Y/SUB/03-021559/4

BWXT Y-12
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Y-12 NATIONAL SECURITY COMPLEX

Y-12 GROUNDWATER PROTECTION PROGRAM GROUNDWATER AND SURFACE WATER SAMPLING AND ANALYSIS PLAN FOR CALENDAR YEAR 2004

September 2003

Prepared by

ELVADO ENVIRONMENTAL LLC
Under Subcontract No. 4300021559

for the

Environmental Compliance Department
Environment, Safety, and Health Division
Y-12 National Security Complex
Oak Ridge, Tennessee 37831

Managed by

BWXT Y-12, L.L.C.
for the U.S. DEPARTMENT OF ENERGY
under contract No. DE-AC05-00OR22800

MANAGED BY
BWXT Y-12, L.L.C.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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List of Acronyms and Abbreviations

ACO	Analytical Chemistry Organization
Bear Creek Regime	Bear Creek Hydrogeologic Regime
BWXT	BWXT Y-12, L.L.C.
Chestnut Ridge Regime	Chestnut Ridge Hydrogeologic Regime
CY	calendar year
DOE	U.S. Department of Energy
East Fork Regime	Upper East Fork Poplar Creek Hydrogeologic Regime
GWPP	Groundwater Protection Program
LMES	Lockheed Martin Energy Systems, Inc.
REDOX	oxidation-reduction potential
SPS	sampling priority score

1.0 INTRODUCTION

This plan provides a description of the groundwater and surface water quality monitoring activities planned for calendar year (CY) 2004 at the U.S. Department of Energy (DOE) Y-12 National Security Complex that will be managed by the Y-12 Groundwater Protection Program (GWPP). Groundwater and surface water monitoring performed by the GWPP during CY 2004 will be in accordance with the following requirements of DOE Order 5400.1:

- to maintain surveillance of existing and potential groundwater contamination sources;
- to provide for the early detection of groundwater contamination and determine the quality of groundwater and surface water where contaminants are most likely to migrate beyond the Oak Ridge Reservation property line;
- to identify and characterize long-term trends in groundwater quality at Y-12; and
- to provide data to support decisions concerning the management and protection of groundwater resources.

Groundwater and surface water monitoring during CY 2004 will be performed primarily in three hydrogeologic regimes at Y-12: 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 in Bear Creek Valley, and the Chestnut Ridge Regime is located south of Y-12 (Figure A.1). Additional surface water monitoring will be performed north of Pine Ridge, along the boundary of the Oak Ridge Reservation (Figure A.1).

Modifications to the CY 2004 monitoring program may be necessary during implementation. Changes in programmatic requirements may alter the analytes specified for selected monitoring wells, or wells could be added or removed from the planned monitoring network. All modifications to the monitoring program will be approved by the Y-12 GWPP manager and documented as addenda to this sampling and analysis plan.

2.0 MONITORING LOCATIONS

The monitoring locations to be sampled by the Y-12 GWPP during CY 2004 (Table B.1) are in two basic groups: (1) a fixed group of 43 monitoring wells, five springs, and 11 surface water stations that are sampled semiannually every year to address specific requirements for DOE Order 5400.1 Surveillance Monitoring or Exit Pathway/Perimeter Monitoring; and (2) a group of "supplemental" monitoring wells to augment Surveillance Monitoring, selected in accordance with the Y-12 GWPP Monitoring Optimization Plan (BWXT Y-12, L.L.C. [BWXT] 2003a). This plan describes the technical approach implemented by the Y-12 GWPP to focus available resources on the monitoring wells at Y-12 which provide the most useful water quality monitoring data. The relative priority for sampling the supplemental wells is expressed by the annual sampling priority score (SPS). The SPS has been determined for each well granted active status (BWXT 2003a) that is not scheduled for sampling during CY 2004 by other organizations that share data with the Y-12 GWPP. Points for each well are scored for: location (the Chestnut Ridge Regime is the focus for CY 2004); sampling history (includes the total number of samples collected and the length of time since the most recent sample); principal contaminant concentrations; and contaminant concentration trends. The SPS is the sum of these points. By sorting in descending SPS order, the wells are ranked to prioritize for sample

collection. The CY 2004 SPS ranking, showing the 34 supplemental wells selected for sample collection, are provided in Appendix C.

The Y-12 GWPP monitoring network for CY 2004 includes 102 monitoring locations (Table B.1): 34 located in the Bear Creek Regime (Figure A.2), 22 located in the Chestnut Ridge Regime (Figure A.3), 41 located in the East Fork Regime (Figure A.4), and five located north of Pine Ridge (Figure A.5). Groundwater samples will be collected from a total of 77 monitoring wells, including 28 wells in the Bear Creek Regime (Figure A.2), 17 wells in the Chestnut Ridge Regime (Figure A.3), and 32 wells (one well has ten discreet sampling points) in the East Fork Regime (Figure A.4). Samples of groundwater discharging from five natural springs will be collected during CY 2004, including three springs (SS-1, SS-4, and SS-5) in the Bear Creek Regime (Figure A.2) and two springs (SCR2.1SP and SCR2.2SP) in the Chestnut Ridge Regime (Figure A.3). Surface water samples will be collected from a total of 11 sampling locations during CY 2004, including three locations in the Bear Creek Regime, three locations in the Chestnut Ridge Regime, and five locations north of Pine Ridge. In the Bear Creek Regime, samples will be collected from Bear Creek at two sampling stations located from about 0.5 to 4.5 kilometers upstream of the confluence of Bear Creek and East Fork Poplar Creek (BCK-00.63 and BCK-04.55), and from one sampling station along a northern tributary (NT-01) to Bear Creek (Figure A.2). The tributaries located in the Chestnut Ridge Regime have been numbered from west to east (SCR1 through SCR5), and surface water samples will be collected from three of the tributaries at stations (SCR1.5SW, SCR3.5SW, and S17 [in SCR5]) located along the north side of Bethel Valley Road (Figure A.3). The surface water sampling locations north of Pine Ridge include three tributaries (NPR07.0SW, NPR12.0SW, and NPR23.0SW) near the Scarboro Community and two locations (GHK2.51ESW and GHK2.51WSW) near Country Club Estates (Figure A.5).

3.0 FIELD MEASUREMENTS AND ANALYTICAL PARAMETERS

Field personnel will measure the static water level in each monitoring well before purging and collecting groundwater samples. Sampling personnel also will record field measurements of pH, temperature, conductivity, dissolved oxygen, and oxidation-reduction potential (REDOX) before collecting samples at each monitoring location (Table B.2). However, REDOX field measurements will not be obtained for sampling ports of monitoring wells equipped with a Westbay™ multiport sampling system.

For this Sampling and Analysis Plan, specific analytes are grouped by analytical method or by type (e.g., trace metals) and referenced as parameter groups (Table B.1 and Table B.2). In addition to field measurements, all groundwater and surface water samples will be analyzed for the following suite of parameters (identified as the Standard Administrative Parameter Group):

- miscellaneous laboratory analytes (total suspended solids and total dissolved solids);
- major anions;
- trace metals (includes major cations);
- a comprehensive suite of organic compounds; and
- gross alpha and gross beta activity.

In addition to the analytes included in the Standard Administrative Parameter Group, samples from selected locations will be analyzed for specific radionuclides.

4.0 SAMPLE PLANNING, COLLECTION, AND HANDLING

The monitoring wells, springs, and surface water stations included in the GWPP monitoring network for CY 2004 are assembled into sample groups (e.g., BC-1) for sample collection, sample tracking, and data management purposes. Semiannual sample collection is specified for each sample group (Table B.1), and the sampling sequence is generally from least contaminated to most contaminated location within each sampling group. A Groundwater Monitoring Schedule will be prepared for each quarterly sampling event by GWPP personnel based on Table B.1 that includes additional information necessary for field personnel to collect the required samples (e.g., management of purged groundwater).

Personnel from the Y-12 Analytical Chemistry Organization (ACO) will be responsible for collection, transportation, and chain-of-custody control of most groundwater and surface water samples. Personnel from the Environment, Safety, and Health Division will be responsible for collection, transportation and chain-of-custody control of the groundwater samples from Westbay well GW-722. Based on the analytical parameters for CY 2004 (Table B.1 and Table B.2), ACO personnel will prepare a set of bottle lists that specify the sample container type, size, preservative, and the laboratory test identification needed for each sampling location (see Appendix D). Sample collection will be performed in accordance with the most recent version of operating procedures for obtaining groundwater samples (Lockheed Martin Energy Systems, Inc. [LMES] 1999a, LMES 1999b, BWXT 2002a, and BWXT 2002b) and surface water samples (BWXT 2000). All field and laboratory activities will be performed in accordance with applicable requirements of the Y-12 Integrated Safety Management System.

Groundwater samples will be collected using bladder pumps for the low-flow minimal drawdown method (low-flow method) from all monitoring wells except Westbay well GW-722 during CY 2004. Typically, a bladder pump is permanently installed in each well that is scheduled for sample collection. If well construction prevents permanent installation (e.g., flush-mounted wells), then the pump and tubing will be installed at least 24 hours before sample collection and will be removed when sampling is completed. In accordance with the procedure for the low-flow method (LMES 1999a), groundwater samples will be collected from the well immediately following the stabilization (minimal variation over four consecutive readings) of field measurements (pH, conductivity, temperature, REDOX, and dissolved oxygen) of the groundwater purged from the well at a low flow rate (<300 milliliters per minute) which ensures minimal drawdown of the water level in the well (<0.1 foot per 15 minutes).

Samples from selected monitoring wells also will be collected using gas piston Bennett ® pumps for the "conventional" sampling method, which was used to collect all groundwater samples through September 1997 (the low-flow method, described above, has been used since October 1997). The conventional sampling method involves removing three well-volumes of groundwater from a well (or purging the well dry) at about 1.5 gallons per minute (much higher than the purge rate for low-flow) before collecting samples. Although the analytical results for the majority of wells do not show a distinct response to the change in method from the conventional to low-flow sampling, the analytical results for some wells potentially exhibit a clear response (BWXT 2002c and BWXT 2003b). To further investigate this phenomenon, samples will be obtained using the conventional method the day after collecting samples using the low-flow method at one well in each regime: well GW-229 in the Bear Creek Regime, well GW-612 in the Chestnut Ridge Regime, and well GW-698 in the East Fork Regime (Table B.1).

Groundwater sampling using a Westbay™ multiport sampling system at well GW-722 in the East Fork Regime will be performed in accordance with the most recent and approved operating procedures (BWXT 2002a and 2002b). The groundwater samples from each sampling port will be collected in 250-milliliter nonvented stainless steel Westbay™ sample collection bottles filled at the designated depth in the well.

Once filled, the bottles will be raised to the surface and the groundwater will be transferred to laboratory sample containers. The sample collection bottles will be lowered, filled, and retrieved as many times as needed to completely fill the laboratory sample bottles. Groundwater in the first sample collection bottles retrieved from each sampling port will be used as a "formation rinse" to obtain field measurements and to condition the sample collection bottle for each zone.

