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**Y-12 GROUNDWATER PROTECTION PROGRAM
MONITORING OPTIMIZATION PLAN
FOR GROUNDWATER MONITORING WELLS
AT THE
U.S. DEPARTMENT OF ENERGY
Y-12 NATIONAL SECURITY COMPLEX,
OAK RIDGE, TENNESSEE**

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**

**Y-12
NATIONAL
SECURITY
COMPLEX**

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

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CONTENTS

<u>Section</u>	<u>Page</u>
List of Figures	ii
List of Tables	iii
List of Acronyms and Abbreviations	iv
1.0 INTRODUCTION	1
2.0 MONITORING WELL STATUS	1
2.1 ACTIVE STATUS	2
2.1.1 Regulatory Monitoring Programs	2
2.1.2 DOE Order 5400.1 Monitoring Programs	3
2.1.3 Hydrologic Monitoring	3
2.1.4 Groundwater Contamination	4
2.1.5 Unique Monitoring Coverage	4
2.2 INACTIVE STATUS	5
3.0 MONITORING WELL UTILIZATION	5
3.1 HYDROLOGIC MONITORING	5
3.2 GROUNDWATER SAMPLING	6
4.0 MONITORING WELL INSPECTION AND MAINTENANCE	8
4.1 ACTIVE STATUS	8
4.2 INACTIVE STATUS	8
5.0 REFERENCES	9
APPENDIX A: FIGURES	
APPENDIX B: TABLES	

List of Figures

<u>Figure</u>	<u>Page</u>
1 Hydrogeologic regimes at the Y-12 National Security Complex	A-1
2 Process used to designate the status of groundwater monitoring wells at the Y-12 National Security Complex	A-2
3 Locations of groundwater monitoring wells in the Bear Creek Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program	A-3
4 Locations of groundwater monitoring wells in the Upper East Fork Poplar Creek Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program	A-4
5 Locations of groundwater monitoring wells in the Chestnut Ridge Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program	A-5
6 Example of the highest possible Y-12 Groundwater Protection Program sampling priority score for an applicable groundwater monitoring well	A-6
7 Example of the lowest possible Y-12 Groundwater Protection Program sampling priority score for an applicable groundwater monitoring well	A-7

List of Tables

<u>Table</u>	<u>Page</u>
1 Groundwater monitoring wells in the Bear Creek Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program	B-1
2 Groundwater monitoring wells in the Upper East Fork Poplar Creek Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program	B-9
3 Groundwater monitoring wells in the Chestnut Ridge Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program	B-17
4 Groundwater monitoring wells at the Y-12 National Security Complex that are granted inactive status under the Y-12 Groundwater Protection Program	B-22
5 Hydrologic monitoring wells in the Bear Creek Hydrogeologic Regime	B-25
6 Hydrologic monitoring wells in the Upper East Fork Poplar Creek Hydrogeologic Regime . . .	B-27
7 Hydrologic monitoring wells in the Chestnut Ridge Hydrogeologic Regime	B-29

List of Acronyms and Abbreviations

Bear Creek Regime	Bear Creek Hydrogeologic Regime
BCV	Bear Creek Valley
BJC	Bechtel Jacobs Company LLC
BWXT	BWXT Y-12, L.L.C.
Chestnut Ridge Regime	Chestnut Ridge Hydrogeologic Regime
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CY	calendar year
DOE	U.S. Department of Energy
East Fork Regime	Upper East Fork Poplar Creek Hydrogeologic Regime
EMWMF	Environmental Management Waste Management Facility
GWPP	Groundwater Protection Program
LMES	Lockheed Martin Energy Systems, Inc.
MCL	maximum contaminant level
mg/L	milligrams per liter
ORR	Oak Ridge Reservation
pCi/L	picoCurries per liter
PCP	post-closure permit
RCRA	Resource Conservation and Recovery Act
SAP	sampling and analysis plan
SDWA	Safe Drinking Water Act
SPS	Sampling Priority Score
SWDF	Solid Waste Disposal Facility
WRRP	Water Resources Restoration Program
Y-12	Y-12 National Security Complex

