-537 ^a	SMP	STD, RAD(2)
		RINSATE SAMPLE		VOC(1)

Table 1 (cont'd)

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
BC-7 (Q1,Q3)	AGLLSF	GW-793	BMP	STD
	AGLLSF	GW-794	BMP	STD
	AGLLSF	GW-795	BMP	STD
	BG	GW-095	SMP	STD
	BG	GW-287	SMP	STD
	BG	GW-653 ^a	SMP	STD
	BG	GW-053 ^a	SMP	STD
	BG	GW-627 ^a	SMP	STD
		RINSATE SAMPLE		VOC(1)
BC-8 (Q1, Q3)	EXP-SW	BCK-00.63	EXP	STD
	EXP-SW	BCK-04.55	EXP	STD
	EXP-SW	BCK-07.75	EXP	STD
	EXP-SW	SS-5	EXP	STD
	EXP-SW	BCK-09.40	EXP	STD, RAD(2)
	EXP-SW	SS-4	EXP	STD, RAD(2)
	EXP-SW	BCK-10.6	EXP	STD, RAD(2)
	EXP-SW	BCK-11.97	EXP	STD, MET(2), RAD(2)
	EXP-SW	SS-1	EXP	STD, MET(2), RAD(2)
	EXP-SW	NT-01	EXP	STD, MET(2), RAD(2)
Chestnut Ridge Hydrogeologic Regime				
CR-1 (Q1,Q3)	LIV	GW-217	SDM	LF1
	LIV	GW-141	SDM	LF1
	LIV	GW-521	SDM	LF1, RAD(2,3,4,5), VOC(4)
	LIV	GW-522	SDM	LF1
	LIV	GW-305	SDM	LF1
		RINSATE SAMPLE		LF1, VOC(4)

Table 1 (cont'd)

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
CR-2 (Q2,Q4)	UNCS	GW-203	ROD	STD, RAD(3,5)
	UNCS	GW-205	ROD	STD, RAD(3,5)
	UNCS	GW-221	ROD	STD, RAD(3,5)
	UNCS	GW-339	ROD	STD, RAD(3,5)
	UNCS	GW-302	ROD	STD, RAD(3,5)
	UNCS	1090	ROD	STD, RAD(3,5)
		RINSATE SAMPLE		VOC(1)
CR-3 (Q3) (Q3)	CRSP	GW-742	AMP	STD
	CRSP	GW-743	AMP	STD
	CRSP	GW-610	AMP	STD
	CRSP	GW-608	AMP	STD
	CRSP	GW-177	AMP	STD
	CRSP	GW-611	AMP	STD
	CRSP	GW-175 ^a	AMP	STD
	CRSP	GW-609 ^a	AMP	STD
	CRSP	GW-174 ^a	AMP	STD
	CRSP	GW-612 ^a	AMP	STD
		RINSATE SAMPLE		VOC(1), MET(1)
		FIELD BLANK		VOC(1), MET(1)
CR-4 (Q2,Q4)	ECRWP	GW-296	BMP	STD
	ECRWP	GW-294	BMP	STD
	ECRWP	GW-293	BMP	STD
	ECRWP	GW-292	BMP	STD
		RINSATE SAMPLE		VOC(1)

Table 1 (cont'd)

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
CR-5 (Q2,Q4)	CRBAWP	GW-161	BMP	STD
	CRBAWP	GW-160	BMP	STD
	CRBAWP	GW-301	BMP	STD
	CRBAWP	GW-300	BMP	STD
	CRBAWP	GW-299	BMP	STD
	CRBAWP	GW-298	BMP	STD
		RINSATE SAMPLE		VOC(1), MET(1)
CR-6 (Q2,Q4)	CRSDB	GW-159	PDM	FLD, CHEM, MET(1,2), RAD(1), X4
	CRSDB	GW-731	PDM	FLD, CHEM, MET(1,2), RAD(1), X4
	CRSDB	GW-732	PDM	FLD, CHEM, MET(1,2), RAD(1), X4
	CRSDB	GW-156	PDM	FLD, CHEM, MET(1,2), RAD(1), X4
		RINSATE SAMPLE		MET(1,2), RAD(1)
CR-7	KHQ	GW-142	IDM	STD, PHEN, REP, RAD(3)
	KHQ	GW-147	IDM	STD, PHEN, REP, RAD(3)
	KHQ	GW-231	IDM	STD, PHEN, REP, RAD(3)
	KHQ	GW-146	IDM	STD, PHEN, REP, RAD(3)
	KHQ	GW-143	IDM	STD, PHEN, REP, RAD(3)
	KHQ	GW-144	IDM	STD, PHEN, REP, RAD(3)
	KHQ	GW-145	IDM	STD, PHEN, REP, RAD(3)
		RINSATE SAMPLE		VOC(1), MET(1)
CR-8 (Q2, Q4)	ADB	GW-321	BMP	STD
	ADB	GW-513	BMP	STD
	ADB	GW-512	BMP	STD
	ADB	GW-514	BMP	STD
		RINSATE SAMPLE		VOC(1)