Unfiltered samples will be collected from all of the monitoring locations during CY 2004. Because analytical results have shown that the conventional sampling method may provide samples that are more turbid than the low-flow sampling method, filtered samples will also be collected from the three wells specified for conventional sampling (Table B.1). These samples will be filtered in the field using a 0.45-micron filter and analyzed for dissolved trace metal concentrations.

Samples will be collected semiannually from all of the monitoring wells, springs, and surface water stations during CY 2004. As summarized below, the number of samples to be collected during each CY quarter (including conventional method samples) will range from 50 to 55, for an annual total of 210 samples.

HYDROGEOLOGIC REGIME/AREA	NUMBER OF SAMPLES PER QUARTER OF CY 2004	
	1st and 3rd	2nd and 4th
Bear Creek Regime	35	0
Chestnut Ridge Regime	5	18
East Fork Regime	10	32
North of Pine Ridge	0	5
TOTAL:	**50**	**55**

In addition to the groundwater and surface water samples, field blanks and equipment rinsate samples will be collected at the frequencies and analyzed for the parameter groups specified on Table B.1. Field blank samples will be collected from at least 10% of the sample groups. Therefore, a field blank will be collected during each quarter of CY 2004: in the Bear Creek Regime during the first and third quarters and in the East Fork Regime during the second and fourth quarters. An equipment rinsate sample will be collected at Westbay well GW-722 immediately after field-cleaning the sampling equipment used to collect samples from the last sampling port (Table B.1).

Trip blank samples, field duplicate samples, and laboratory quality assurance samples will be prepared and analyzed as specified in the *Quality Assurance Plan for the Analytical Chemistry Organization* (BWXT 2003c) using applicable analytical procedures. 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. A total of 26 field duplicate samples will be collected during CY 2004, including eight in the Bear Creek Regime, six in the Chestnut Ridge Regime, ten in the East Fork Regime, and two from surface water stations located north of Pine Ridge (Table B.1).

All groundwater and surface water samples will be relinquished to the appropriate Y-12 ACO laboratory that will perform the analyses under chain-of-custody control. The Y-12 ACO laboratories will perform each analyses within established holding times and deliver results within established turnaround times (see Appendix D).

5.0 REFERENCES

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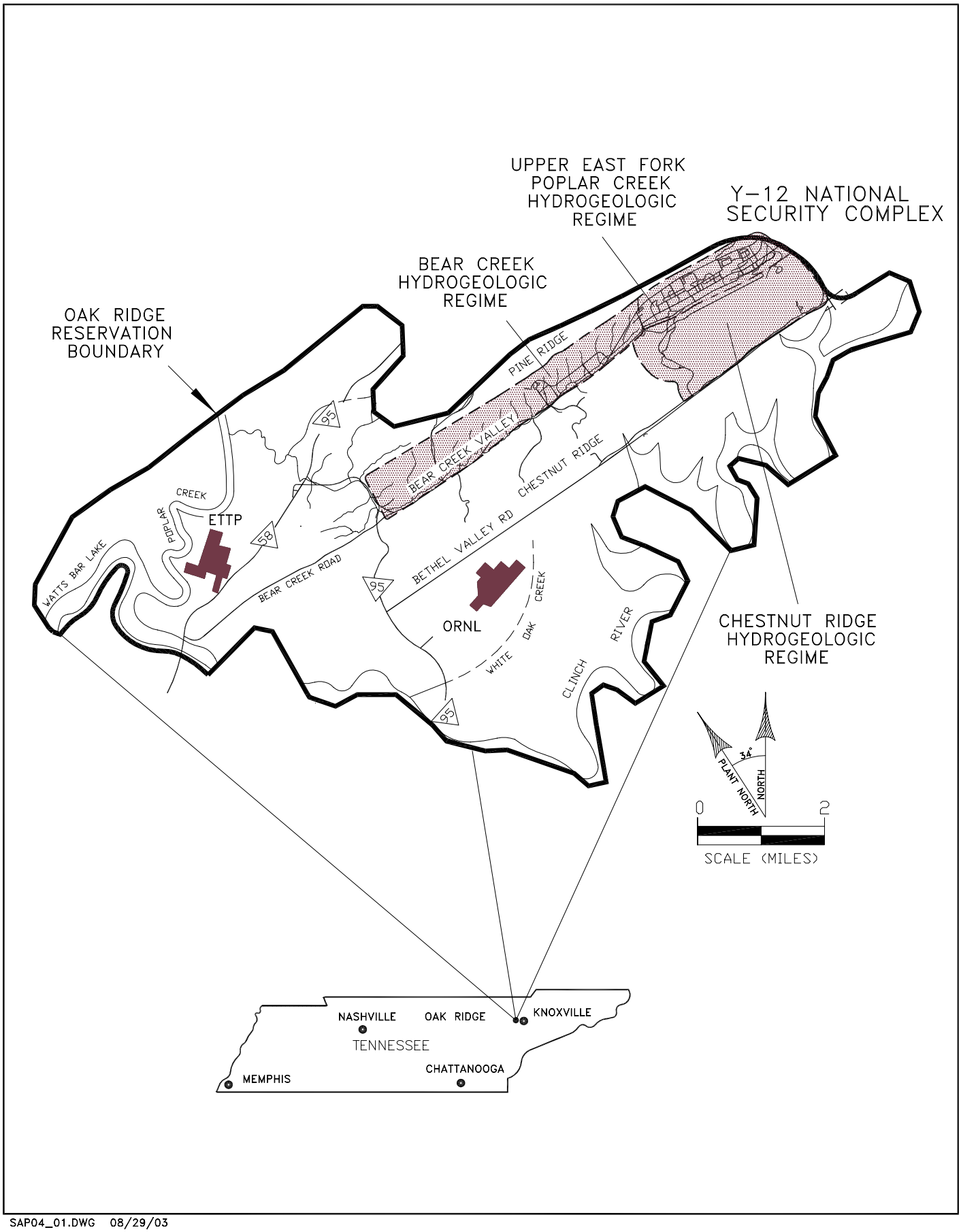
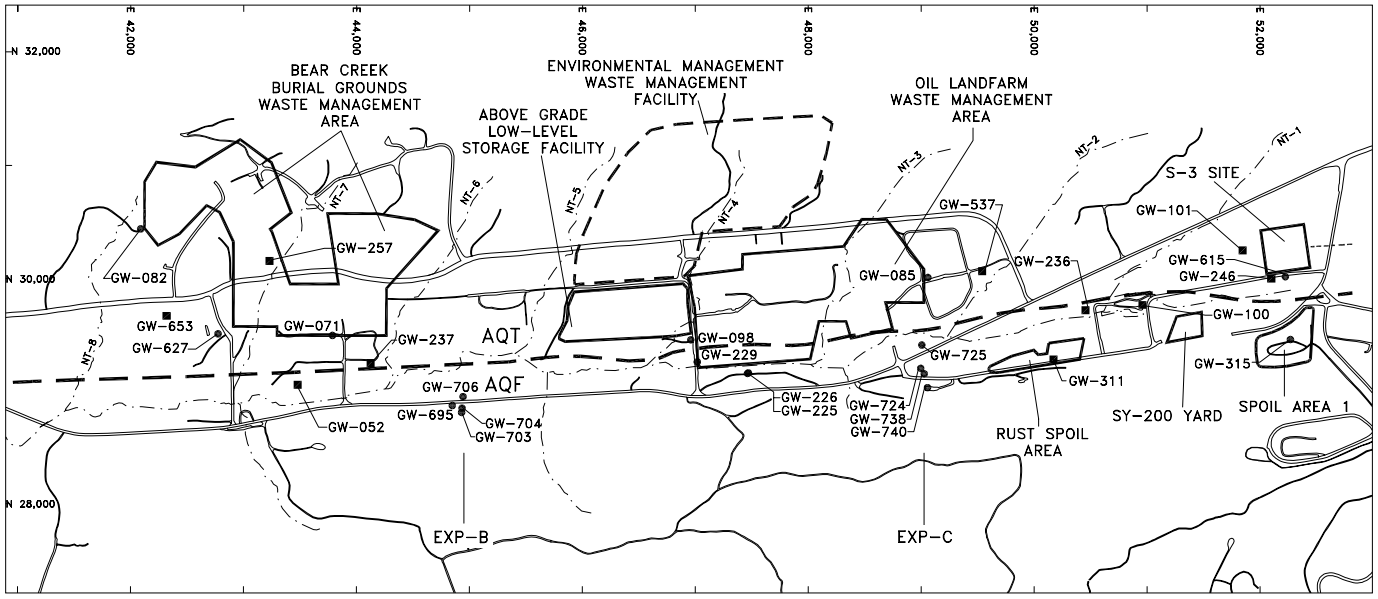
APPENDIX A

FIGURES



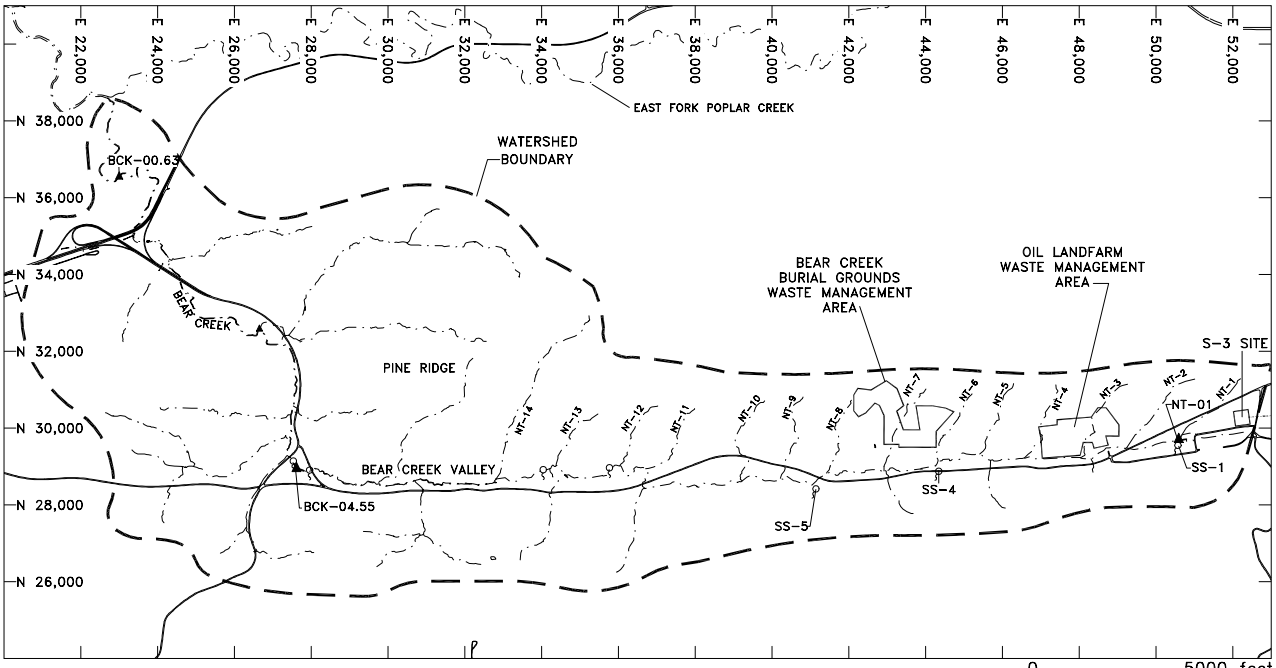
SAP04_01.DWG 08/29/03

Fig. A.1. Hydrogeologic regimes at the Y-12 National Security Complex.