1.0 INTRODUCTION

This document is the monitoring optimization plan for groundwater monitoring wells associated with the U.S. Department of Energy (DOE) Y-12 National Security Complex (Y-12) in Oak Ridge, Tennessee (Figure 1). The plan describes the technical approach that will be implemented under the Y-12 Groundwater Protection Program (GWPP) to focus available resources on the monitoring wells at Y-12 which provide the most useful hydrologic and water-quality monitoring data. The technical approach is based on the GWPP status designation for each well (Section 2.0). Under this approach, wells granted “active” status are used by the GWPP for hydrologic monitoring and/or groundwater sampling (Section 3.0), whereas well granted “inactive” status are not used for either purpose. The status designation also determines the frequency at which the GWPP will inspect applicable wells, the scope of these well inspections, and extent of any maintenance actions initiated by the GWPP (Section 4.0). Details regarding the ancillary activities associated with implementation of this plan (e.g., well inspection) are deferred to the referenced GWPP plans and procedures (Section 5.0).

This plan applies to groundwater monitoring wells associated with Y-12 and related waste management facilities located within three hydrogeologic regimes (Figure 1): 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 Regime encompasses a section of Bear Creek Valley (BCV) immediately west of Y-12. The East Fork Regime encompasses most of the Y-12 process, operations, and support facilities in BCV and, for the purposes of this plan, includes a section of Union Valley east of the DOE Oak Ridge Reservation (ORR) boundary along Scarboro Road. The Chestnut Ridge Regime is directly south of Y-12 and encompasses a section of Chestnut Ridge that is bound to the west by a surface drainage feature (Dunaway Branch) and by Scarboro Road to the east. The GWPP maintains an extensive database of construction details and related information for the monitoring wells in each hydrogeologic regime (including wells that have been destroyed or intentionally plugged and abandoned); the most recent hardcopy version of the database was issued in February 2003 (BWXT Y-12, L.L.C. [BWXT] 2003).

This plan does not apply to temporary piezometers or other specialized groundwater monitoring/sampling devices that have been or may be installed for research purposes, hydrologic tests, pilot studies, or short-term investigations.

This plan will be reviewed and updated in accordance with the schedule required in the Y-12 GWPP Management Plan (BWXT 2001). Between scheduled updates of this plan, any substantial changes or modifications to the plan, including changes in the GWPP status designation for each monitoring well identified in the plan, will be described in addenda issued by the GWPP Manager (or authorized designee). Information included in the addenda will be incorporated into the plan during the next scheduled update.

2.0 MONITORING WELL STATUS

Existing groundwater monitoring wells at Y-12 are assigned active or inactive status for the purposes of this plan (Figure 2). Although the wells granted either status may be functionally suitable for hydrologic monitoring and groundwater sampling, only wells granted active status will be used for either purpose by the GWPP. Additionally, the status designation for each well will not change unless warranted by future circumstances and approved by the GWPP Manager. For example, a well granted inactive status may be used to replace a nearby well granted active status that has been irreparably damaged or destroyed. Whenever a

change in the status of a well is warranted, the GWPP Manager (or authorized designee) will issue an addendum to this plan that identifies the well and the reason(s) for the change in status.

2.1 ACTIVE STATUS

Active status under the GWPP is granted to the following groups of groundwater monitoring wells at Y-12:

- Wells that are used for regulatory monitoring programs (see Section 2.1.1);
- Wells that are sampled specifically to address applicable groundwater monitoring requirements specified in DOE Order 5400.1 (see Section 2.1.2);
- Wells that are used to monitor groundwater surface elevations in each hydrogeologic regime (see Section 2.1.3);
- Wells that are known to yield contaminated groundwater (see Section 2.1.4); and
- Wells located hydraulically downgradient of a Y-12 facility, or a known source of groundwater contamination, that provide unique hydrologic or water-quality information (see Section 2.1.5).

Based on these criteria, a total of 451 wells at Y-12 are granted active status, including 190 wells in the Bear Creek Regime (Table 1), 173 wells in the East Fork Regime (Table 2), and 88 wells in the Chestnut Ridge Regime (Table 3); the locations of these wells are shown on Figure 3 (Bear Creek Regime), Figure 4 (East Fork Regime), and Figure 5 (Chestnut Ridge Regime).

Active status under the GWPP also will be granted to any newly installed well that meets the design and construction standards described in the Y-12 GWPP Monitoring Well Installation Plan (Lockheed Martin Energy Systems, Inc.[LMES] 1997), serves an ongoing regulatory monitoring program, or provides data suited to the technical purposes or programmatic objectives of the GWPP. New wells that do not meet these criteria will be granted inactive status. In either case, new wells installed at Y-12 will be incorporated into this plan from addenda issued by the GWPP Manager (or authorized designee).

