Y/SUB/97-KDS15V/7

Y-12

OAK RIDGE
Y-12
PLANT

LOCKHEED MARTIN

Y-12 PLANT GROUNDWATER PROTECTION PROGRAM GROUNDWATER AND SURFACE WATER SAMPLING AND ANALYSIS PLAN FOR CALENDAR YEAR 1998

Prepared by

AJA TECHNICAL SERVICES, INC
Under Subcontract 70Y-KDS15V

September 1997

for the

Water Compliance Department
Environmental Compliance 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 No. DE-AC05-84OR21400

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

UCN-13672 (26 6-95)

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List of Acronyms and Abbreviations

ASO	Analytical Services Organization
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
RCRA	Resource Conservation and Recovery Act
SESD	Sampling and Environmental Support Department

1.0 INTRODUCTION

This plan provides a description of the groundwater and surface water quality monitoring activities planned for calendar year (CY) 1998 at the Department of Energy (DOE) Y-12 Plant. These monitoring activities are managed by the Y-12 Plant Environmental Compliance Organization through the Y-12 Plant Groundwater Protection Program (GWPP).

Groundwater and surface water monitoring during CY 1998 will be performed in three hydrogeologic regimes at the Y-12 Plant: 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).

Groundwater and surface water monitoring will be performed during CY 1998 to comply with:

- requirements specified in Resource Conservation and Recover Act (RCRA) post-closure permits regarding RCRA corrective action monitoring and RCRA detection monitoring;
- Tennessee Department of Environment and Conservation regulations governing detection monitoring at nonhazardous solid waste management facilities; and
- DOE Order 5400.1 surveillance monitoring and exit pathway monitoring.

Data from some of the sampling locations in each regime will be used to meet the requirements of more than one of the monitoring drivers listed above.

Modifications to the CY 1998 monitoring program may be necessary during implementation. For example, changes in regulatory requirements may alter the parameters specified for selected monitoring wells, or wells could be removed from the planned 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 a total of 111 monitoring wells, including 31 wells located in the Bear Creek Regime (Figure 2), 34 wells located in the Chestnut Ridge Regime (Figure 3), and 46 wells located in the East Fork Regime (Figure 4). Samples of groundwater discharging from 10 natural springs also will be collected, including four springs (SS-1, SS-4, SS-5, and SS-6) in the Bear Creek Regime (Figure 2) and six springs (SCR2.1SP, SCR2.2SP, SCR3.4SP, SCR4.3SP, SCR5.1SP, and SCR5.4SP) in the Chestnut Ridge Regime (Figure 3).

Surface water samples will be collected from a total of eight sampling locations during CY 1998, including seven locations in the Bear Creek Regime and one location in the East Fork regime. In the Bear Creek Regime, samples will be collected from Bear Creek at six sampling stations located from about 0.6 to 12 kilometers upstream of the confluence of Bear Creek and East Fork Poplar Creek (BCK-00.63 to BCK-11.97), and from one sampling station along a northern tributary to Bear Creek (NT-01) (Figure 2). In the East Fork Regime, samples will be collected from the Lake Reality Emergency Spillway (LRSPW) (Figure 4).

3.0 SAMPLE COLLECTION

Groundwater and surface water samples will be collected by personnel from the Sampling and Environmental Support Department (SESD) of the Analytical Services Organization (ASO). Sampling will be performed in accordance with the most recent version of the technical procedure for groundwater and surface water sampling approved by the Y-12 Plant GWPP Manager (SESD-TP-8204). Descriptions of the field methods and procedures are contained in *Environmental Surveillance Procedures Quality Control Manual* (Martin Marietta Energy Systems, Inc. 1988). Sample collection, handling, analysis, and surveillance will be performed in accordance with the GWPP Quality Program Plan (Science Applications International Corporation 1994), and the ASO Laboratory Quality Assurance Project Plan for Groundwater monitoring at the Y-12 Plant (Martin Marietta Energy Systems 1991).

Monitoring wells, springs, and surface water stations are subdivided into sample groups based on hydrogeologic regimes. These sample groups, located in the Bear Creek (BC), Chestnut Ridge (CR), and East Fork (EF) hydrogeologic 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. Some sampling groups consist of wells that are widely scattered, but are grouped by monitoring requirements (e.g., corrective action monitoring in sampling group EF-1). The sampling groups generally are arranged from hydraulically upgradient to downgradient areas in each regime. 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).

Samples will be collected semiannually from all of the monitoring wells, springs, and surface water stations in each regime, with the exception of 13 wells that will be sampled only in the first quarter of CY 1998. As summarized below, the number of samples to be collected during each quarter will be fairly consistent, ranging from 71 to 84, for an annual total of 319 samples:

HYDROGEOLOGIC REGIME	NUMBER OF SAMPLES PER QUARTER OF CY 1998		
	1st and 3rd	2nd and 4th	1st Only
BC Regime	42	0	.
CR Regime	24	44	1
EF Regime	5	39	12
TOTAL:	**71**	**83**	**13**

The total number of samples shown for the second and fourth quarters includes four discrete replicate samples collected from nine wells in post-closure detection monitoring (CR-6 and CR-7),

and ten samples from separate ports in one well equipped with a Westbay® multiport sampling system (GW-722, EF-WB).

In addition to the groundwater and surface water samples, equipment rinsate and field blank samples will be collected at the frequencies and analyzed for the parameters specified on Table 1. Equipment rinsate samples will be collected from non-dedicated pumps used in sampling groups that have inorganic analyses specified for the rinsate. Equipment rinsates will not be collected from sampling groups where all wells have dedicated sampling devices. The rinsate sample will be collected at the last well sampled with each non-dedicated pump, immediately following the field cleaning procedure. Rinsate samples analyzed for organic compounds 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 (Table 1).

Trip blank samples, field duplicate samples, and laboratory quality assurance samples will be prepared and analyzed as specified in the ASO Laboratory Quality Assurance Project Plan (Martin Marietta Energy Systems, Inc. 1991) 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 10% of the sampling locations (Table 1).

4.0 ANALYTICAL PARAMETERS

The various monitoring drivers for CY 1998 require an extensive list of analytes. For this Sampling and Analysis Plan, specific analytes are grouped by analytical method or by type (e.g., metals) and referenced as analytical parameters. Analytical parameters commonly grouped for monitoring purposes are assembled into the administrative parameter groups listed on Table 2. Most groundwater and surface water samples will be analyzed for the following suite of parameters (identified as the Standard Administrative Parameter Group):

- 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 ions;
- trace metals (unfiltered [total] and filtered [dissolved] concentrations);
- a comprehensive suite of organic compounds; and
- gross alpha and gross beta activity.