MONITORING WELL LOCATIONS

0 1700 feet



SPRING AND SURFACE WATER SAMPLING LOCATIONS

0 5000 feet

EXPLANATION

■ — Water Table Monitoring Well

● — Bedrock Monitoring Well

▲ — Surface Water Sampling Station

♀ — Spring Sampling Station

EXP-C — Exit Pathway, Maynardville Limestone Picket

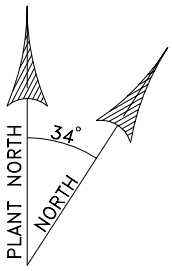
— Surface Drainage Feature

NT-5 — North Tributary

AQT — Aquitard

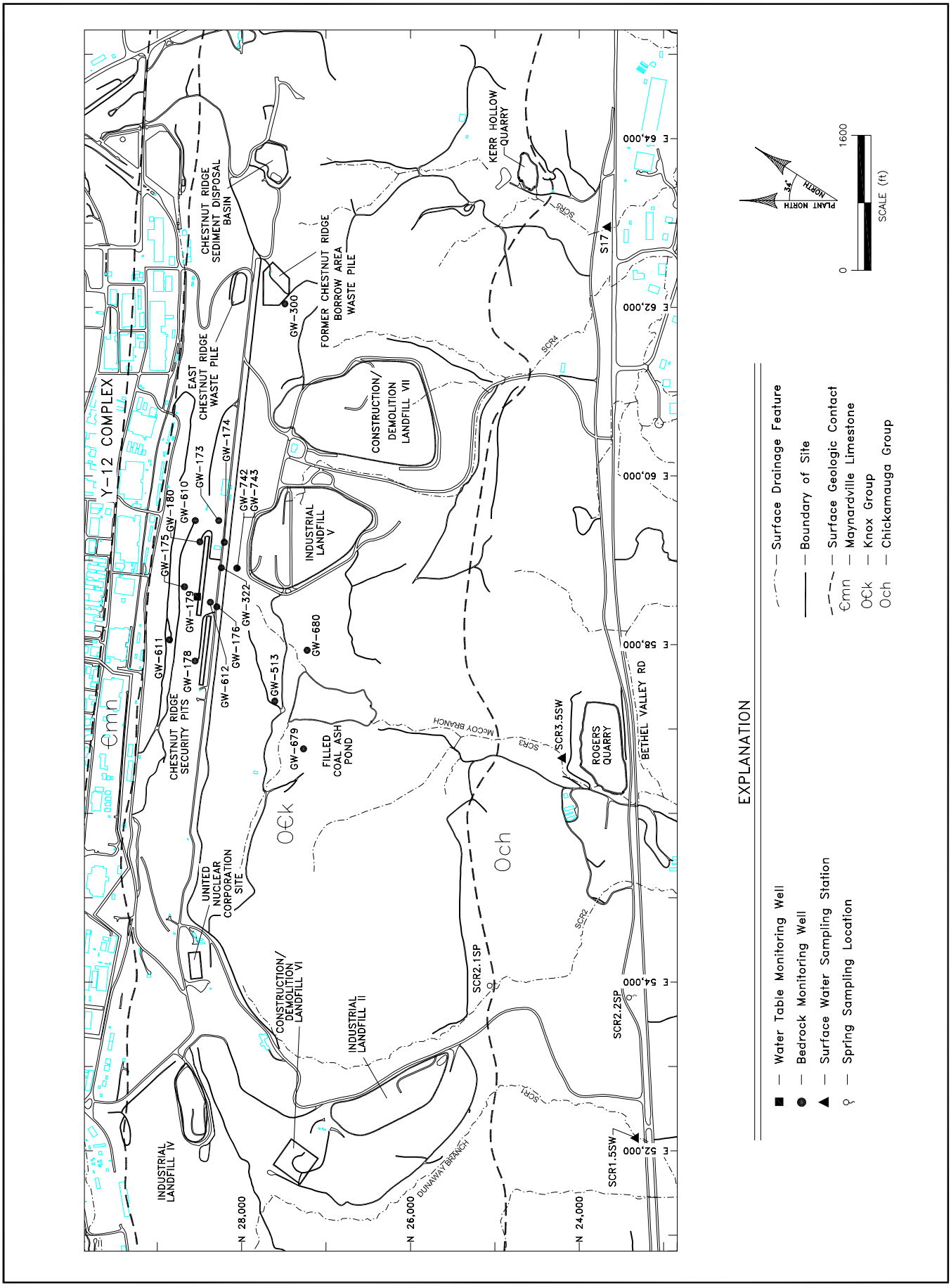
— Approximate Nolichucky Shale\Maynardville Limestone Contact

AQF — Aquifer



SAP04_2.DWG 09/01/2003

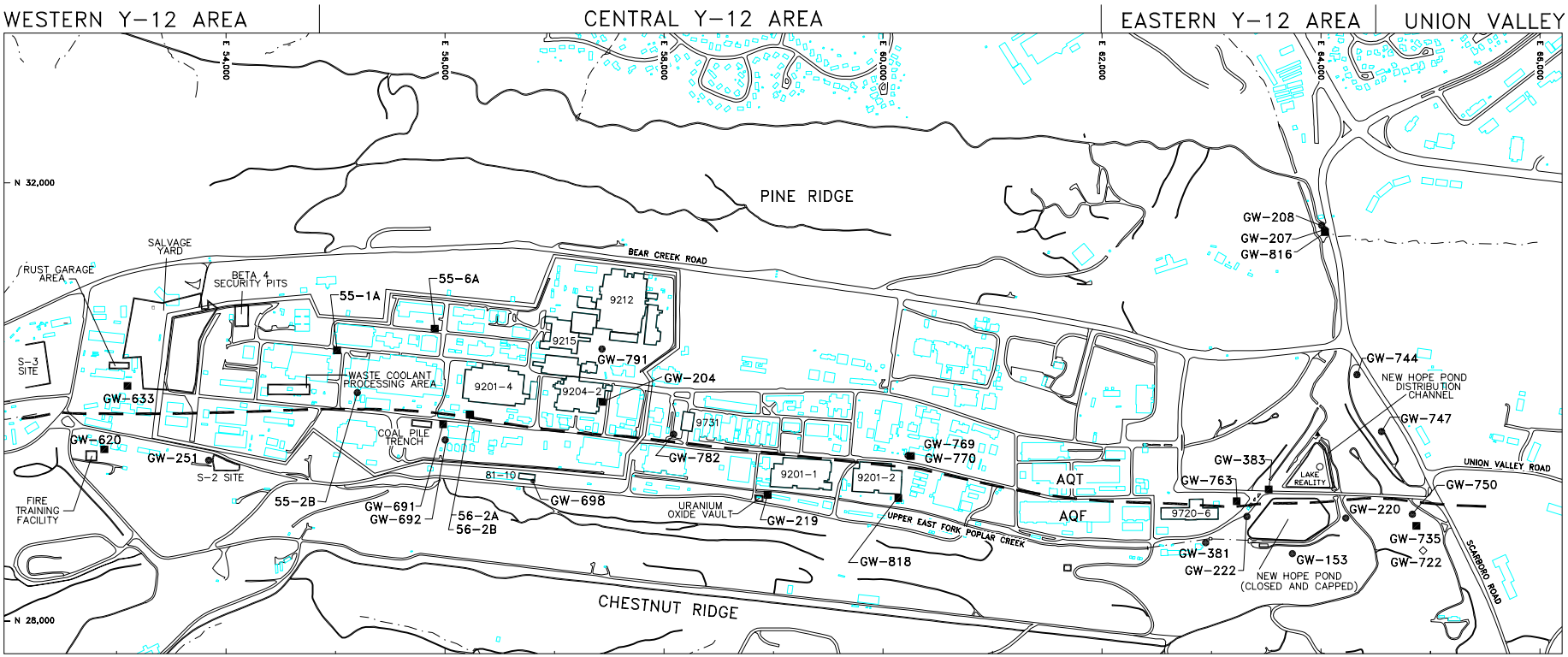
Fig. A.2. CY 2004 sampling locations in the Bear Creek Hydrogeologic Regime.



SAP04_3.DWG 09/01/03

Fig. A.3. CY 2004 sampling locations in the Chestnut Ridge Hydrogeologic Regime.

SAP03_4.DWG 09/01/03



EXPLANATION

- ■ — Water Table Monitoring Well
- • — Bedrock Monitoring Well
- ◇ — Well With Westbay Multiport Sampling System

AQT — Aquitard

AQF — Aquifer

Approximate contact of Nolichucky Shale and Maynardville Limestone

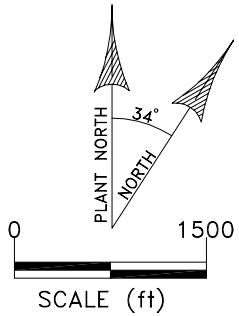


Fig. A.4. CY 2004 sampling locations in the Upper East Fork Poplar Creek Hydrogeologic Regime.

SAP04_5.DWG 08/29/03

Fig. A.5. CY 2004 surface water sampling locations north of Pine Ridge.

APPENDIX B

TABLES

Table B.1. Sampling sequence, frequency, and analytical parameters for groundwater and surface water monitoring during CY 2004

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Monitoring Driver[5]	Parameter Groups[6]
Bear Creek Hydrogeologic Regime					
BC-1 (Q1, Q3)	EXP-B	GW-695		SMP	STD
	EXP-B	GW-703		SMP	STD
	EXP-B	GW-704		SMP	STD
	EXP-B	GW-706		SMP	STD
	EXP-C	GW-740		SMP	STD
	EXP-C	GW-738	Q3	SMP	STD
	EXP-C	GW-724		SMP	STD
	EXP-C	GW-725	Q1	SMP	STD
	OLF	GW-229		SMP	STD, RAD(3,12)
	OLF	GW-229(C)		SMP	STD/F, RAD(3,12)
	OLF	GW-226		SMP	STD
	OLF	GW-225		SMP	STD
BC-2 (Q1, Q3)	RS	GW-311		SMP	STD
	SPI	GW-315		SMP	STD
	OLF	GW-098		SMP	STD
	OLF	GW-085	Q1	SMP	STD
	OLF	GW-537		SMP	STD
	BG	GW-653		SMP	STD
	BG	GW-627		SMP	STD
	BG	GW-082	Q3	SMP	STD
	BG	GW-071		SMP	STD
	FIELD BLANK				VOC(1)
BC-3 (Q1, Q3)	EXP-SW	BCK-00.63		EXP	STD
	EXP-SW	BCK-04.55		EXP	STD
	EXP-SW	SS-5	Q1	EXP	STD
	EXP-SW	SS-4		EXP	STD
	EXP-SW	SS-1		EXP	STD
	EXP-SW	NT-01	Q3	EXP	STD

Table B.1 (continued)