2.1.1 Regulatory Monitoring Programs

Active status is granted to each groundwater monitoring well that is identified in the respective Resource Conservation and Recovery Act (RCRA) post-closure permit (PCP) for the Bear Creek Regime, East Fork Regime, and Chestnut Ridge Regime. The PCP for the Bear Creek Regime designates 27 RCRA wells (Table 1), the PCP for the East Fork Regime designates ten RCRA wells (Table 2), and the PCP for the Chestnut Ridge Regime designates 22 RCRA wells (Table 3). Note that the RCRA well networks for the Bear Creek Regime and East Fork Regime share a common upgradient/background well (GW-115) that is located in the Bear Creek Regime (Figure 3). Additionally, six of the RCRA wells in the Chestnut Ridge Regime also serve the purposes of groundwater detection monitoring programs at nonhazardous solid waste disposal facilities (SWDFs). Ongoing RCRA groundwater monitoring activities in each hydrogeologic regime are managed by the Bechtel Jacobs Company LLC (BJC) as part of the Water Resources Restoration Program (WRRP) for the ORR.

Active status is granted to each groundwater monitoring well that is specified in a Comprehensive Environmental Response, Liability, and Compensation Act (CERCLA) interim/final record of decision or related decision documents. Over the past three years, CERCLA-related groundwater monitoring activities have involved a total of eight wells in the Bear Creek Regime (Table 1), seventeen wells in the East Fork Regime and in Union Valley east of the ORR boundary (Table 2), and ten wells in the Chestnut Ridge Regime (Table 3). Ongoing CERCLA-related groundwater monitoring activities in each hydrogeologic regime are managed by BJC as part of the WRRP.

Active status is granted to each groundwater monitoring well that is specified in the operating permit (or equivalent CERCLA decision document) for hazardous and nonhazardous waste management facilities associated with Y-12. This includes thirteen wells in the Bear Creek Regime (Table 1) that are used to monitor groundwater quality at the Environmental Management Waste Management Facility (EMWMF); the EMWMF is a landfill constructed to receive hazardous and mixed wastes generated during CERCLA-related clean up actions on the ORR. Additionally, there are a total of 21 wells granted active status that are used for groundwater monitoring at several landfills for nonhazardous wastes in the Chestnut Ridge Regime (Table 3), including Industrial Landfill II (three wells), Industrial Landfill IV (five wells), Industrial Landfill V (five wells), Construction/Demolition Landfill VI (four wells), and Construction/Demolition Landfill VII (four wells). Ongoing groundwater monitoring activities at the EMWMF and the SWDFs are managed by respective BJC facility operation subcontractors.

2.1.2 DOE Order 5400.1 Monitoring Programs

Active status is granted to each groundwater monitoring well at Y-12 that is sampled by GWPP specifically to address the requirements for DOE Order 5400.1 Surveillance Monitoring and DOE Order 5400.1 Exit Pathway/Perimeter Monitoring. Sampling locations in each hydrogeologic regime that serve these DOE Order 5400.1 monitoring requirements, as described in the ORR Environmental Monitoring Plan (DOE 2003), include wells that are sampled by the GWPP in direct support of either Surveillance Monitoring or Exit Pathway/Perimeter Monitoring and wells that are sampled by other organizations responsible for the regulatory monitoring programs described in Section 2.1.1.

Surveillance Monitoring is required in areas that are, or could be, affected by operations at DOE facilities. The regulatory monitoring programs described in Section 2.1.1 address many of these areas at Y-12. In addition, the GWPP samples a fixed network of seventeen wells in the Bear Creek Regime (Table 1) and fourteen wells in the East Fork Regime (Table 2) specifically for Surveillance Monitoring at other known or suspected sources of groundwater contamination that are not addressed by a regulatory monitoring program.

Exit Pathway/Perimeter Monitoring is required in areas where contaminants from DOE facilities have the potential to migrate off-site. In conjunction with the perimeter monitoring wells in each hydrogeologic regime that serve an ongoing regulatory monitoring program, the GWPP samples nine monitoring wells for the purposes of Exit Pathway/Perimeter Monitoring in the East Fork Regime (Table 2).