Table 1 (cont'd)

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
CR-9	RQ	GW-184	BMP	STD
(Q2, Q4)	RQ	GW-188	BMP	STD
	RQ	GW-187	BMP	STD
	RQ	GW-186	BMP	STD
		RINSATE SAMPLE		VOC(1)
CR-10	LII	GW-539	SDM	LF3
(Q2,Q4)	LII	GW-709	SDM	LF1
	LII	GW-757	SDM	LF1
		RINSATE SAMPLE		VOC(1,2,3)
CR-11	CDLVI	GW-540	SDM	LF2
(Q2, Q4)	CDLVI	GW-546	SDM	LF2
	CDLVI	GW-541	SDM	LF2
	CDLVI	GW-827	SDM	LF2
	CDLVI	GW-542	SDM	LF2
	CDLVI	GW-543	SDM	LF2
	CDLVI	GW-544	SDM	LF2
		RINSATE SAMPLE		VOC(1,3)
CR-12	CDLVII	GW-560	SDM	LF3, TPH
(Q2,Q4)	CDLVII	GW-562	SDM	LF3, TPH
	CDLVII	GW-564	SDM	LF3, TPH
	LV	GW-557	SDM	LF3
	LV	GW-799	SDM	LF3
	CDLVII	GW-798	SDM	LF3, TPH
	LV	GW-797	SDM	LF3
	LV	GW-796	SDM	LF3
	LV	GW-801	SDM	LF3
	LV	CBS-1	SDM	LF3, TPH
		RINSATE SAMPLE		VOC(1,2,3), RAD(1)

Table 1 (cont'd)

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
Upper East Fork Poplar Creek Hydrogeologic Regime				
EF-1	B4	GW-191	GMP	STD
	B4	GW-194	GMP	STD
	B4	GW-195	GMP	STD
	WC	GW-338	GMP	STD
	B4	GW-192 ^a	GMP	STD
	EXP-E	GW-617 ^a	EXP	STD
	EXP-E	GW-618 ^a	EXP	STD
	S2	GW-251 ^a	GMP	STD
	FTF	GW-619 ^a	GMP	STD
	FTF	GW-620 ^a	GMP	STD
		RINSATE SAMPLE		VOC(1)
		FIELD BLANK		VOC(1)
EF-2	GRID E2	GW-786	GMP	STD
	GRID E2	GW-787	GMP	STD
	GRID F2	GW-779	GMP	STD
	GRID F2	GW-780	GMP	STD
	GRID F3	GW-788	GMP	STD
	GRID F3	GW-789	GMP	STD
	GRID D2	GW-792 ^a	GMP	STD
	GRID E3	GW-781 ^a	GMP	STD
	GRID E3	GW-783 ^a	GMP	STD
	GRID E3	GW-782 ^a	GMP	STD
	GRID D2	GW-791 ^a	GMP	STD
		RINSATE SAMPLE		VOC(1)

Table 1 (cont'd)

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
EF-3	GRID I2	GW-766	GMP	STD
	GRID I2	GW-767	GMP	STD
	GRID H3	GW-775	GMP	STD
	GRID H3	GW-776	GMP	STD
	GRID G3	GW-770	GMP	STD
	GRID G3	GW-769	GMP	STD
		RINSATE SAMPLE		VOC(1)
EF-4	GRID JP	GW-763 ^a	GMP	STD
	NHP	GW-148 ^a	BMP	STD
	NHP	GW-149 ^a	BMP	STD
	NHP	GW-153 ^a	BMP	STD
	NHP	GW-223 ^a	BMP	STD
	NHP	GW-222 ^a	BMP	STD
	NHP	GW-154 ^a	BMP	STD
	NHP	GW-380 ^a	AMP	STD
	NHP	GW-240 ^a	AMP	STD
	NHP	GW-220 ^a	AMP	STD
	NHP	GW-151 ^a	AMP	STD
	NHP	GW-383 ^a	AMP	STD
		RINSATE SAMPLE		VOC(1), MET(1)
EF-5 (Q1,Q3)	EXP-SW	LRSPW	EXP	STD, BNA
EF-6	GRID J3	GW-751	GMP	STD
	GRID J3	GW-752	GMP	STD
	GRID K1	GW-744	GMP	STD
	GRID K1	GW-745	GMP	STD
	GRID K1	GW-746	GMP	STD