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Monitoring Driver[5]	Parameter Groups[6]
BC-4 (Q1, Q3)	BG	GW-237		SMP	STD
	BG	GW-257		SMP	STD
	BG	GW-052		SMP	STD, RAD(3,12)
	S3	GW-100	Q3	SMP	STD, RAD(3,12)
	S3	GW-236	Q1	SMP	STD, RAD(3,12)
	S3	GW-101		SMP	STD, RAD(3,12)
	S3	GW-615		SMP	STD, RAD(3,12)
	S3	GW-246		SMP	STD, RAD(3,12)
Chestnut Ridge Hydrogeologic Regime					
CR-1 (Q1,Q3)	EXP-SW	SCR1.5SW	Q3	EXP	STD
	EXP-SW	SCR2.1SP		EXP	STD
	EXP-SW	SCR2.2SP		EXP	STD
	EXP-SW	SCR3.5SW	Q1	EXP	STD
	EXP-SW	S17		EXP	STD
CR-2 (Q2,Q4)	CRBAWP	GW-300		SMP	STD
	FCAP	GW-679		SMP	STD
	FCAP	GW-513	Q2	SMP	STD
	FCAP	GW-680		SMP	STD
	CRSP	GW-742		SMP	STD
	CRSP	GW-743		SMP	STD
	CRSP	GW-610		SMP	STD
	CRSP	GW-611	Q4	SMP	STD
CR-3 (Q2,Q4)	CRSP	GW-173	Q2	SMP	STD
	CRSP	GW-175		SMP	STD
	CRSP	GW-174		SMP	STD
	CRSP	GW-180		SMP	STD
	CRSP	GW-178		SMP	STD
	CRSP	GW-176		SMP	STD
	CRSP	GW-179	Q4	SMP	STD
	CRSP	GW-612		SMP	STD
	CRSP	GW-612(C)		SMP	STD/F
	CRSP	GW-322		SMP	STD

Table B.1 (continued)

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Monitoring Driver[5]	Parameter Groups[6]
Upper East Fork Poplar Creek Hydrogeologic Regime					
EF-1 (Q2,Q4)	FTF	GW-620		SMP	STD
	S2	GW-251	Q2	SMP	STD
	RG	GW-633		SMP	STD
	GRID D2	GW-791		SMP	STD
	T0134	GW-204	Q4	SMP	STD
	GRID E3	GW-782		SMP	STD
	FIELD BLANK				VOC(1)
EF-2 (Q2,Q4)	GRID G3	GW-770		SMP	STD
	GRID G3	GW-769	Q2	SMP	STD
	UOV	GW-219		SMP	STD
	GRID JP	GW-763		SMP	STD
	B8110	GW-698		SMP	STD
	B8110	GW-698(C)		SMP	STD/F
	NHP	GW-381		SMP	STD
	NHP	GW-153	Q4	SMP	STD
	NHP	GW-383		SMP	STD
EF-3 (Q2,Q4)	EXP-SR	GW-208		EXP	STD
	EXP-SR	GW-207		EXP	STD
	EXP-SR	GW-816		EXP	STD
	GRID K1	GW-744		EXP	STD
	GRID K2	GW-747	Q2	EXP	STD
	EXP-J	GW-750		EXP	STD
	EXP-J	GW-735	Q4	EXP	STD
	NHP	GW-220		EXP	STD
EF-4 (Q2,Q4)	Y12	55-6A		SMP	STD
	GRID B2	55-1A		SMP	STD
	B9201-2	GW-818		SMP	STD
	CPT	GW-692		SMP	STD
	CPT	GW-691		SMP	STD, RAD(12)
	NHP	GW-222	Q2	SMP	STD, RAD(3)
	GRID C3	56-2A		SMP	STD
	GRID C3	56-2B	Q4	SMP	STD
	Y12	55-2B		SMP	STD

Table B.1 (continued)

Sample Group[1]	Location[2]	Sampling Point[3]	Duplicate[4]	Monitoring Driver[5]	Parameter Groups[6]
EF-WB (Q1,Q3)	EXP-J	GW-722-06		EXP	STD
	EXP-J	GW-722-30		EXP	STD
	EXP-J	GW-722-26		EXP	STD
	EXP-J	GW-722-32		EXP	STD
	EXP-J	GW-722-33		EXP	STD
	EXP-J	GW-722-10		EXP	STD
	EXP-J	GW-722-22	Q1	EXP	STD
	EXP-J	GW-722-20	Q3	EXP	STD
	EXP-J	GW-722-14		EXP	STD
	EXP-J	GW-722-17		EXP	STD
	RINSATE SAMPLE				STD
North of Pine Ridge					
PR-1 (Q2,Q4)	EXP-NPR	NPR07.0SW		EXP	STD
	EXP-NPR	NPR12.0SW		EXP	STD
	EXP-NPR	NPR23.0SW	Q2	EXP	STD
	EXP-NPR	GHK2.51ESW		EXP	STD
	EXP-NPR	GHK2.51WSW	Q4	EXP	STD

Notes:

1 Samples will be collected during the calendar year quarter as specified (e.g., Q1).

2 **Bear Creek Regime**

BG - Bear Creek Burial Grounds Waste Management Area
EXP-B - Exit Pathway Picket B
EXP-C - Exit Pathway Picket C
EXP-SW - Spring or Surface Water Location
OLF - Oil Landfarm Waste Management Area
RS - Rust Spoil Area
SPI - Spoil Area I

Chestnut Ridge Regime

EXP-SW - Spring or surface water sampling location
CRBAWP - Chestnut Ridge Borrow Area Waste Pile (formerly)
CRSP - Chestnut Ridge Security Pits
FCAP - Filled Coal Ash Pond

Table B.1 (continued)

Notes: (continued)

2 (continued)

East Fork Regime

B8110	-	Building 81-10
B9201-2	-	Building 9201-2
CPT	-	Coal Pile Trench
EXP-J	-	Maynardville Limestone Exit Pathway Picket J
EXP-SR	-	Exit pathway well in the gap through Pine Ridge along Scarboro Road
FTF	-	Fire Training Facility
GRID	-	Comprehensive Groundwater Monitoring Plan Grid Location
NHP	-	New Hope Pond
RG	-	Rust Garage Area
T0134	-	Underground Storage Tank 0134-U
UOV	-	Uranium Oxide Vault
S2	-	S-2 Site
Y12	-	Y-12 Complex

North of Pine Ridge

EXP-NPR	-	Surface water sampling station located where drainage exits the Oak Ridge Reservation

3

BCK	-	Bear Creek Kilometer (surface water station)
GW	-	Groundwater monitoring well
GHK	-	Gum Hollow Kilometer (surface water station)
NPR	-	North of Pine Ridge (surface water station)
NT	-	North Tributary to Bear Creek
S17	-	Surface water station in SCR5
SCR	-	South Chestnut Ridge (spring or surface water station)
SS	-	Spring sampling location: South Side of Bear Creek
(C)	-	A sample will be collected using the conventional sampling method the day after collecting the sample using the low-flow sampling method.

4 Q_ - Field duplicate samples will be collected at these locations during the quarter specified.

5

EXP	-	DOE Order 5400.1 Exit Pathway/Perimeter Monitoring
SMP	-	DOE Order 5400.1 Surveillance Monitoring

Table B.1 (continued)

Notes: (continued)

6 Table B.2 provides a comprehensive list of analytes, analytical methods, and the associated parameter group.

STD - Standard administrative parameter group, including the following elementary parameter groups:

FLD - Field measurements
CHEM - Miscellaneous laboratory analytes (e.g., dissolved solids) and anions
MET(1) - Metals
VOC(1) - Volatile organic compounds
RAD(1) - Gross alpha and gross beta activity

Radionuclide Elementary Parameter Groups:

RAD(3) - Uranium-234, -235, and -238
RAD(12) - Technetium-99

Special Sample Elementary Parameter Group:

STD/F - Standard administrative parameter group, plus a filtered sample for dissolved metals analyses; collected using the conventional sampling method with a 0.45-micron filter.

Table B.2. Field measurements and analytes that comprise the elementary parameter groups for CY 2004 groundwater and surface water samples

Parameter Group	Measurement or Analyte	Analytical Method [1]	Reporting Limit [2]	Units [3]
FLD	Depth to Water	NA	NA	ft
	Water Temperature	NA	NA	centigrade
	pH	NA	NA	pH units
	Conductivity	NA	NA	µmho/cm
	Dissolved Oxygen	NA	NA	ppm
	Oxidation-Reduction Potential	NA	NA	mV
CHEM (miscellaneous)	Total Dissolved Solids	EPA-160.1	1	mg/L
	Total Suspended Solids	EPA-160.2	1	mg/L
CHEM (anions)	Alkalinity - HCO3	EPA-310.1	1.0	mg/L
	Alkalinity - CO3	EPA-310.1	1.0	mg/L
	Chloride	EPA-300.0	0.2	mg/L
	Fluoride	EPA-340.2	0.1	mg/L
	Nitrate (as Nitrogen)	EPA-300.0	0.028	mg/L
	Sulfate	EPA-300.0	0.25	mg/L
MET(1)	Aluminum	SW846-6010B	0.2	mg/L
	Antimony	EPA-200.8	0.0025	mg/L
	Arsenic	EPA-200.8	0.005	mg/L
	Barium	SW846-6010B	0.004	mg/L
	Beryllium	SW846-6010B	0.0005	mg/L
	Boron	SW846-6010B	0.1	mg/L
	Cadmium	EPA-200.8	0.0005	mg/L
	Calcium	SW846-6010B	0.2	mg/L
	Chromium	EPA-200.8	0.0025	mg/L
	Cobalt	SW846-6010B	0.02	mg/L
	Copper	SW846-6010B	0.02	mg/L
	Iron	SW846-6010B	0.05	mg/L
	Lead	EPA-200.8	0.0005	mg/L
	Lithium	SW846-6010B	0.01	mg/L
	Magnesium	SW846-6010B	0.2	mg/L
	Manganese	SW846-6010B	0.005	mg/L
	Mercury	SW846-7470	0.0002	mg/L
	Molybdenum	SW846-6010B	0.05	mg/L
	Nickel	EPA-200.8	0.005	mg/L
	Potassium	SW846-6010B	2	mg/L
	Selenium	EPA-200.8	0.01	mg/L
	Silver	SW846-6010B	0.02	mg/L

Table B.2 (continued)