2.1.3 Hydrologic Monitoring

Active status is granted to each groundwater monitoring well that is part of the respective regime-wide network of wells used for monitoring groundwater surface elevations in the Bear Creek Regime, East Fork Regime, and Chestnut Ridge (Figure 2). Section 3.1 provides details regarding the hydrologic monitoring

wells in each regime. Using fixed networks of hydrologic monitoring wells in each regime ensures that the GWPP obtains adequate, equivalent, and consistent groundwater elevation data.

2.1.4 Groundwater Contamination

Active status is granted to groundwater monitoring wells that yield contaminated groundwater but do not serve a regulatory monitoring program and are not used for Surveillance Monitoring, Exit Pathway/Perimeter Monitoring, or hydrologic monitoring (Figure 2). For the purposes of this plan, the presence of groundwater contaminants in a well is based on:

- Nitrate (as N) concentrations that exceed 10 milligrams per liter (mg/L), which is the Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) for drinking water;
- Total uranium concentrations that exceed the (federal) MCL (0.03 mg/L);
- Summed concentrations of volatile organic compounds (VOCs) that exceed 5 micrograms per liter;
- Gross alpha activity above the 15 pCi/L MCL;
- Gross beta activity above the 50 pCi/L SDWA threshold level for a 4 millirem per year dose equivalent (the MCL for gross beta activity); and
- Other conspicuous inorganic, organic, or radiological contaminants with concentrations that exceed background levels or applicable water-quality standards.

Representative contaminant concentrations in each applicable well were determined from the most recent monitoring data obtained since January 1986. Only the results that meet the applicable data quality objective criteria, as described in the Y-12 GWPP Data Management Plan (LMES 2000), were used to determine representative contaminant concentrations in each well. Based on these data, there are 33 wells in the Bear Creek Regime (Table 1) and 29 wells in the East Fork Regime (Table 2) that are granted active status because they yield groundwater containing one or more contaminants.

2.1.5 Unique Monitoring Coverage

Active status is granted to each groundwater monitoring well that: (1) yields uncontaminated groundwater; (2) does not serve regulatory monitoring, DOE Order 5400.1 monitoring, or hydrologic monitoring purposes; (3) is located hydraulically downgradient of a facility at Y-12 or a source of groundwater contamination; and (4) provides unique hydrologic or geochemical information (Figure 2). This includes, for example, wells that monitor uncontaminated groundwater downgradient of a contaminant plume boundary, or wells equipped with a specialized sampling apparatus (e.g., a Westbay™ multiport sampling system). A total of 82 wells at Y-12, including 31 wells in the Bear Creek Regime (Table 1), 46 wells in the East Fork Regime (Table 2), and five wells in the Chestnut Ridge Regime (Table 3), are granted active status because they provide unique monitoring coverage.

2.2 INACTIVE STATUS

Inactive status under the GWPP is granted to the following groups of groundwater monitoring wells at Y-12:

- Wells for which the design and construction details are unknown or do not meet the technical standards of the GWPP, or wells which do not meet other GWPP requirements (e.g., all-weather access);
- Wells for which groundwater monitoring data are not available;
- Wells that are not located hydraulically downgradient of any facility associated with Y-12 or any source of groundwater contamination; and
- Wells that are located hydraulically downgradient of a facility associated with Y-12 or a source of groundwater contamination, monitor uncontaminated groundwater, and provide redundant monitoring coverage.

Based on these criteria, a total of 248 wells at Y-12 are granted inactive status (Table 4), including 188 wells in the Bear Creek Regime, 34 wells in the East Fork Regime, and 26 wells in the Chestnut Ridge Regime.

3.0 MONITORING WELL UTILIZATION

Each groundwater monitoring well at Y-12 that is granted active status under the GWPP is generally suitable for hydrologic monitoring or groundwater sampling. Section 3.1 describes the regime-wide well networks that are designated for monitoring groundwater surface elevations in the Bear Creek Regime, East Fork Regime, and Chestnut Ridge Regime. Section 3.2 describes the priority-based decision process for selecting wells from the pool of candidates in each regime that will be scheduled for sampling by the GWPP (i.e., wells that are granted active status and are not scheduled for sampling by another organization).

3.1 HYDROLOGIC MONITORING

A total of 240 wells at Y-12 are designated for hydrologic monitoring by the GWPP, including 95 wells in the Bear Creek Regime (Table 5), 78 wells in the East Fork Regime (Table 6), and 67 wells in the Chestnut Ridge Regime (Table 7). The hydrologic monitoring wells in each regime provide the areal coverage needed to determine regime-wide groundwater surface elevations, evaluate localized groundwater flow patterns, and calculate representative horizontal and vertical hydraulic gradients.