Regulatory drivers for several monitoring wells require other specific compounds or parameter groups in addition to the analytes included in the Standard Administrative Parameter Group. For example, the Compliance Monitoring Parameter Groups include additional radiological analytes that will be reported for samples from RCRA corrective action monitoring wells in sample groups BC-1 and EF-1 (Tables 1 and 2).

5.0 REFERENCES

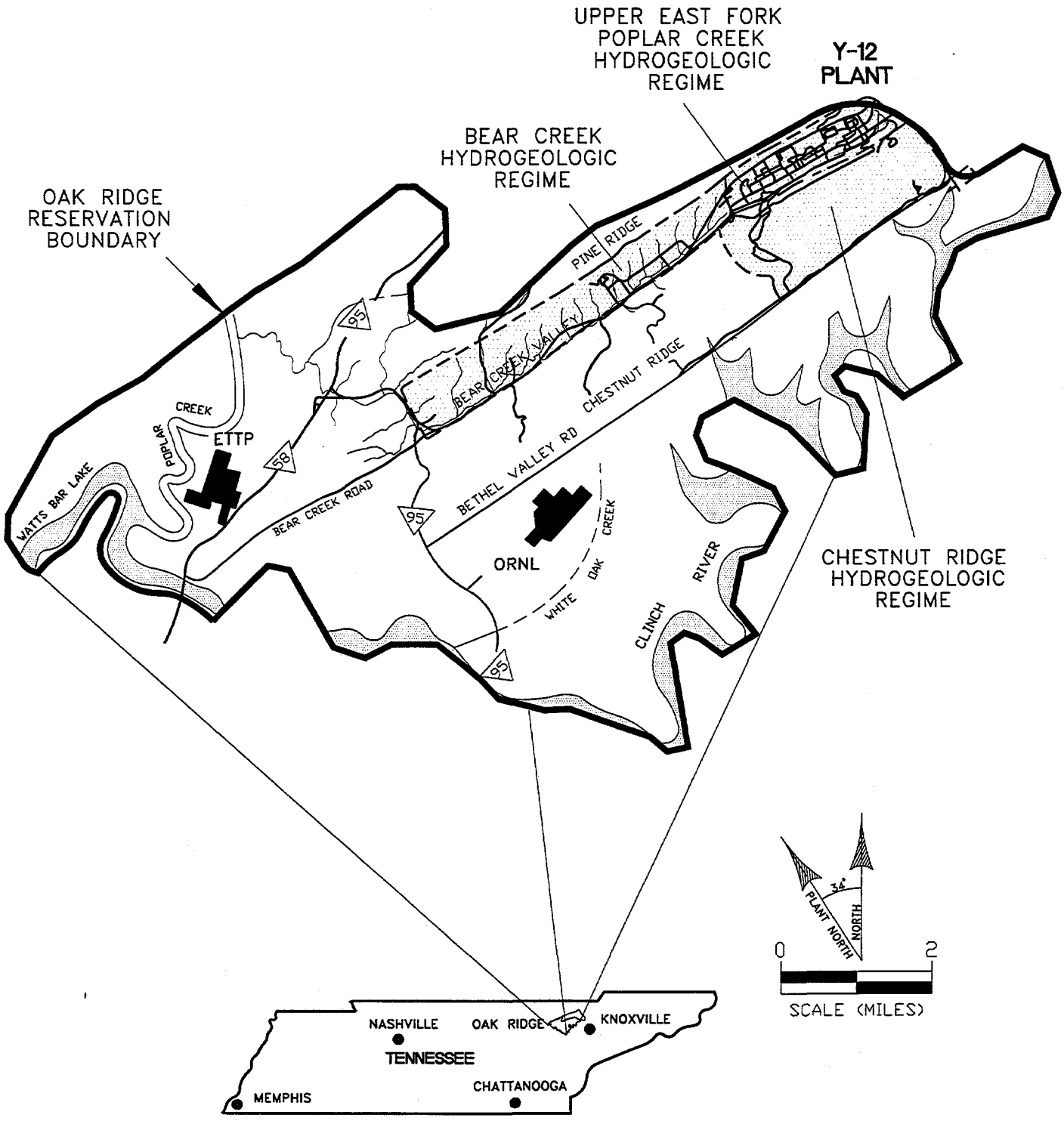
Martin Marietta Energy Systems, Inc. 1988. *Environmental Surveillance Procedures Quality Control Manual.* (ES/ESH/INT-14).

Martin Marietta Energy Systems, Inc. 1991. *Laboratory Quality Assurance Project Plan for the Sampling and Analysis of Groundwater Wells at the Y-12 Plant Site on the Oak Ridge Reservation.* Prepared by Analytical Chemistry Department Technical Division, QAP: 04-90-0014.