Parameter Group	Analyte	Analytical Method [1]	Reporting Limit [2]	Units [3]
MET(1) (continued)	Sodium	SW846-6010B	0.2	mg/L
	Strontium	SW846-6010B	0.005	mg/L
	Thallium	EPA-200.8	0.0005	mg/L
	Thorium	SW846-6010B	0.2	mg/L
	Uranium	EPA-200.8	0.0005	mg/L
	Vanadium	SW846-6010B	0.02	mg/L
	Zinc	SW846-6010B	0.05	mg/L
VOC(1)	Acetone	SW846-8260B-UP	10	µg/L
	Acrolein	SW846-8260B-UP	10	µg/L
	Acrylonitrile	SW846-8260B-UP	5	µg/L
	Benzene	SW846-8260B-UP	5	µg/L
	Bromochloromethane	SW846-8260B-UP	5	µg/L
	Bromodichloromethane	SW846-8260B-UP	5	µg/L
	Bromoform	SW846-8260B-UP	5	µg/L
	Bromomethane	SW846-8260B-UP	5	µg/L
	2-Butanone	SW846-8260B-UP	5	µg/L
	Carbon disulfide	SW846-8260B-UP	5	µg/L
	Carbon tetrachloride	SW846-8260B-UP	5	µg/L
	Chlorobenzene	SW846-8260B-UP	5	µg/L
	Chloroethane	SW846-8260B-UP	5	µg/L
	2-Chloroethyl vinyl ether	SW846-8260B-UP	10	µg/L
	Chloroform	SW846-8260B-UP	5	µg/L
	Chloromethane	SW846-8260B-UP	5	µg/L
	Dibromochloromethane	SW846-8260B-UP	5	µg/L
	1,2-Dibromo-3-chloropropane	SW846-8260B-UP	10	µg/L
	1,2-Dibromoethane	SW846-8260B-UP	5	µg/L
	Dibromomethane	SW846-8260B-UP	5	µg/L
	1,2-Dichlorobenzene	SW846-8260B-UP	5	µg/L
	1,4-Dichlorobenzene	SW846-8260B-UP	5	µg/L
	1,4-Dichloro-2-butene	SW846-8260B-UP	5	µg/L
	trans-1,4-Dichloro-2-butene	SW846-8260B-UP	5	µg/L
	Dichlorodifluoromethane	SW846-8260B-UP	5	µg/L
	1,1-Dichloroethane	SW846-8260B-UP	5	µg/L
	1,2-Dichloroethane	SW846-8260B-UP	5	µg/L
	1,1-Dichloroethene	SW846-8260B-UP	5	µg/L
	cis-1,2-Dichloroethene	SW846-8260B-UP	5	µg/L
	trans-1,2-Dichloroethene	SW846-8260B-UP	5	µg/L
	1,2-Dichloropropane	SW846-8260B-UP	5	µg/L

Table B.2 (continued)

Parameter Group	Analyte	Analytical Method [1]	Reporting Limit [2]	Units [3]
VOC(1) (continued)	cis-1,3-Dichloropropene	SW846-8260B-UP	5	µg/L
	trans-1,3-Dichloropropene	SW846-8260B-UP	5	µg/L
	Dimethylbenzene	SW846-8260B-UP	5	µg/L
	Ethanol	SW846-8260B-UP	200	µg/L
	Ethylbenzene	SW846-8260B-UP	5	µg/L
	Ethyl methacrylate	SW846-8260B-UP	5	µg/L
	2-Hexanone	SW846-8260B-UP	5	µg/L
	Iodomethane	SW846-8260B-UP	5	µg/L
	4-Methyl-2-pentanone	SW846-8260B-UP	5	µg/L
	Methylene chloride	SW846-8260B-UP	5	µg/L
	Styrene	SW846-8260B-UP	5	µg/L
	1,1,1,2-Tetrachloroethane	SW846-8260B-UP	5	µg/L
	1,1,2,2-Tetrachloroethane	SW846-8260B-UP	5	µg/L
	Tetrachloroethene	SW846-8260B-UP	5	µg/L
	Toluene	SW846-8260B-UP	5	µg/L
	1,1,1-Trichloroethane	SW846-8260B-UP	5	µg/L
	1,1,2-Trichloroethane	SW846-8260B-UP	5	µg/L
	Trichloroethene	SW846-8260B-UP	5	µg/L
	Trichlorofluoromethane	SW846-8260B-UP	5	µg/L
	1,2,3-Trichloropropane	SW846-8260B-UP	10	µg/L
	1,1,2-Trichloro-1,2,2-trifluoroethane	SW846-8260B-UP	5	µg/L
	Vinyl acetate	SW846-8260B-UP	10	µg/L
	Vinyl chloride	SW846-8260B-UP	2	µg/L
RAD(1)	Gross Alpha Activity	EPA-900.0	3.5	pCi/L
RAD(1)	Gross Beta Activity	EPA-900.0	7.0	pCi/L
RAD(3)	Uranium-234, -235, & -238	Y/P65-7061	0.4	pCi/L
RAD(12)	Technetium-99	Y/P65-7060	10	pCi/L

Notes:

1 NA - not applicable

Field measurement procedures:

- LMES 1999a, LMES 1999b, BWXT 2000a, and BWXT 2002a

Analytical methods from:

- *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (U.S. Environmental Protection Agency 1996)
- *Methods for Chemical Analysis of Water and Wastes* (U.S. Environmental Protection Agency 1983)
- BWXT Analytical Chemistry Organization Controlled Procedures: (Y/P65-7060 and Y/P65-7061)

Table B.2 (continued)

Notes: (continued)

2 NA - not applicable

VOC(1) - Reporting limits are contract-required quantitation limits; also report estimated values (with qualifier) below this limit and above the instrument detection limit.

RAD(1,2,3,12) - Reporting limits are target minimum detectable activities (MDAs) that may be obtained under optimal analytical conditions; actual MDAs are sample-specific and may vary significantly from the target value.

3 ft - feet
µg/L - micrograms per liter
µmho/cm - micromhos per centimeter
mg/L - milligrams per liter
mV - millivolts
ppm - parts per million
pCi/L - picoCuries per liter

APPENDIX C

SAMPLING PRIORITY SCORES FOR CY 2004

Sampling Priority Scores for CY 2004

Rank	Sampling Priority Score [1]	Well No.	Hydro. Regime [2]	Most Recent Sample [3]	Points Scored [4]					Selected for CY 2004
					Regime	Time since sampled last	No. of Samples	Contaminant Concentrations	Trending Potential	
1	14	GW-322	CR	01/12/98	5	4	-5	2	8	X
2	13	GW-612	CR	08/22/01	5	1	-5	2	10	X
3	12	GW-176	CR	07/23/92	5	5	-5	2	5	X
4	12	GW-179	CR	07/27/92	5	5	-5	2	5	X
5	12	GW-175	CR	08/20/01	5	1	-5	1	10	X
6	12	GW-180	CR	08/21/01	5	1	-5	1	10	X
7	11	GW-173	CR	07/16/92	5	5	-5	1	5	X
8	10	55-2B	EF	06/10/96	-5	5	5	4	1	X
9	8	GW-178	CR	02/08/92	5	5	-5	1	2	X
10	8	GW-691	EF	06/08/96	-5	5	5	2	1	X
11	8	GW-243	BC	08/13/02	-5	0	-5	8	10	
12	7	GW-237	BC	04/15/88	-5	5	5	1	1	X
13	7	GW-257	BC	08/08/95	-5	5	-1	2	6	X
14	7	55-1A	EF	06/05/96	-5	5	5	1	1	X
15	7	56-2A	EF	03/23/98	-5	4	5	2	1	X
16	7	56-2B	EF	03/23/98	-5	4	5	2	1	X
17	7	GW-273	EF	11/20/03	-5	0	-3	5	10	
18	7	55-2C	EF	11/20/03	-5	0	2	4	6	
19	6	GW-692	EF	06/08/96	-5	5	4	1	1	X
20	6	GW-818	EF	03/26/98	-5	4	5	1	1	X
21	6	GW-236	BC	09/08/99	-5	3	-4	2	10	X
22	6	GW-615	BC	08/30/00	-5	2	-5	5	9	X
23	6	GW-222	EF	10/26/00	-5	2	-5	4	10	X
24	6	GW-109	EF	11/20/03	-5	0	-5	6	10	
25	6	GW-274	EF	11/20/03	-5	0	-5	6	10	
26	5	GW-246	BC	01/17/90	-5	5	-5	9	1	X
27	5	GW-101	BC	04/14/91	-5	5	-2	3	4	X
28	5	GW-052	BC	04/26/93	-5	5	1	3	1	X
29	5	GW-100	BC	09/06/95	-5	5	-5	2	8	X
30	5	GW-242	BC	03/08/99	-5	3	-5	2	10	
31	5	GW-346	BC	03/09/99	-5	3	-4	2	9	
32	5	GW-228	BC	09/09/99	-5	3	-5	2	10	
33	5	GW-690	EF	11/20/03	-5	0	2	2	6	
34	5	GW-700	EF	11/20/03	-5	0	2	2	6	
35	4	GW-624	BC	06/21/91	-5	5	1	2	1	
36	4	GW-629	BC	06/22/91	-5	5	1	2	1	
37	4	GW-227	BC	09/12/92	-5	5	-5	4	5	
38	4	GW-601	BC	03/08/99	-5	3	-5	3	8	
39	4	GW-148	EF	11/09/99	-5	3	-5	1	10	
40	4	GW-066	BC	08/13/02	-5	0	3	1	5	
41	3	GW-064	BC	08/06/95	-5	5	-5	2	6	
42	3	GW-312	BC	08/06/95	-5	5	-5	2	6	
43	3	GW-332	EF	03/24/98	-5	4	-5	2	7	
44	3	GW-124	BC	08/09/01	-5	1	-5	2	10	
45	3	GW-365	BC	08/07/01	-5	1	-5	2	10	
46	3	GW-616	BC	08/09/01	-5	1	-5	2	10	
47	3	GW-061	BC	08/05/02	-5	0	-5	3	10	
48	3	56-2C	EF	11/20/03	-5	0	2	2	4	
49	2	GW-127	BC	01/18/90	-5	5	-5	5	2	
50	2	GW-245	BC	01/17/90	-5	5	-5	6	1	
51	2	GW-277	BC	01/23/90	-5	5	-5	5	2	
52	2	GW-619	EF	11/13/96	-5	5	-5	2	5	
53	2	GW-617	EF	11/05/97	-5	5	-5	1	6	
54	2	GW-053	BC	07/25/01	-5	1	-5	1	10	
55	2	GW-364	BC	08/07/01	-5	1	-5	1	10	
56	2	GW-192	EF	10/17/01	-5	1	-5	1	10	
57	2	GW-240	EF	10/22/01	-5	1	-5	1	10	
58	2	GW-656	EF	11/12/01	-5	1	-5	2	9	
59	2	GW-626	BC	07/25/02	-5	0	-5	2	10	
60	2	GW-072	BC	08/06/02	-5	0	-5	2	10	