Table 1 (cont'd)

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
EF-6 (cont'd)	GRID K2	GW-747	GMP	STD
	GRID K2	GW-748	GMP	STD
	GRID K2	GW-749	GMP	STD
	GRIDK3	GW-817	GMP	STD
	NHP	GW-385	AMP	STD
	NHP	GW-384	AMP	STD
		RINSATE SAMPLE		VOC(1)
EF-7	EXP-SR	GW-207	EXP	STD
	EXP-SR	GW-208	EXP	STD
	EXP-SR	GW-816	EXP	STD
	EXP-J	GW-603	EXP	STD
	EXP-J	GW-604	EXP	STD
	EXP-J	GW-735	EXP	STD
	EXP-J	GW-750	EXP	STD
	EXP-J	GW-733 ^a	EXP	STD
	EXP-I	GW-605 ^a	EXP	STD
	EXP-I	GW-606 ^a	EXP	STD
		RINSATE SAMPLE		VOC(1)
EF-8	EXP-UV	GW-171	EXP	COMP, BNA
	EXP-UV	GW-172	EXP	COMP, BNA
	EXP-UV	GW-230	EXP	COMP, BNA
	EXP-UV	GW-169	EXP	COMP, BNA
	EXP-UV	GW-232	EXP	COMP, BNA
	EXP-UV	GW-170 ^a	EXP	COMP, BNA
		RINSATE SAMPLE		VOC(1), MET(1), RAD(1,2,3,4,5), NO3

Table 1 (cont'd)

Sample Group ¹	Location ²	Sampling Point ³	Monitoring Driver ⁴	Parameters ⁵
EF-9 (Q2)	GRIDC2	55-6A ^a	BMP	STD
	GRIDB2	55-1A ^a	BMP	STD
	GRIDB2	55-1C ^a	BMP	STD
	UOV	GW-218 ^a	BMP	STD
	CPT	GW-690 ^a	BMP	STD
	CPT	GW-691 ^a	BMP	STD
	CPT	GW-692 ^a	BMP	STD
	B8110	GW-700 ^a	BMP	STD
	B8110	GW-698 ^a	BMP	STD
	GRIDC3	56-4C ^a	BMP	STD
	GRIDB3	55-2C ^a	BMP	STD
	GRIDB3	55-2B ^a	BMP	STD
	S2	GW-253 ^a	BMP	STD, MET(2), RAD(2)
		RINSATE SAMPLE		VOC(1)

Notes:

- 1 Samples will be collected quarterly unless specific sampling quarters are identified. Surface water samples in BC-10 will be collected on or about the same day as wells GW-683 and GW-684 in BC-9 are sampled. Samples collection for surface water locations in EF-10 will coincide with sampling of EF-6 monitoring wells.

Table 1 (cont'd)

Notes (cont):

2

Bear Creek Regime

- AGLLSF - Above Grade Low-Level Storage Facility
- BG - Bear Creek Burial Grounds WMA
- EXP - Exit Pathway Monitoring Location:
Maynardville Limestone Transverse (-A, -B, -C, -W)
Spring or Surface Water Location (-SW)
- OLF - Oil Landfarm WMA
- RS - Rust Spoil Area
- S3 - S-3 Site
- SPI - Spoil Area I

Chestnut Ridge Regime

- ADB - Ash Disposal Basin
- CDLVI - Construction/Demolition Landfill VI
- CDLVII - Construction/Demolition Landfill VII
- CRBAWP - Chestnut Ridge Borrow Area Waste Pile
- CRSDB - Chestnut Ridge Sediment Disposal Basin
- CRSP - Chestnut Ridge Security Pits
- ECRWP - East Chestnut Ridge Waste Pile
- KHQ - Kerr Hollow Quarry (located in Bethel Valley)
- LII - Industrial Landfill II
- LIV - Industrial Landfill IV
- LV - Industrial Landfill V
- RQ - Rogers Quarry (located in Bethel Valley)
- UNCS - United Nuclear Corporation Site