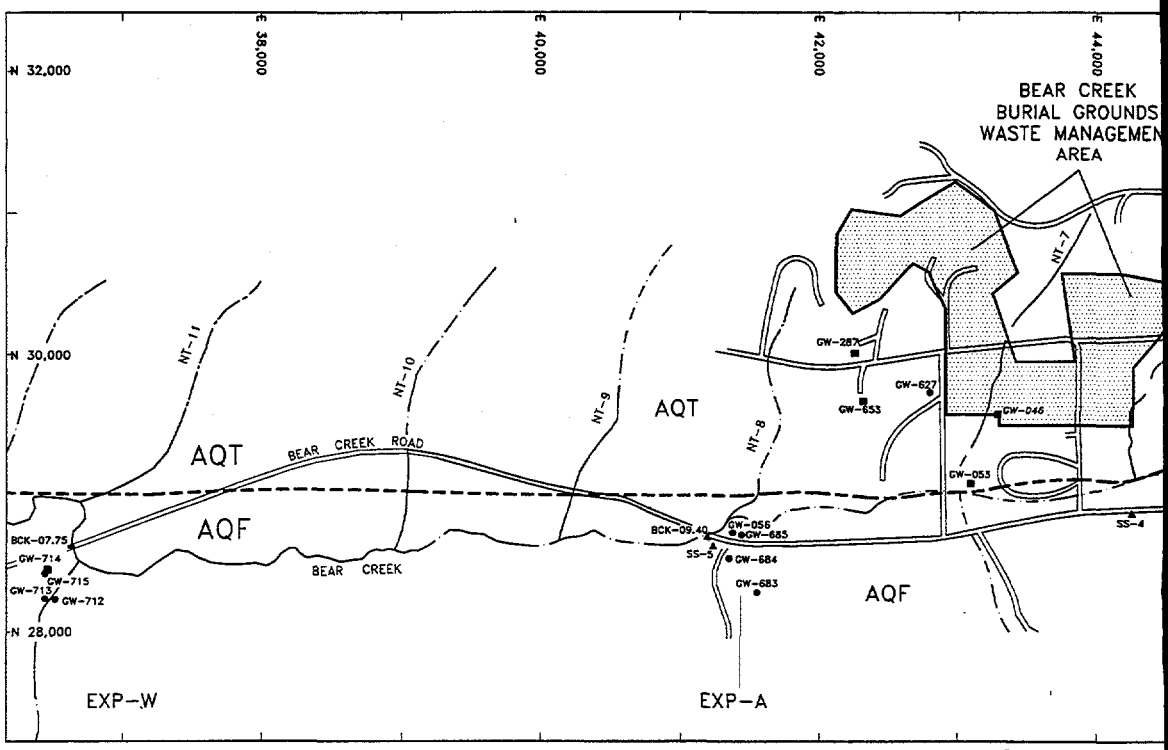
Science Applications International Corporation. 1994. *Groundwater Protection Program Quality Program Plan.* Prepared for Martin Marietta Energy Systems, Inc. (Y/SUB/94-99069C/Y13/1).

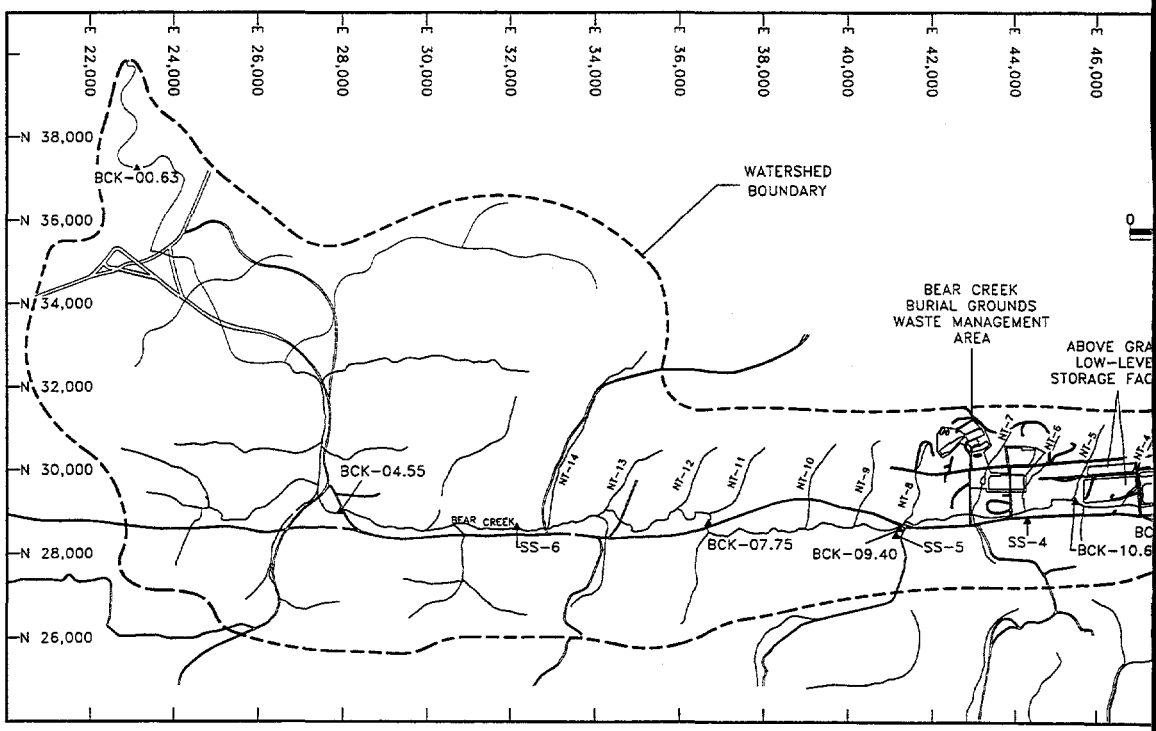
APPENDIX A

Figures



PREPARED FOR: *LOCKHEED MARTIN ENERGY SYSTEMS, INC.*	LOCATION:	Y-12 PLANT OAK RIDGE, TN.	FIGURE 1
PREPARED BY: *AJA TECHNICAL SERVICES, INC.*	DOC NUMBER:	97-D003	HYDROGEOLOGIC REGIMES AT THE Y-12 PLANT
	DWG ID.:	97-007	
	DATE:	8-10-97	