Sampling Priority Scores for CY 2004

Rank	Sampling Priority Score [1]	Well No.	Hydro. Regime [2]	Most Recent Sample [3]	Points Scored [4]					Selected for CY 2004
					Regime	Time since sampled last	No. of Samples	Contaminant Concentrations	Trending Potential	
61	2	GW-288	BC	08/07/02	-5	0	-5	2	10	
62	2	GW-289	BC	08/08/02	-5	0	-5	2	10	
63	2	GW-291	BC	08/07/02	-5	0	-5	2	10	
64	2	GW-014	BC	08/12/02	-5	0	-5	2	10	
65	2	GW-105	EF	11/20/03	-5	0	-5	2	10	
66	2	GW-106	EF	11/20/03	-5	0	-5	2	10	
67	2	GW-190	EF	11/20/03	-5	0	-5	2	10	
68	2	GW-269	EF	11/20/03	-5	0	-5	2	10	
69	2	GW-270	EF	11/20/03	-5	0	-5	2	10	
70	2	GW-275	EF	11/20/03	-5	0	-5	2	10	
71	2	GW-820	EF	11/20/03	-5	0	1	2	4	
72	1	GW-244	BC	01/18/90	-5	5	-5	5	1	
73	1	GW-247	BC	01/17/90	-5	5	-5	5	1	
74	1	GW-368	BC	01/31/90	-5	5	-2	2	1	
75	1	GW-068	BC	03/12/90	-5	5	-3	2	2	
76	1	GW-694	BC	07/17/02	-5	0	-5	1	10	
77	1	GW-736	BC	07/17/02	-5	0	-5	2	9	
78	1	GW-737	BC	07/18/02	-5	0	-5	2	9	
79	1	GW-658	EF	08/15/03	-5	0	-5	1	10	
80	1	GW-684	BC	08/15/03	-5	0	-5	1	10	
81	1	GW-710	BC	08/15/03	-5	0	-5	1	10	
82	1	GW-336	EF	11/20/03	-5	0	-5	1	10	
83	1	GW-337	EF	11/20/03	-5	0	-5	1	10	
84	1	GW-505	EF	11/20/03	-5	0	-5	1	10	
85	0	GW-304	CR	07/12/95	5	5	-5	0	-5	
86	0	GW-303	CR	07/16/95	5	5	-5	0	-5	
87	0	GW-181	CR	11/06/95	5	5	-5	0	-5	
88	0	GW-511	CR	11/07/95	5	5	-5	0	-5	
89	**0**	**GW-742**	**CR**	**02/01/96**	**5**	**5**	**-5**	**0**	**-5**	**X**
90	**0**	**GW-610**	**CR**	**02/23/96**	**5**	**5**	**-5**	**0**	**-5**	**X**
91	**0**	**GW-743**	**CR**	**02/23/96**	**5**	**5**	**-5**	**0**	**-5**	**X**
92	**0**	**GW-611**	**CR**	**02/25/96**	**5**	**5**	**-5**	**0**	**-5**	**X**
93	0	GW-546	CR	04/09/96	5	5	-5	0	-5	
94	0	GW-541	CR	04/15/96	5	5	-5	0	-5	
95	0	GW-160	CR	04/29/96	5	5	-5	0	-5	
96	0	GW-184	CR	04/30/96	5	5	-5	0	-5	
97	0	GW-188	CR	04/30/96	5	5	-5	0	-5	
98	0	GW-299	CR	04/30/96	5	5	-5	0	-5	
99	**0**	**GW-300**	**CR**	**04/30/96**	**5**	**5**	**-5**	**0**	**-5**	**X**
100	**0**	**GW-513**	**CR**	**04/29/96**	**5**	**5**	**-5**	**0**	**-5**	**X**
101	0	GW-186	CR	05/01/96	5	5	-5	0	-5	
102	0	GW-298	CR	05/01/96	5	5	-5	0	-5	
103	0	GW-512	CR	05/02/96	5	5	-5	0	-5	
104	0	GW-292	CR	05/08/96	5	5	-5	0	-5	
105	0	GW-293	CR	05/08/96	5	5	-5	0	-5	
106	0	1082	CR	.	5	.	.	.	-5	
107	0	1084	CR	.	5	.	.	.	-5	
108	0	GW-558	CR	.	5	.	.	.	-5	
109	0	GW-559	CR	.	5	.	.	.	-5	
110	0	GW-674	CR	.	5	.	.	.	-5	
111	0	GW-676	CR	.	5	.	.	.	-5	
112	0	GW-677	CR	.	5	.	.	.	-5	
113	0	GW-678	CR	.	5	.	.	.	-5	
114	**0**	**GW-679**	**CR**	**.**	**5**	**.**	**.**	**.**	**-5**	**X**
115	**0**	**GW-680**	**CR**	**.**	**5**	**.**	**.**	**.**	**-5**	**X**
116	0	GW-259	BC	03/05/90	-5	5	-3	2	1	
117	0	GW-122	BC	04/13/91	-5	5	-5	2	3	
118	0	GW-307	BC	04/26/91	-5	5	-5	3	2	
119	0	GW-645	BC	08/02/92	-5	5	-2	1	1	
120	0	GW-314	BC	08/15/92	-5	5	-5	2	3	

Sampling Priority Scores for CY 2004

Rank	Sampling Priority Score [1]	Well No.	Hydro. Regime [2]	Most Recent Sample [3]	Points Scored [4]					Selected for CY 2004
					Regime	Time since sampled last	No. of Samples	Contaminant Concentrations	Trending Potential	
121	0	GW-309	BC	08/30/92	-5	5	-5	2	3	
122	**0**	**55-6A**	**EF**	**06/05/96**	**-5**	**5**	**5**	**0**	**-5**	**X**
123	0	55-1C	EF	06/07/96	-5	5	5	0	-5	
124	0	GW-739	BC	07/22/02	-5	0	-5	1	9	
125	0	GW-723	BC	07/23/02	-5	0	-5	1	9	
126	-1	GW-258	BC	03/05/90	-5	5	-3	1	1	
127	-1	GW-265	EF	03/13/90	-5	5	-5	2	2	
128	-1	GW-334	EF	04/13/91	-5	5	-4	2	1	
129	-1	GW-306	BC	04/26/91	-5	5	-5	2	2	
130	-1	GW-308	BC	04/30/91	-5	5	-5	2	2	
131	-1	GW-310	BC	04/30/91	-5	5	-5	2	2	
132	-1	GW-018	BC	06/20/91	-5	5	4	0	-5	
133	-1	GW-313	BC	08/15/92	-5	5	-5	1	3	
134	-1	GW-623	BC	09/27/92	-5	5	-3	1	1	
135	-1	GW-819	EF	03/26/98	-5	4	5	0	-5	
136	-1	GW-775	EF	10/31/02	-5	0	-5	1	8	
137	-2	GW-107	EF	01/19/90	-5	5	-5	1	2	
138	-2	GW-010	BC	02/01/90	-5	5	-5	2	1	
139	-2	GW-369	BC	05/15/91	-5	5	-5	2	1	
140	-2	GW-282	EF	07/29/92	-5	5	-5	1	2	
141	-2	GW-183	EF	11/16/93	-5	5	-5	1	2	
142	-2	GW-508	EF	03/02/94	-5	5	-5	1	2	
143	-2	GW-783	EF	05/01/00	-5	2	-5	2	4	
144	-3	GW-097	BC	01/29/90	-5	5	-5	1	1	
145	-3	GW-367	BC	05/11/91	-5	5	-5	1	1	
146	-3	GW-089	BC	08/13/92	-5	5	-5	1	1	
147	-3	GW-659	EF	11/15/93	-5	5	-5	1	1	
148	-3	GW-006	BC	08/02/00	-5	2	-2	1	1	
149	-3	GW-829	BC	08/01/01	-5	1	-5	1	5	
150	-4	GW-609	CR	01/10/01	5	1	-5	0	-5	
151	-4	GW-241	CR	08/16/01	5	1	-5	0	-5	
152	-4	GW-514	CR	08/16/01	5	1	-5	0	-5	
153	-4	GW-608	CR	08/20/01	5	1	-5	0	-5	
154	**-4**	**GW-174**	**CR**	**08/21/01**	**5**	**1**	**-5**	**0**	**-5**	**X**
155	-4	GW-249	BC	02/16/90	-5	5	1	0	-5	
156	-4	GW-778	EF	05/18/95	-5	5	1	0	-5	
157	-5	GW-539	CR	07/17/02	5	0	-5	0	-5	
158	-5	GW-686	EF	11/14/02	-5	0	4	1	-5	
159	-5	59-1C	EF	11/20/03	-5	0	4	1	-5	
160	-5	60-1B	EF	11/20/03	-5	0	5	.	-5	
161	-6	GW-045	BC	02/08/90	-5	5	-1	0	-5	
162	-6	GW-753	EF	10/21/93	-5	5	-1	0	-5	
163	-6	GW-091	BC	08/08/02	-5	0	4	0	-5	
164	-6	55-1B	EF	10/14/02	-5	0	4	0	-5	
165	-6	59-1A	EF	11/20/03	-5	0	4	0	-5	
166	-6	59-1B	EF	11/20/03	-5	0	4	0	-5	
167	-7	GW-375	BC	02/06/90	-5	5	-2	0	-5	
168	-7	GW-648	BC	07/23/92	-5	5	-2	0	-5	
169	-7	GW-646	BC	08/03/92	-5	5	-2	0	-5	
170	-7	GW-167	EF	02/14/96	-5	5	-2	0	-5	
171	-7	GW-754	EF	02/15/96	-5	5	-2	0	-5	
172	-7	GW-756	EF	02/14/96	-5	5	-2	0	-5	
173	-7	GW-218	EF	11/06/00	-5	2	1	0	-5	
174	-8	GW-200	EF	10/10/88	-5	5	-3	0	-5	
175	-8	GW-202	EF	10/10/88	-5	5	-3	0	-5	
176	-9	GW-150	EF	03/08/88	-5	5	-4	0	-5	
177	-9	GW-335	EF	04/10/91	-5	5	-4	0	-5	
178	-9	GW-531	BC	06/24/91	-5	5	-4	0	-5	
179	-9	GW-086	BC	10/21/93	-5	5	-4	0	-5	
180	-9	GW-248	BC	08/08/95	-5	5	-4	0	-5	