The elevation of the groundwater surface throughout the Bear Creek Regime, East Fork Regime, and Chestnut Ridge Regime will be determined at least annually from depth-to-water measurements for each of the hydrologic monitoring wells in each regime. The depth to water in each well will be measured in accordance with the most recent approved version of the applicable GWPP technical procedure (or a functionally equivalent technical procedure used by the WRRP). Annual depth-to-water measurements will be performed during alternating wet (winter and spring) and dry (summer and fall) seasonal flow conditions. To ensure the most contemporaneous regime-wide data, measurements of the depth to water in all of the hydrologic monitoring wells in each regime will be completed in the shortest time practical. Also, the organization

responsible for performing annual hydrologic monitoring in each regime will alternate each year between the GWPP (beginning in calendar year [CY] 2003) and the WRRP.

Most of the hydrologic monitoring wells are functionally suitable for groundwater sampling and many of these wells are sampled in compliance with regulatory monitoring programs or DOE Order 5400.1 monitoring requirements. For the purposes of the GWPP, the collection of groundwater samples from the hydrologic monitoring wells which do not serve regulatory and/or DOE monitoring purposes will depend on the sampling prioritization process described in Section 3.2.

3.2 GROUNDWATER SAMPLING

The groundwater monitoring wells at Y-12 that will be sampled by the GWPP each CY are identified in the corresponding annual GWPP sampling and analysis plan (SAP), modified as needed with addenda issued by the GWPP Manager. There are three basic groups of wells typically included the SAP:

- Wells scheduled for sampling specifically to address requirements for DOE Order 5400.1 Surveillance Monitoring and/or Exit Pathway/Perimeter Monitoring in each hydrogeologic regime;
- Wells scheduled for sampling to augment Surveillance Monitoring and/or Exit Pathway/Perimeter Monitoring in a particular hydrogeologic regime; and
- Wells scheduled for sampling as part of a hydrogeologic study or to otherwise serve the technical purposes or programmatic objectives of the GWPP.

The first group of wells remains fixed from year to year and includes 20 wells that are sampled for Surveillance Monitoring in the Bear Creek Regime, fourteen wells that are sampled for Surveillance Monitoring in the East Fork Regime, and nine wells that are sampled for Exit Pathway/Perimeter Monitoring in the East Fork Regime (see Section 2.1.2). Wells comprising the second group, hereafter referenced as the “supplemental” wells, change from year to year depending on several factors, including data needs and funding levels. Similarly, the wells in the third group vary from year to year depending on the particular needs of the applicable hydrogeologic study and the evolving technical purposes and programmatic objectives of the GWPP.

Selection of the supplemental wells to be included in the annual SAP depends on their relative priority for sampling by the GWPP, as expressed by the annual sampling priority score (SPS) for each applicable well. The SPS is determined from the total “points” awarded on the basis of the following criteria:

- **Hydrogeologic Regime:** On a rotating annual basis (i.e., once every three years), the GWPP sampling and analysis activities are focused on a single hydrogeologic regime at Y-12; the East Fork Regime in CY 2003, the Chestnut Ridge Regime in CY 2004, and the Bear Creek Regime in CY 2005. Accordingly, for SPS purposes, 5 points are awarded to each supplemental well candidate that is located within the applicable hydrogeologic regime, whereas -5 points are awarded to each candidate well that is not located within the applicable regime.