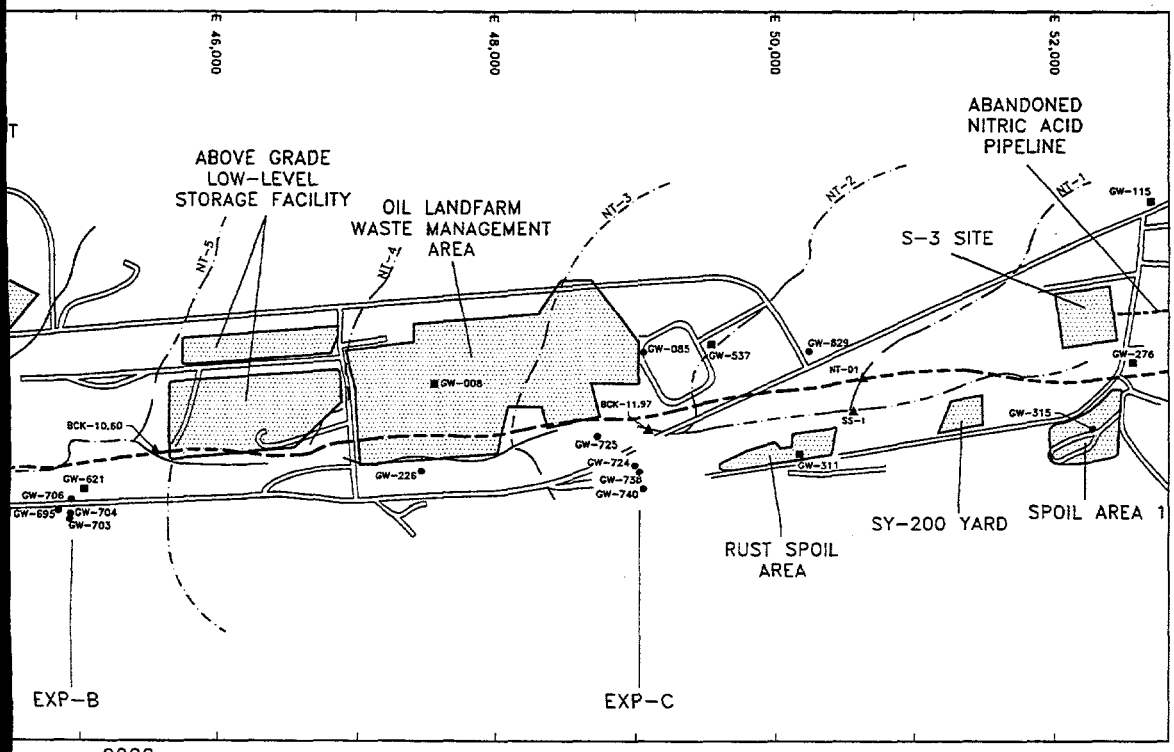




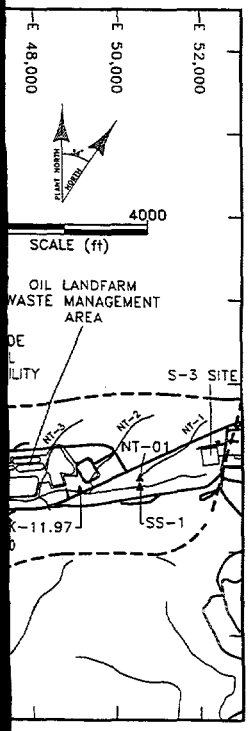
SPRINGS AND SURFACE WATER SAMPLING LOCATIONS

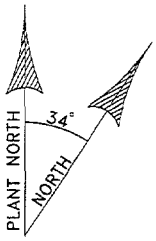
0 2000

SCALE (ft)



2000
(ft)

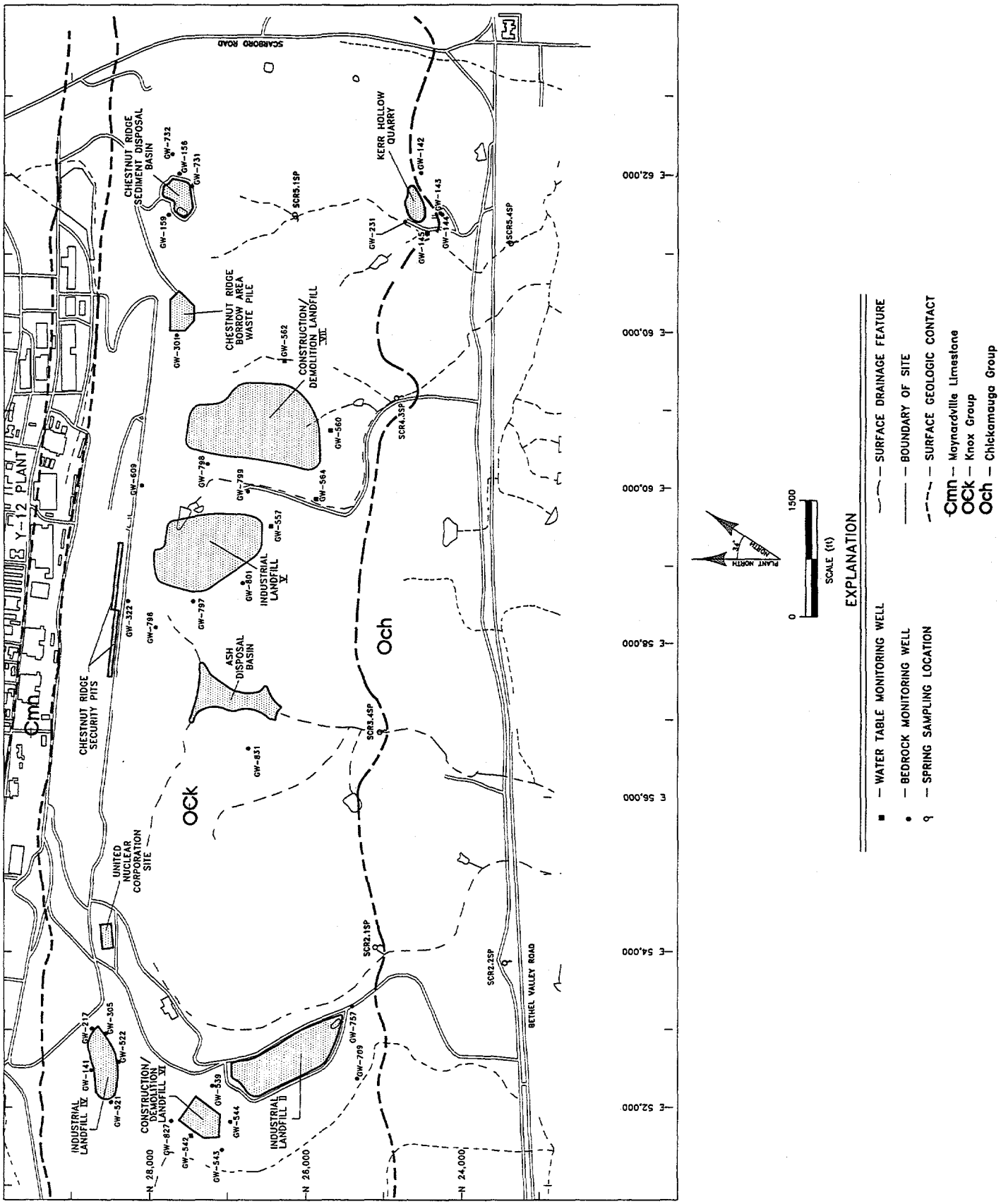




EXPLANATION

- ■ — Water Table Monitoring Well
- • — Bedrock Monitoring Well
- ▲ — Spring or Surface Water Sampling Station
- EXP-C — Exit Pathway, Maynardville Limestone Picket
- – – – – – — Surface Drainage Feature
- NT-5 — North Tributary
- AQT — Aquitard
- ——— — Approximate Nolichucky Shale\Maynardville Limestone Contact
- AQF — Aquifer