Sampling Priority Scores for CY 2004

Rank	Sampling Priority Score [1]	Well No.	Hydro. Regime [2]	Most Recent Sample [3]	Points Scored [4]					Selected for CY 2004
					Regime	Time since sampled last	No. of Samples	Contaminant Concentrations	Trending Potential	
181	-10	GW-073	BC	01/30/90	-5	5	-5	0	-5	
182	-10	GW-120	BC	01/30/90	-5	5	-5	0	-5	
183	-10	GW-197	EF	02/03/90	-5	5	-5	0	-5	
184	-10	GW-094	BC	02/15/90	-5	5	-5	0	-5	
185	-10	GW-250	BC	02/16/90	-5	5	-5	0	-5	
186	-10	GW-196	EF	02/21/90	-5	5	-5	0	-5	
187	-10	GW-152	EF	02/28/90	-5	5	-5	0	-5	
188	-10	GW-067	BC	03/13/90	-5	5	-5	0	-5	
189	-10	GW-268	EF	03/13/90	-5	5	-5	0	-5	
190	-10	GW-074	BC	08/03/92	-5	5	-5	0	-5	
191	-10	GW-630	BC	08/29/92	-5	5	-5	0	-5	
192	-10	GW-054	BC	09/02/92	-5	5	-5	0	-5	
193	-10	GW-083	BC	09/02/92	-5	5	-5	0	-5	
194	-10	GW-075	BC	09/08/92	-5	5	-5	0	-5	
195	-10	GW-366	BC	09/07/92	-5	5	-5	0	-5	
196	-10	GW-520	BC	09/07/92	-5	5	-5	0	-5	
197	-10	GW-125	BC	09/17/92	-5	5	-5	0	-5	
198	-10	GW-058	BC	09/24/92	-5	5	-5	0	-5	
199	-10	GW-622	BC	09/25/92	-5	5	-5	0	-5	
200	-10	GW-286	BC	10/07/93	-5	5	-5	0	-5	
201	-10	GW-651	BC	10/10/93	-5	5	-5	0	-5	
202	-10	GW-283	EF	10/14/93	-5	5	-5	0	-5	
203	-10	GW-641	BC	10/14/93	-5	5	-5	0	-5	
204	-10	GW-323	BC	10/23/93	-5	5	-5	0	-5	
205	-10	GW-316	BC	10/24/93	-5	5	-5	0	-5	
206	-10	GW-239	EF	10/30/93	-5	5	-5	0	-5	
207	-10	GW-657	EF	11/15/93	-5	5	-5	0	-5	
208	-10	GW-013	BC	12/19/93	-5	5	-5	0	-5	
209	-10	GW-636	BC	12/18/93	-5	5	-5	0	-5	
210	-10	GW-638	BC	12/18/93	-5	5	-5	0	-5	
211	-10	GW-325	BC	02/15/94	-5	5	-5	0	-5	
212	-10	GW-261	EF	05/16/95	-5	5	-5	0	-5	
213	-10	GW-263	EF	05/16/95	-5	5	-5	0	-5	
214	-10	GW-252	EF	05/17/95	-5	5	-5	0	-5	
215	-10	GW-255	EF	05/17/95	-5	5	-5	0	-5	
216	-10	GW-637	BC	07/19/95	-5	5	-5	0	-5	
217	-10	GW-047	BC	07/24/95	-5	5	-5	0	-5	
218	-10	GW-057	BC	08/05/95	-5	5	-5	0	-5	
219	-10	GW-290	BC	08/07/95	-5	5	-5	0	-5	
220	-10	GW-370	BC	08/08/95	-5	5	-5	0	-5	
221	-10	GW-800	BC	08/05/95	-5	5	-5	0	-5	
222	-10	GW-317	BC	08/15/95	-5	5	-5	0	-5	
223	-10	GW-347	BC	08/15/95	-5	5	-5	0	-5	
224	-10	GW-348	BC	08/21/95	-5	5	-5	0	-5	
225	-10	GW-652	BC	09/19/95	-5	5	-5	0	-5	
226	-10	GW-759	EF	11/14/95	-5	5	-5	0	-5	
227	-10	GW-199	EF	11/16/95	-5	5	-5	0	-5	
228	-10	GW-773	EF	11/18/95	-5	5	-5	0	-5	
229	-10	GW-774	EF	11/18/95	-5	5	-5	0	-5	
230	-10	GW-654	BC	12/09/95	-5	5	-5	0	-5	
231	-10	GW-095	BC	08/27/96	-5	5	-5	0	-5	
232	-10	GW-794	BC	08/26/96	-5	5	-5	0	-5	
233	-10	GW-795	BC	08/26/96	-5	5	-5	0	-5	
234	-10	GW-766	EF	10/09/96	-5	5	-5	0	-5	
235	-10	GW-767	EF	10/09/96	-5	5	-5	0	-5	
236	-10	GW-191	EF	11/06/96	-5	5	-5	0	-5	
237	-10	GW-194	EF	11/07/96	-5	5	-5	0	-5	
238	-10	GW-195	EF	11/07/96	-5	5	-5	0	-5	
239	-10	GW-779	EF	11/07/96	-5	5	-5	0	-5	
240	-10	GW-780	EF	11/07/96	-5	5	-5	0	-5	

Sampling Priority Scores for CY 2004

Rank	Sampling Priority Score [1]	Well No.	Hydro. Regime [2]	Most Recent Sample [3]	Points Scored [4]					Selected for CY 2004
					Regime	Time since sampled last	No. of Samples	Contaminant Concentrations	Trending Potential	
241	-10	GW-338	EF	11/11/96	-5	5	-5	0	-5	
242	-10	GW-149	EF	11/14/96	-5	5	-5	0	-5	
243	-10	GW-384	EF	11/21/96	-5	5	-5	0	-5	
244	-10	GW-385	EF	11/19/96	-5	5	-5	0	-5	
245	-10	GW-751	EF	11/18/96	-5	5	-5	0	-5	
246	-10	GW-752	EF	11/18/96	-5	5	-5	0	-5	
247	-10	GW-603	EF	11/25/96	-5	5	-5	0	-5	
248	-10	GW-084	BC	08/13/97	-5	5	-5	0	-5	
249	-10	GW-372	BC	08/14/97	-5	5	-5	0	-5	
250	-10	GW-613	BC	08/11/97	-5	5	-5	0	-5	
251	-10	GW-642	BC	08/14/97	-5	5	-5	0	-5	
252	-10	GW-817	EF	12/04/97	-5	5	-5	0	-5	
253	-10	GW-745	EF	12/09/97	-5	5	-5	0	-5	
254	-10	GW-746	EF	12/09/97	-5	5	-5	0	-5	
255	-10	GW-748	EF	12/10/97	-5	5	-5	0	-5	
256	-10	GW-749	EF	12/10/97	-5	5	-5	0	-5	
257	-10	55-2A	EF	.	-5	.	.	.	-5	
258	-10	55-3A	EF	.	-5	.	.	.	-5	
259	-10	55-3B	EF	.	-5	.	.	.	-5	
260	-10	55-3C	EF	.	-5	.	.	.	-5	
261	-10	56-1A	EF	.	-5	.	.	.	-5	
262	-10	56-1C	EF	.	-5	.	.	.	-5	
263	-10	56-3A	EF	.	-5	.	.	.	-5	
264	-10	56-3B	EF	.	-5	.	.	.	-5	
265	-10	56-3C	EF	.	-5	.	.	.	-5	
266	-10	56-4A	EF	.	-5	.	.	.	-5	
267	-10	56-6A	EF	.	-5	.	.	.	-5	
268	-10	56-8A	EF	.	-5	.	.	.	-5	
269	-10	58-2A	EF	.	-5	.	.	.	-5	
270	-10	60-1A	EF	.	-5	.	.	.	-5	
271	-10	GW-001	BC	.	-5	.	.	.	-5	
272	-10	GW-012	BC	.	-5	.	.	.	-5	
273	-10	GW-016	BC	.	-5	.	.	.	-5	
274	-10	GW-041	BC	.	-5	.	.	.	-5	
275	-10	GW-055	BC	.	-5	.	.	.	-5	
276	-10	GW-059	BC	.	-5	.	.	.	-5	
277	-10	GW-065	BC	.	-5	.	.	.	-5	
278	-10	GW-090	BC	.	-5	.	.	.	-5	
279	-10	GW-699	EF	.	-5	.	.	.	-5	
280	-10	GW-734	EF	.	-5	.	.	.	-5	
281	-12	GW-126	BC	03/02/99	-5	3	-5	0	-5	
282	-12	GW-345	BC	03/09/99	-5	3	-5	0	-5	
283	-12	GW-788	EF	10/20/99	-5	3	-5	0	-5	
284	-12	GW-781	EF	10/26/99	-5	3	-5	0	-5	
285	-12	GW-792	EF	11/28/99	-5	3	-5	0	-5	
286	-13	GW-621	BC	07/13/00	-5	2	-5	0	-5	
287	-13	GW-287	BC	08/21/00	-5	2	-5	0	-5	
288	-14	GW-056	BC	03/14/01	-5	1	-5	0	-5	
289	-14	GW-685	BC	03/14/01	-5	1	-5	0	-5	
290	-14	GW-789	EF	10/15/01	-5	1	-5	0	-5	
291	-14	GW-349	EF	10/14/02	-5	0	-4	0	-5	
292	-14	GW-350	EF	10/15/02	-5	0	-4	0	-5	
293	-15	GW-069	BC	08/05/02	-5	0	-5	0	-5	
294	-15	GW-776	EF	10/31/02	-5	0	-5	0	-5	
295	-15	GW-123	BC	08/15/03	-5	0	-5	0	-5	
296	-15	GW-683	BC	08/15/03	-5	0	-5	0	-5	
297	-15	GW-711	BC	08/15/03	-5	0	-5	0	-5	
298	-15	GW-271	EF	11/20/03	-5	0	-5	0	-5	
299	-15	GW-272	EF	11/20/03	-5	0	-5	0	-5	
300	-15	GW-631	EF	11/20/03	-5	0	-5	0	-5	

Sampling Priority Scores for CY 2004

Rank	Sampling Priority Score [1]	Well No.	Hydro. Regime [2]	Most Recent Sample [3]	Points Scored [4]					Selected for CY 2004
					Regime	Time since sampled last	No. of Samples	Contaminant Concentrations	Trending Potential	
301	-15	GW-760	EF	11/20/03	-5	0	-5	0	-5	
302	-15	GW-761	EF	11/20/03	-5	0	-5	0	-5	
303	-15	GW-765	EF	11/20/03	-5	0	-5	0	-5	
304	-15	GW-786	EF	11/20/03	-5	0	-5	0	-5	
305	-15	GW-787	EF	11/20/03	-5	0	-5	0	-5	
292	-15	GW-765	EF	11/20/03	-5	0	-5	0	-5	
293	-15	GW-786	EF	11/20/03	-5	0	-5	0	-5	
294	-15	GW-787	EF	11/20/03	-5	0	-5	0	-5	

Notes:

1 The Sampling Priority Score is the sum of the points scored.

2 BC = Bear Creek Hydrogeologic Regime
CR = Chestnut Ridge Hydrogeologic Regime
EF = Upper East Fork Poplar Creek Hydrogeologic Regime

3 Because sampling for CY 2003 is incomplete, the most recent sample dates for locations sampled during CY 2003 are default values based on the sampling schedule: first and third quarter locations use 08/15/03 as a default, and second and fourth quarter locations use 11/20/03. Some wells with relatively high ranking were not selected for CY 2004 because they were sampled within the previous two years and are not located in the Chestnut Ridge Regime (focus for FY 2004).

4 Point values are assigned in accordance with the monitoring optimization plan (see example on the following page).

CY 2004 sampling priority score for well GW-322.

Criteria			Point Value	Score
Is the well located in the hydrogeologic regime that is the focus of the GWPP sampling program?				
	YES	x	5	5
	NO		-5	
How long since groundwater samples were collected from the well (beginning in January 1986)?				
	Years			
	>		5	
	5	x	4	4
	4		3	
	3		2	
	2		1	
	<		0	
How many samples have been collected from the well since January 1986?				
	Total Number of Samples			
	>9	x	-5	-5
	9		-4	
	8		-3	
	7		-2	
	6		-1	
	5		1	
	4		2	
	3		3	
	2		4	
	1		5	

Do the concentrations of the following contaminants in the well exceed the specified criteria?

		Concentration Relative to the MCL							
		NO3	U	VOC	GA	GB	OTHER		
	MCL:	10	0.03	5	15	50	.		
	Units:	m/L	mg/L	ug/L	pCi/L	pCi/L	.		
YES	> MCL							1	
	10 X MCL			x				2	2
	100 X MCL							2	
	1000 X MCL							1	
NO								-5	

Does the well provide a long-term contaminant concentration trend?