East Fork Regime

- B4 - Beta-4 Security Pits
- EXP - Exit Pathway Monitoring Location:
Maynardville Limestone Transverse (-E, -I, -J)
Offsite in Union Valley (UV)
Along Scarboro Road in the gap through Pine Ridge (-SR)
- FTF - Fire Training Facility
- GRID - Comprehensive Groundwater Monitoring Plan Grid Location
- NHP - New Hope Pond
- S2 - S-2 Site
- SY - Y12 Salvage Yard
- UOV - Uranium Oxide Vault
- WC - Waste Coolant Processing Area
- Y12 - Y-12 Plant Complex

Table 1 (cont'd)

Notes (cont):

- 3 BCK - Bear Creek Kilometer (Surface-Water Sampling Station)
 CBS - Spring Sampling Location: Chestnut Ridge Regime
 GW - Groundwater Monitoring Well
 LRSPW - Lake Reality Emergency Spillway (Surface Water Sampling Station)
 NT - North Tributary to Bear Creek
 SS - Spring Sampling Location: Bear Creek Regime

- 4 AMP - RCRA Interim Status Assessment Monitoring
 BMP - Best-Management Practice Monitoring
 CMP - RCRA Post-Closure Corrective Action Monitoring
 EXP - DOE Order 5400.1 Exit Pathway Monitoring
 GMP - Grid Well (DOE Order 5400.1 Surveillance) Monitoring
 IDM - RCRA Interim Status Detection Monitoring
 PDM - RCRA Post-Closure Detection Monitoring
 ROD - CERCLA Record of Decision Monitoring
 SDM - SWDF Detection Monitoring
 SMP - DOE Order 5400.1 Surveillance Monitoring

- 5 A list of administrative parameter groups (i.e., STD, COMP) is provided in Table 2, including a complete listing of analytical parameters.

- a All purged groundwater will be contained.

Table 2. Administrative Parameter Groups and Analytical Parameters for Groundwater and Surface Water Monitoring at the Y-12 Plant During CY 1996

Parameter Group	Symbol	Parameters Included ¹
Standard Parameter Group	STD	FLD, CHEM, MET(1), VOC(1), RAD(1)
Compliance Monitoring	COMP	STD, MET(2), VOC(4), RAD(2,3,4,5)
Landfill Parameter Groups	LF1	STD, MET(2,3), VOC(2,3), MISC(1,2)
	LF2	STD, MET(2,3), VOC(3), RAD(3,6), MISC(1,2,3)
	LF3	STD, MET(2,3), VOC(2,3), RAD(3,6), MISC(1,2,3)

Notes:

I A complete listing of analytes is provided below:

FLD: FIELD MEASUREMENTS

Depth to Water	Temperature	pH
Specific Conductance (COND)	Dissolved	Oxidation-Reduction

CHEM: WET CHEMISTRY

Anions

Alkalinity - Carbonate	Chloride IC	Nitrate Nitrogen (N03)
Alkalinity - Bicarbonate	Fluoride SIE	Sulfate

Other Parameters

Total Suspended Solids	pH
Turbidity	COND
Total Dissolved Solids	

Table 2 (cont'd)

TRACE METALS (Filtered and Unfiltered Samples)**MET(1):****Inductively Coupled Plasma**

Aluminum	Cadmium	Lead	Selenium
Antimony	Calcium	Magnesium	Silver
Arsenic	Chromium	Manganese	Sodium
Barium	Cobalt	Molybdenum	Strontium
Beryllium	Copper	Nickel	Thorium
Boron	Iron	Potassium	Vanadium
			Zinc

Plasma Mass Spectrometry

Uranium

Cold Vapor Atomic Absorption

Mercury

MET(2): Atomic Absorption Spectrometry

Lead

MET(3): Atomic Absorption Spectrometry

Thallium

VOLATILE ORGANIC COMPOUNDS**VOC(1): Target Compound List**

Acetone	1,2-Dichloropropane
Benzene	cis-1,3-Dichloropropene
Bromodichloromethane	trans-1,3-Dichloropropene
Bromoform	Ethylbenzene
Bromomethane	2-Hexanone
2-Butanone	4-Methyl-2-pentanone
Carbon disulfide	Methylene chloride
Carbon tetrachloride	Styrene
Chlorobenzene	1,1,2,2-Tetrachloroethane
Chlorodibromomethane	Tetrachloroethene
Chloroethane	Toluene

Table 2 (cont'd)