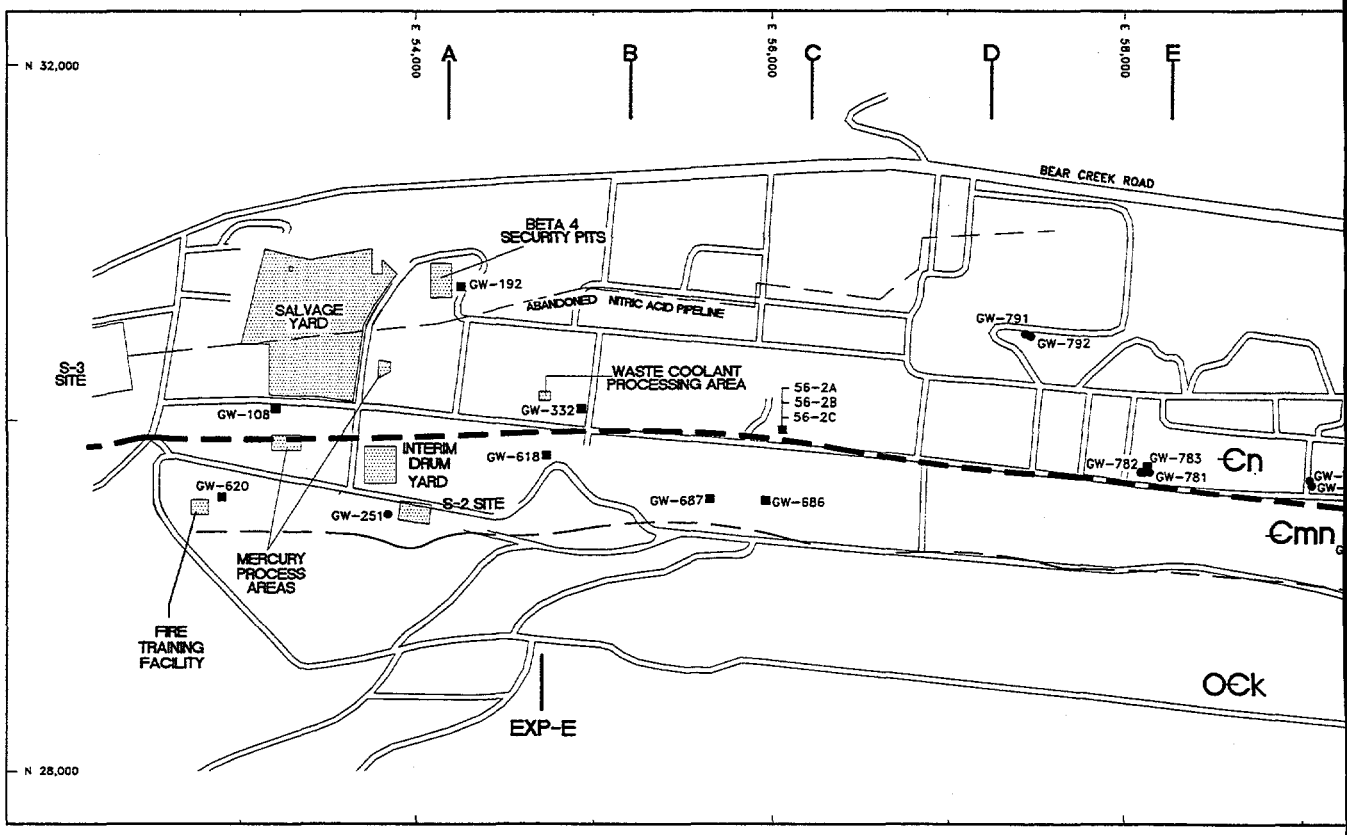
PREPARED FOR: *LOCKHEED MARTIN ENERGY SYSTEMS, INC.*	LOCATION:	Y-12 PLANT OAK RIDGE, TN.	FIGURE 2
PREPARED BY: *AJA TECHNICAL SERVICES, INC.*	DOC NUMBER:	96-D006	SAMPLING LOCATIONS IN THE BEAR CREEK HYDROGEOLOGIC REGIME, CY 1998
	DWG ID.:	96-028	
	DATE:	8-10-97	



PREPARED FOR: *LOCKHEED MARTIN ENERGY SYSTEMS, INC.*	LOCATION:	Y-12 PLANT OAK RIDGE, TN.
PREPARED BY: *AJA TECHNICAL SERVICES, INC.*	DOC NUMBER:	96-D001
	DWG ID.:	96-033
	DATE:	9-24-96