	Length of Trend (Years)			
YES	>		10	
	10		9	
	9	x	8	8
	8		7	
	7		6	
	6		5	
	5		4	
	4		3	
	3		2	
	<		1	
NO			-5	

SAMPLING PRIORITY SCORE 14

APPENDIX D

LABORATORY REQUIREMENTS
(Bottle Lists, Holding Times, Turnaround Time)

STD

Parameter	Chemical Preservative [1]	Bottle Types/Size
Anions, and Fluoride	None	1 - 250 mL polyethylene
Total Suspended Solids	None	1 - 250 mL polyethylene
Total Dissolved Solids	None	1 - 250 mL polyethylene
Carbonate, Bicarbonate	None	1 - 250 mL polyethylene
Total Metals (ICP,ICP-MS, and Hg)	HNO_3	1 - 500 mL polyethylene
Radiochemistry (UV / Y-12)	HNO_3	1 – 500 mL polyethylene
VOA	None	2 - 40 mL amber glass with Teflon lined septum lids
Trip Blank (VOA) **(one per cooler)**	None	1 - 40 mL amber glass with Teflon lined septum lid

STD: **ESLIMS LAB TEST ID**

FLD GWTRSAMP
CHEM ALKALINITY-I, ANIONS, FLUORIDE, SOLIDS-TOT-S, SOLIDS-TOT-D
MET(1)ICP6010, ICPMSGW and HG7470
VOC(1) VOA8260GW
RAD(1)GROSSAB-ENV

[1] Samples chilled to 4 +/- 2C

STD/F

Parameter	Chemical Preservative [1]	Bottle Types/Size
Anions, and Fluoride	None	1 - 250 mL polyethylene
Total Suspended Solids	None	1 - 250 mL polyethylene
Total Dissolved Solids	None	1 - 250 mL polyethylene
Carbonate, Bicarbonate	None	1 - 250 mL polyethylene
Total Metals (ICP,ICP-MS, and Hg)	HNO_3	1 - 500 mL polyethylene
Filtered Metals (ICP, ICP-MS, and Hg)	HNO_3	1 - 500 mL polyethylene
Radiochemistry (UV / Y-12)	HNO_3	1 – 500 mL polyethylene
VOA	None	2 - 40 mL amber glass with Teflon lined septum lids
Trip Blank (VOA) **(one per cooler)**	None	1 - 40 mL amber glass with Teflon lined septum lid

STD: **ESLIMS LAB TEST ID**

FLD GWTRSAMP
CHEM ALKALINITY-I, ANIONS, FLUORIDE, SOLIDS-TOT-S, SOLIDS-TOT-D
MET(1)/F ICP6010, ICPMSGW and HG7470
VOC(1) VOA8260GW
RAD(1)GROSSAB-ENV

[1] Samples chilled to 4 +/- 2C

VOC (1)

Parameter	Chemical Preservative [1]	Bottle Types/Size
VOA	None	2 – 40 mL amber glass with Teflon lined septum lid

VOC(1) VOA8260GW

[1] Samples chilled to 4 +/- 2C

STD, RAD (3)

Parameter	Chemical Preservative[1]	Bottle Types/Size
Anions, and Fluoride	None	1 – 250 mL polyethylene
Total Suspended Solids	None	1 – 250 mL polyethylene
Total Dissolved Solids	None	1 – 250 mL polyethylene
Carbonate, Bicarbonate	None	1 – 250 mL polyethylene
Total Metals (ICP,ICP-MS, and Hg)	HNO_3	1 – 500 mL polyethylene
Radiochemistry (UV / Y12)	HNO_3	1 – 1L polyethylene
VOA	None	2 – 40 mL amber glass with Teflon lined septum lids
Trip Blank (VOA) **(one per cooler)**	None	1 – 40 mL amber glass with Teflon lined septum lid

STD: **ESLIMS LAB TEST ID**
FLD GWSPSAMP
CHEM ALKALINITY-I, ANIONS, FLUORIDE, SOLIDS-TOT-S, SOLIDS-TOT-D
MET(1)ICP6010, ICPMSGW and HG7470
VOC(1) VOA8260GW

RAD (1) = Gross Alpha Beta (GROSSAB-ENV) 500 mL preserved w HNO3

RAD (3) = ^{234}U, ^{235}U, ^{238}U (ASPECU-ENV) 500 mL preserved w HNO3

[1] Samples chilled to 4 +/- 2C

STD, RAD (12)

Parameter	Chemical Preservative [1]	Bottle Types/Size
Anions, and Fluoride	None	1 – 250 mL polyethylene
Total Suspended Solids	None	1 – 250 mL polyethylene
Total Dissolved Solids	None	1 – 250 mL polyethylene
Carbonate, Bicarbonate	None	1 – 250 mL polyethylene
Total Metals (ICP,ICP-MS, and Hg)	HNO_3	1 – 500 mL polyethylene
Radiochemistry (UV / Y12)	HNO_3	1 – liter polyethylene &
VOA	None	2 – 40 mL amber glass with Teflon lined septum lids
Trip Blank (VOA) **(one per cooler)**	None	1 – 40 mL amber glass with Teflon lined septum lid

STD: **ESLIMS LAB TEST ID**
FLD GWTRSAMP
CHEM ALKALINITY-I, ANIONS, FLUORIDE, SOLIDS-TOT-S, SOLIDS-TOT-D
MET(1)ICP6010, ICPMSGW and HG7470
VOC(1) VOA8260GW

RAD (1) = Gross Alpha Beta (GROSSAB-ENV) 500 mL preserved w HNO3

RAD (12) = Tc-99 (TC99LS-ENV) 500 mL preserved w HNO3

[1] Samples chilled to 4 +/- 2C

STD, RAD (3, 12)

Parameter	Chemical Preservative [1]	Bottle Types/Size
Anions, and Fluoride	None	1 – 250 mL polyethylene
Total Suspended Solids	None	1 – 250 mL polyethylene
Total Dissolved Solids	None	1 – 250 mL polyethylene
Carbonate, Bicarbonate	None	1 – 250 mL polyethylene
Total Metals (ICP,ICP-MS, and Hg)	HNO_3	1 – 500 mL polyethylene
Radiochemistry (UV / Y12)	HNO_3	1 – liter polyethylene & 1 – 500 mL polyethylene
VOA	None	2 – 40 mL amber glass with Teflon lined septum lids
Trip Blank (VOA) **(one per cooler)**	None	1 – 40 mL amber glass with Teflon lined septum lid

STD: **ESLIMS LAB TEST ID**
FLD GWTRSAMP
CHEM ALKALINITY-I, ANIONS, FLUORIDE, SOLIDS-TOT-S, SOLIDS-TOT-D
MET(1)ICP6010, ICPMSGW and HG7470
VOC(1) VOA8260GW

RAD (1) = Gross Alpha Beta (GROSSAB-ENV) 500 mL preserved w HNO3

RAD (3) = ^{234}U, ^{235}U, ^{238}U (ASPECU-ENV) 500 mL preserved w HNO3

RAD (12) = Tc-99 (TC99LS-ENV) 500 mL preserved w HNO3

[1] Samples chilled to 4 +/- 2C

STD/F, RAD (3, 12)

Parameter	Chemical Preservative [1]	Bottle Types/Size
Anions, and Fluoride	None	1 – 250 mL polyethylene
Total Suspended Solids	None	1 – 250 mL polyethylene
Total Dissolved Solids	None	1 – 250 mL polyethylene
Carbonate, Bicarbonate	None	1 – 250 mL polyethylene
Total Metals (ICP,ICP-MS, and Hg)	HNO_3	1 – 500 mL polyethylene
Filtered Metals (ICP,ICP-MS, and Hg)	HNO_3	1 – 500 mL polyethylene
Radiochemistry (UV / Y12)	HNO_3	1 – liter polyethylene & 1 – 500 mL polyethylene
VOA	None	2 – 40 mL amber glass with Teflon lined septum lids
Trip Blank (VOA) **(one per cooler)**	None	1 – 40 mL amber glass with Teflon lined septum lid

STD:	**ESLIMS LAB TEST ID**
FLD	GWTRSAMP
CHEM	ALKALINITY-I, ANIONS, FLUORIDE, SOLIDS-TOT-S, SOLIDS-TOT-D
MET(1)/F	ICP6010, ICPMSGW and HG7470
VOC(1)	VOA8260GW

RAD (1) = Gross Alpha Beta (GROSSAB-ENV) 500 mL preserved w HNO3

RAD (3) = ^{234}U, ^{235}U, ^{238}U (ASPECU-ENV) 500 mL preserved w HNO3

RAD (12) = Tc-99 (TC99LS-ENV) 500 mL preserved w HNO3

[1] Samples chilled to 4 +/- 2C

WESTBAY

Parameter	Chemical Preservative [1]	Bottle Types/Size
Anions, and Fluoride	None	1 - 250 mL polyethylene
Total Suspended Solids	None	1 - 250 mL polyethylene
Total Dissolved Solids	None	1 - 250 mL polyethylene
Carbonate, Bicarbonate	None	1 - 250 mL polyethylene
Total Metals (ICP,ICP-MS, and Hg)	HNO_3	1 - 250 mL polyethylene
Radiochemistry (UV / Y-12)	HNO_3	1 – 250 mL polyethylene
VOA	None	2 - 40 mL amber glass with Teflon lined septum lids
Trip Blank (VOA) **(one per cooler)**	None	1 - 40 mL amber glass with Teflon lined septum lid

STD: **ESLIMS LAB TEST ID**

FLD GWTRSAMP
CHEM ALKALINITY-I, ANIONS, FLUORIDE, SOLIDS-TOT-S, SOLIDS-TOT-D
MET(1)ICP6010, ICPMSGW and HG7470
VOC(1) VOA8260GW
RAD(1)GROSSAB-ENV

[1] Samples chilled to 4 +/- 2C

ESTABLISHED HOLDING TIMES

Parameter	**Holding Times**
Alkalinity (Carbonate, Bicarbonate)	14 days
Anions (Chloride, Nitrate, Sulfate)	48 hr
Fluoride	28 days
Mercury	28 days
Metals (ICP, ICPMS)	6 months
Radiochemistry (except tritium)	6 months
Solids, Total Dissolved	7 days
Solids, Total Suspended	7 days
Tritium	No EPA guidance
Uranium by Thermal Ionization Mass Spec	6 months
VOA	7 days

ESTABLISHED TURNAROUND TIMES

The Groundwater Protection Program and the Analytical Chemistry Organization (ACO) laboratory have agreed upon a turnaround time, such that the analytical data generated from all sample locations within a sample group will be transmitted to the Data Manager as a data deliverable. Currently, the turnaround time for all sample groups is 35 days from the receipt of the last sample within a group. Data is transmitted in the form of hard copy of the completed and approved lab reports for each locations, along with an electronic copy in a standardized and compatible format (please see *Y-12 Plant Groundwater Protection Program Data Management Plan, Revision 1*, May 2000, Y/SUB/00-KFX63/C/1)

APPENDIX E

ADDENDA TO THE CY 2004 SAMPLING AND ANALYSIS PLAN
(if issued)

APPENDIX F

CY 2004 GROUNDWATER MONITORING SCHEDULES

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