VOC(1)	Chloroform	1,1,1-Trichloroethane
(cont'd)	Chloromethane	1,1,2-Trichloroethane
	1,1-Dichloroethane	Trichloroethene
	1,2-Dichloroethane	Vinyl acetone
	1,1-Dichloroethene	Vinyl chloride
	1,2-Dichloroethene	Xylenes
VOC(2):	Additional Organics	
	Acrolein	Ethanol
	Acrylonitrile	Ethyl methacrylate
	2-Chloroethyl vinyl ether	Iodomethane
	Dibromomethane	Trichlorofluoromethane
	1,4-Dichloro-2-butene	1,2,3-Trichloropropane
	Dichlorodifluoromethane	
VOC(3):	Other Organics (preserved)	
	Bromochloromethane	1,4-Dichlorobenzene - BNA
	Dibromomethane - VOC(2)	Cis-1,2-Dichloroethene
	1,2-Dibromo-3-chloropropane	Trans-1,2-Dichloroethene - VOC(4)
	1,2-Dichlorobenzene - BNA	1,1,1,2-Tetrachloroethane
VOC(4):	Trans-1,2-Dichloroethene	
BNA:	Base, Neutral, and Acid Extractable Organic Compounds	
	Acenaphthene	Nitrobenzene
	Acenaphthylene	Pentachlorophenol
	Anthracene	Phenol
	Benzo (A) Anthracene	Phenanthrene
	Benzo (A) Pyrene	Pyrene
	Benzo (B) Fluoranthene	4-Bromophenyl Phenyl Ether
	Benzo (G,H,I) Perylene	2-Chloronaphthalene
	Benzo (K) Fluoranthene	2-Chlorophenol
	Benzoic Acid	4-Chlorophenyl Phenyl Ether
	Benzyl Alcohol	4-Chloro-3-Methylphenol
	Bis (2-Chloroethoxy) Methane	4-Chloroaniline
	Bis (2-Chloroethyl) Ether	1,2-Dichlorobenzene

Table 2 (cont'd)

BNA	Bis (2-Chloroisopropyl) Ether	1,3-Dichlorobenzene
(cont'd)	Bis (2-Ethylhexyl) Phthalate	1,4-Dichlorobenzene
	Butyl Benzyl Phthalate	2,4-Dinitrotoluene
	Chrysene	2,6-Dinitrotoluene
	Dibenzofuran	2,4-Dichlorophenol
	Dibenzo (A,H) Anthracene	2,4-Dimethylphenol
	Diethylphthalate	2,4-Dinitrophenol
	Dimethylphthalate	3,3-Dichlorobenzidine
	Di-N-Butylphthalate	4,6-Dinitro-2-Methylphenol
	Di-N-Octylphthalate	2-Methylnaphthalene
	Fluoranthene	2-Methylphenol
	Fluorene	4-Methylphenol
	Hexachlorobenzene	2-Nitrophenol
	Hexachlorobutadiene	2-Nitroaniline
	Hexachlorocyclopentadiene	3-Nitroaniline
	Hexachloroethane	4-Nitroaniline
	Ideno(1,2,3-CD) Pyrene	4-Nitrophenol
	Isophorone	1,2,4-Trichlorobenzene
	N-Nitrosodi-N-Propylamine	2,4,5-Trichlorophenol
	N-Nitrosodiphenylamine	2,4,6-Trichlorophenol
	Naphthalene	

RADIOLOGICAL PARAMETERS

RAD(1):	Gross Alpha Activity	Gross Beta Activity	
RAD(2):	(X-10)		
	Technetium (^{99}Tc)	Strontium	Tritium
RAD(3):	Uranium (^{234}U , ^{235}U , and ^{238}U)		
RAD(4):	(X-10)		
	Americium (^{241}Am)	Iodine (^{129}I)	Plutonium (^{239}Pu)
	Neptunium (^{237}Np)	Plutonium (^{238}Pu)	
RAD(5):	Radium		

Table 2 (cont'd)

RAD(6): Gamma Activity (spectrum)

MISCELLANEOUS PARAMETERS

MISC(1): Total Organic Carbon (TOC) Total Organic Halides (TOX)

MISC(2): Chemical Oxygen Demand Cyanide

MISC(3): Ammonia

PHEN: Phenols

REP: 4 Replicate Samples

pH COND TOC TOX

TPH: Total Petroleum Hydrocarbons (Deisel Range Organics)

X4: Four (4) discrete samples, one sample collected during four consecutive days

pH COND TOC TOX

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