FIGURE 3

SAMPLING LOCATIONS IN THE CHESTNUT RIDGE HYDROGEOLOGIC REGIME, CY 1998



■ — Water Table M

• — Bedrock Monit

◇ — Well With West

▲ — Surface Water

LRSPW — Lake Reality E

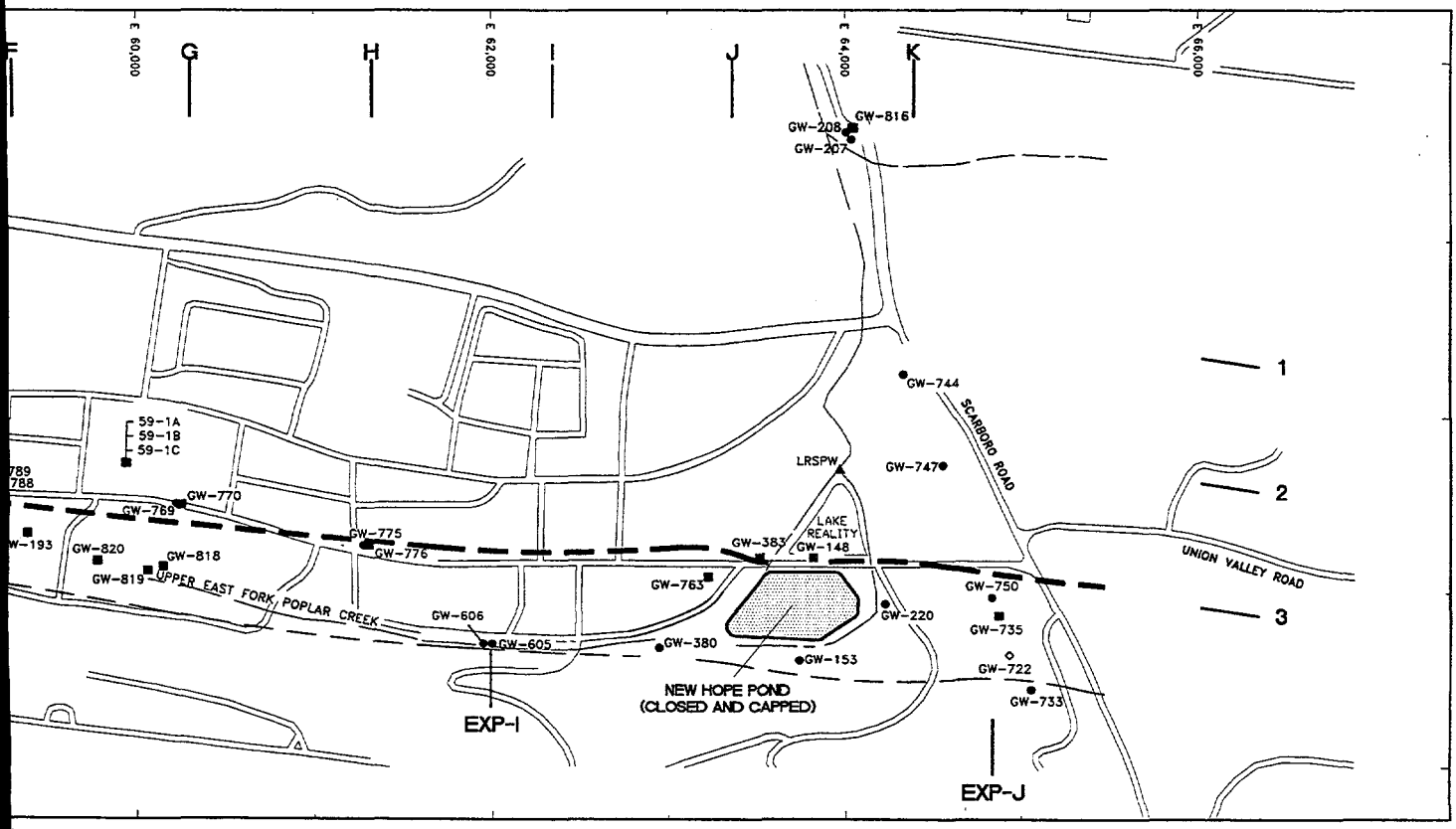
EXP-E — Exit Pathway,

K
1 — Comprehensive

Cn — NOLICHUCKY SH

Cmn — MAYNARDVILLE L

OCk — KNOX GROUP —



EXPLANATION

onitoring Well

oring Well

bay Multiport Sampling System (10 Sampling Locations)

Sampling Location

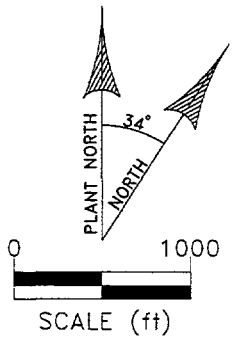
mergency Spillway

Maynardville Limestone Picket

Groundwater Monitoring Grid

LE —— AQUITARD

MESTONE —— AQUIFER



PREPARED FOR: *LOCKHEED MARTIN ENERGY SYSTEMS, INC.*	LOCATION:	Y-12 PLANT OAK RIDGE, TN.	FIGURE 4
PREPARED BY: *AJA TECHNICAL SERVICES, INC.*	DOC NUMBER:	96-D006	SAMPLING LOCATIONS IN THE UPPER EAST FORK POPLAR CREEK HYDROGEOLOGIC REGIME, CY 1998
	DWG ID.:	96-075	
	DATE:	8-10-97	

APPENDIX B

Tables

Table 1.
Sampling Sequence, Frequency, and Analytical Parameters for Groundwater and Surface Water Monitoring at the Y-12 Plant During CY 1998

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Contain[5]	Monitoring Driver[6]	Parameters[7]
Bear Creek Hydrogeologic Regime						
BC-1	S3	GW-115			CMP	COMP1
(Q1,Q3)	EXP-W	GW-712			CMP/EXP	COMP1
	EXP-W	GW-713	Y		CMP/EXP	COMP1
	EXP-W	GW-714			CMP/EXP	COMP1
	EXP-W	GW-715			CMP/EXP	COMP1
	S3	GW-276		Y	CMP	COMP1
	OLF	GW-008		Y	CMP	COMP1
	BG	GW-046		Y	CMP	COMP1
		FIELD BLANK				VOC(1)
BC-2	EXP-A	GW-056			EXP	STD
(Q1, Q3)	EXP-A	GW-685			EXP	STD
	EXP-B	GW-621			EXP	STD
	EXP-B	GW-695			EXP	STD
	EXP-A	GW-683		Y	EXP	STD
	EXP-A	GW-684	Y	Y	EXP	STD
	EXP-B	GW-703		Y	EXP	STD
	EXP-B	GW-704		Y	EXP	STD
	EXP-B	GW-706		Y	EXP	STD
BC-3	BG	GW-287			SMP	STD
(Q1, Q3)	SPI	GW-315		Y	SMP	STD
	RS	GW-311		Y	SMP	STD
	OLF	GW-829		Y	SMP	STD
	OLF	GW-085		Y	SMP	STD
	OLF	GW-537	Y	Y	SMP	STD
	OLF	GW-226		Y	SMP	STD, RAD (3,11,12)
	EXP-C	GW-740		Y	EXP	STD
	EXP-C	GW-738		Y	EXP	STD

Table 1 (cont'd)

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Contain[5]	Monitoring Driver[6]	Parameters[7]
BC-3 (cont'd)	EXP-C	GW-724		Y	EXP	STD
	EXP-C	GW-725		Y	EXP	STD
	BG	GW-653		Y	SMP	STD
	BG	GW-053		Y	SMP	STD
	BG	GW-627		Y	SMP	STD
BC-4	EXP-SW	BCK-00.63			EXP	STD
(Q1, Q3)	EXP-SW	BCK-04.55			EXP	STD
	EXP-SW	SS-6[a]			EXP	STD
	EXP-SW	BCK-07.75			EXP	STD
	EXP-SW	SS-5[a]			EXP	STD
	EXP-SW	BCK-09.40[a]	Y		EXP	STD
	EXP-SW	SS-4			EXP	STD
	EXP-SW	BCK-10.60			EXP	STD
	EXP-SW	BCK-11.97			EXP	STD, RAD(2,3,4,5,8,13)
	EXP-SW	SS-1			EXP	STD
	EXP-SW	NT-01			EXP	STD
		Chestnut Ridge Hydrogeologic Regime				
CR-1	LIV	GW-217			SDM	STD
(Q1,Q3)	LIV	GW-141	Y		SDM	STD
	LIV	GW-521			SDM/CMP	STD
	LIV	GW-522			SDM	STD
	LIV	GW-305			SDM	STD
CR-2	CRSP	GW-831			CMP	STD
(Q1,Q3)	CRBAWP	GW-301			CMP	STD
	CRSP	GW-609[a]		Y	CMP	STD
CR-3	LV	GW-557	Y		SDM/CMP	STD
(Q1,Q3)	LV	GW-799			SDM/CMP	STD
	LV	GW-797			SDM	STD

Table 1 (cont'd)

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Contain[5]	Monitoring Driver[6]	Parameters[7]
CR-3 (cont'd)	LV	GW-796			SDM/CMP	STD
	LV	GW-801			SDM/CMP	STD
	LV	SCR4.3SP			SDM	STD
		FIELD BLANK				VOC(1)
CR-4	CDLVII	GW-560			SDM	STD
(Q1,Q3)	CDLVII	GW-562			SDM	STD
	CDLVII	GW-564			SDM	STD
	CDLVII	GW-798			SDM/CMP	STD
CR-5	CRSP	GW-322[b]		Y	SMP	STD
(Q1,Q3)	EXP-SW	SCR2.1SP			EXP	STD
	EXP-SW	SCR2.2SP			EXP	STD
	EXP-SW	SCR3.4SP[a]			EXP	STD
	EXP-SW	SCR5.1SP[a]			EXP	STD
	EXP-SW	SCR5.4SP[a]			EXP	STD
CR-6	CRSDB	GW-159			PDM	DM1
(Q2,Q4)	CRSDB	GW-731	Y		PDM	DM1
	CRSDB	GW-732			PDM	DM1
	CRSDB	GW-156			PDM	DM1
CR- 7	KHQ	GW-142			PDM	DM2
(Q2,Q4)	KHQ	GW-231	Y		PDM	DM2
	KHQ	GW-143			PDM	DM2
	KHQ	GW-144			PDM	DM2
	KHQ	GW-145			PDM	DM2
CR-8	LII	GW-539			SDM	STD
(Q2,Q4)	LII	GW-709			SDM	STD
	LII	GW-757	Y		SDM	STD

Table 1 (cont'd)

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Contain[5]	Monitoring Driver[6]	Parameters[7]
CR-9	CDLVI	GW-827			SDM	STD
(Q2, Q4)	CDLVI	GW-542			SDM	STD
	CDLVI	GW-543			SDM	STD
	CDLVI	GW-544			SDM	STD
Upper East Fork Poplar Creek Hydrogeologic Regime						
EF-1	EXP-J	GW-733		Y	CMP	COMP2
(Q1,Q3)	EXP-I	GW-605		Y	CMP	COMP2
	EXP-I	GW-606		Y	CMP	COMP2
	T2331	GW-193		Y	CMP	COMP2
	S3	GW-108	Y	Y	CMP	COMP2
EF-2	GRID F3	GW-788			SMP	STD
(Q2,Q4)	GRID F3	GW-789			SMP	STD
	GRID H3	GW-776			SMP	STD
	GRID G3	GW-770			SMP	STD
	GRID H3	GW-775		Y	SMP	STD
	GRID G3	GW-769	Y	Y	SMP	STD
	GRID D2	GW-792		Y	SMP	STD
	GRID E3	GW-781		Y	SMP	STD
	GRID E3	GW-783		Y	SMP	STD
	GRID E3	GW-782		Y	SMP	STD
	GRID D2	GW-791		Y	SMP	STD
EF-3	B4	GW-192		Y	SMP	STD
(Q2,Q4)	EXP-E	GW-618		Y	EXP	STD
	S2	GW-251		Y	EXP	STD
	FTF	GW-620		Y	EXP	STD
	GRID JP	GW-763		Y	SMP	STD
	NHP	GW-148		Y	SMP	STD
	NHP	GW-153		Y	EXP	STD

Table 1 (cont'd)

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Contain[5]	Monitoring Driver[6]	Parameters[7]
EF-3 (cont'd)	NHP	GW-380		Y	EXP	STD
	NHP	GW-220		Y	EXP	STD
	NHP	GW-383		Y	SMP	STD
EF-4	EXP-SW	LRSPW			EXP	STD
(Q2,Q4)	EXP-SR	GW-207			EXP	STD
	EXP-SR	GW-208			EXP	STD
	EXP-SR	GW-816			EXP	STD
	GRID K1	GW-744			SMP	STD
	GRID K2	GW-747			SMP	STD
	EXP-J	GW-735	Y		EXP	STD
	EXP-J	GW-750			EXP	STD
EF-5	B9202	59-1A		Y	SMP	STD
(Q1)	B9202	59-1B		Y	SMP	STD
	B9202	59-1C		Y	SMP	STD
	CPT	GW-686		Y	SMP	STD, RAD(3,11,12)
	CPT	GW-687		Y	SMP	STD, RAD(3,11,12)
	B9201-2	GW-818		Y	SMP	STD, RAD(3,11,12)
	B9201-2	GW-819		Y	SMP	STD, RAD(3,11,12)
	B9201-2	GW-820		Y	SMP	STD, RAD(3,11,12)
	GRIDC3	56-2A		Y	SMP	STD
	GRIDC3	56-2B		Y	SMP	STD
	GRIDC3	56-2C		Y	SMP	STD
	WC	GW-332	Y	Y	SMP	STD
		RINSATE SAMPLE				VOC(1)
EF-WB	EXP-J	GW-722-06			EXP	STD
(Q1,Q3)	EXP-J	GW-722-10			EXP	STD
	EXP-J	GW-722-14			EXP	STD
	EXP-J	GW-722-17			EXP	STD
	EXP-J	GW-722-20			EXP	STD

Table 1 (cont'd)

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Contain[5]	Monitoring Driver[6]	Parameters[7]
EF-WB	EXP-J	GW-722-22			EXP	STD
(cont'd)	EXP-J	GW-722-26			EXP	STD
	EXP-J	GW-722-30			EXP	STD
	EXP-J	GW-722-32			EXP	STD
	EXP-J	GW-722-33			EXP	STD

Notes:

1 Samples will be collected during the calendar year quarter as specified. Surface water samples in BC-4 will be collected on or about the same day as groundwater samples will be collected from wells GW-683 and GW-684 in Exit Pathway Picket A.

2 **Bear Creek Regime**

BG - Bear Creek Burial Grounds WMA
EXP - Exit Pathway Monitoring Location:
Maynardville Limestone Picket (-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

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
EXP-SW - Exit Pathway Monitoring Location (spring)
KHQ - Kerr Hollow Quarry
LII - Industrial Landfill II
LIV - Industrial Landfill IV
LV - Industrial Landfill V

Table 1 (cont'd)

Notes: (cont'd)

East Fork Regime

	B4	- Beta-4 Security Pits
	B9201-2	- Building 9201-2
	B9202	- Building 9202
	EXP	- Exit Pathway Monitoring Location: Maynardville Limestone Picket (-E, -I, -J) 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
	S3	- S-3 Site
	T2331	- Tank 2331-U, near Building 9201-1
	WC	- Waste Coolant Processing Area
3	BCK	- Bear Creek Kilometer (Surface Water Sampling Station)
	GW	- Groundwater Monitoring Well
	LRSPW	- Lake Reality Emergency Spillway (Surface Water Sampling Station)
	NT	- North Tributary to Bear Creek
	SCR	- South Chestnut Ridge (Spring Sampling Station)
	SS	- Spring Sampling Location: South Side of Bear Creek
4	Y	- Field duplicate samples will be collected at these locations.
5	Y	- All purged groundwater will be contained at these locations.
6	CMP	- RCRA Post-Closure Corrective Action Monitoring
	EXP	- DOE Order 5400.1 Exit Pathway Monitoring
	PDM	- RCRA Post-Closure Detection Monitoring
	SDM	- SWDF Detection Monitoring
	SMP	- DOE Order 5400.1 Surveillance Monitoring

7 A list of administrative parameter groups (e.g., STD) is provided in Table 2, including a complete listing of analytes grouped by parameter (e.g., FLD).

a Sampling location is included in the ORR Integrated Water Quality Program and subject to be discontinued. Refer to quarterly schedules for final sampling status.

b A sample will be collected from well GW-322 in CR-5 only during the first quarter sampling event.

Table 2.
Administrative Parameter Groups and Analytical Parameters for Groundwater and Surface Water Samples

Parameter Group	Symbol	Parameters [1]
Standard Administrative Parameter Group	STD	FLD, CHEM, MET(1), VOC(1), RAD(1)
Compliance Monitoring	COMP1	STD, RAD(2,3,4,5)
	COMP2	STD, RAD(12)
Detection Monitoring	DM1	FLD, CHEM, MET(1), X4
	DM2	STD, X4

Notes:

1 A complete listing of analytes, grouped by parameter, is provided below:

FLD: FIELD MEASURMENTS

Depth to Water	Temperature	Dissolved Oxygen
Specific Conductance	pH	Oxidation-Reduction

CHEM: WET CHEMISTRY

Anions

Alkalinity - Carbonate	Chloride IC	Nitrate Nitrogen
Alkalinity - Bicarbonate	Fluoride SIE	Sulfate

Miscellaneous Laboratory Analytes

Total Suspended Solids	Total Dissolved Solids	pH
Turbidity	Specific Conductance	

Table 2 (Notes: cont'd)

TRACE METALS (Filtered and Unfiltered Samples)

MET(1):

Inductively Coupled Plasma Spectrometry

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

Plasma Mass Spectrometry

Arsenic	Lead	Thallium	Uranium

Cold Vapor Atomic Absorption

Mercury

ORGANIC COMPOUNDS

VOC(1):

Acetone	1,1-Dichloroethene
Acrolein	1,2-Dichloroethene
Acrylonitrile	Cis-1,2-Dichloroethene
Benzene	Trans-1,2-Dichloroethene
Bromochloromethane	1,2-Dichloropropane
Bromodichloromethane	Cis-1,3-Dichloropropene
Bromoform	Trans-1,3-Dichloropropene
Bromomethane	Dimethylbenzene
2-Butanone	Ethanol
Carbon disulfide	Ethylbenzene
Carbon tetrachloride	Ethyl methacrylate
Chlorobenzene	Iodomethane
Chlorodibromomethane	2-Hexanone
Chloroethane	4-Methyl-2-pentanone
2-Chloroethyl vinyl ether	Methylene chloride
Chloroform	Styrene
Chloromethane	1,1,1,2-Tetrachloroethane

Table 2 (Notes: cont'd)

VOC(1):	1,2-Dibromo-3-chloropropane	1,1,2,2-Tetrachloroethane
(cont'd)	1,2-Dibromoethane	Tetrachloroethene
	Dibromomethane	Toluene
	1,2-Dichlorobenzene	1,1,1-Trichloroethane
	1,4-Dichlorobenzene	1,1,2-Trichloroethane
	1,4-Dichloro-2-butene	Trichloroethene
	Trans-1,4-Dichloro-2-butene	Trichlorofluoromethane
	Dichlorodifluoromethane	1,2,3-Trichloropropane
	1,1-Dichloroethane	Vinyl acetate
	1,2-Dichloroethane	Vinyl chloride

RADIOLOGICAL PARAMETERS

RAD(1):	Gross Alpha Activity	Gross Beta Activity	
RAD(2):	Strontium ($^{89/90}$Sr)	Technetium (^{99}Tc)	Tritium
RAD(3):	Uranium (^{234}U, ^{235}U, and ^{238}U)		
RAD(4):	Americium (^{241}Am)	Neptunium (^{237}Np)	
	Iodine (^{129}I)	Plutonium (^{238}Pu and $^{239/240}$Pu)	
RAD(5):	Radium (total)		
RAD(8):	Thorium (^{228}Th, ^{230}Th, ^{232}Th, and ^{234}Th)		
RAD(11):	Strontium ($^{89/90}$Sr)		
RAD(12):	Technetium (^{99}Tc)		
RAD(13):	Total Uranium and percent ^{235}U		

COLLECTION METHOD

X4: Four (4) discrete samples, collected at a time interval that allows recovery of at least 70 % of the initial well casing volume.

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