- **Sampling History:** Two components of the sampling history for each supplemental well candidate contribute to the annual SPS: the length of time since the most recent sampling of the well and the total number of samples that have been collected from the well (since January 1986). Using a sliding point scale, wells with a year or less since the most recent sampling receive 0 points and wells with five years or more since the most recent sampling receive 5 points. An inverse sliding scale is used for the total number of samples collected from each well, with -5 points awarded to each well with ten or more samples and 5 points awarded to each well with only one sample. All other factors being equal, this scoring approach gives higher sampling priority to wells that have not been sampled recently or often.
- **Groundwater Quality:** The presence of groundwater contaminants in a supplemental well candidate and the most recent concentration of each contaminant in the well contribute to the annual SPS. One point is awarded for each contaminant present in the well, as determined by the criteria described in Section 2.1.4, with additional points awarded if the most recent concentration of the contaminant exceeds the applicable MCL by a factor of 10, 100, or 1000. Conversely, -5 points are awarded to each well that monitors uncontaminated groundwater. All other factors being equal, this scoring approach gives higher sampling priority to wells which monitor moderately contaminated groundwater. Wells that monitor the most highly contaminated groundwater receive lower sampling priority because of the higher costs associated with collecting samples from these wells. Wells that yield uncontaminated groundwater receive the lowest sampling priority because the large existing database of monitoring results obtained from such wells adequately characterize the range of ambient groundwater quality conditions at Y-12.
- **Contaminant Concentration Trends:** The evaluation of long-term trends in groundwater (and surface water) quality at Y-12 is required under DOE Order 5400.1 and is a primary objective of the GWPP. For SPS purposes, the relative suitability of each supplemental well candidate with respect to contaminant concentration trending is scored on a sliding scale, with 10 points awarded to wells with trends of more than ten years and 1 point awarded to wells with trends of less than three years. Also, -5 points are awarded to each well that monitors uncontaminated groundwater and, therefore, is not suitable for contaminant concentration trending. All other factors being equal, this scoring approach gives higher sampling priority to wells that are best suited monitoring long-term contaminant concentration trends.

The endpoints of the SPS point scale illustrate the scoring scheme associated with the preceding criteria. The highest possible SPS (35) would be awarded to each supplemental well candidate that: (1) is located within the hydrogeologic regime that receives the annual focus of the GWPP, (2) has only three previous sampling events (the minimum number of data points for trending) and has not been sampled within the past five years, (3) monitors moderately contaminated groundwater, and (4) provides a contaminant concentration trend of ten years or more (Figure 6). Conversely, the lowest possible SPS (-20) would be awarded to each supplemental well candidate that: (1) is located outside the hydrogeologic regime receiving the annual focus of the GWPP, (2) has ten or more previous sampling events, including at least one within the past two years, and (3) monitors uncontaminated groundwater and, therefore, is not suitable for contaminant concentration trending (Figure 7).

Each year (beginning in CY 2003), the SPS for each supplemental well candidate at Y-12 will be arranged in descending order, which will sequence the wells from highest to lowest sampling priority. Depending on the total number of supplemental wells to be sampled each year, a corresponding number of wells will be selected from the top of the SPS data distribution and included in the SAP for the following CY. Implementation of this approach ensures the non-subjective selection of supplemental wells that have the highest sampling priority. Nevertheless, circumstances may warrant instances where, based on the professional judgement of the GWPP Manager, a supplemental well may be selected for sampling even though it may not warrant sampling under this prioritization process.

4.0 MONITORING WELL INSPECTION AND MAINTENANCE

As described in the following sections, the active or inactive status designation for each well at Y-12 determines the frequency at which the GWPP will inspect the wells, the scope of the inspections, and the extent of maintenance response actions. All well inspection and maintenance activities will be performed in accordance with the GWPP Monitoring Well Inspection and Maintenance Plan (LMES 1996), which describes the approach used by the GWPP to ensure that the wells at Y-12 continue to yield representative hydrologic and water-quality monitoring data. However, this approach applies only to the wells for which BWXT assumes organizational responsibility under the GWPP. Other organizations retain responsibility for the inspection and maintenance of the RCRA wells in each hydrogeologic regime, the CERCLA wells in each regime (including the wells associated with the EMWMF), and the wells used for groundwater monitoring at the SWDFs in the Chestnut Ridge Regime (see Section 2.1.1).

4.1 ACTIVE STATUS

Wells in each hydrogeologic regime that are granted active status under the GWPP will be inspected annually. During each inspection, the security status (locked or unlocked well cap) of each well will be verified and the applicable above-ground components of the each well (cap, lock hasp, lock, concrete pad, and protective posts) will be assessed for visible damage, deterioration, and functionality. All-weather access to each well also will be evaluated during the annual inspection. Once every three years, as a qualitative check on down-hole conditions in each well, the total depth to the bottom of the well will be measured and compared to the Reference Tag Depth for the well (BWXT 2002). Based on the outcome of each inspection, the GWPP Manager will initiate the necessary and appropriate maintenance actions, including repairs needed to ensure all weather access to each well and redeveloping wells found to have excessive accumulations of silt and sediment.

4.2 INACTIVE STATUS

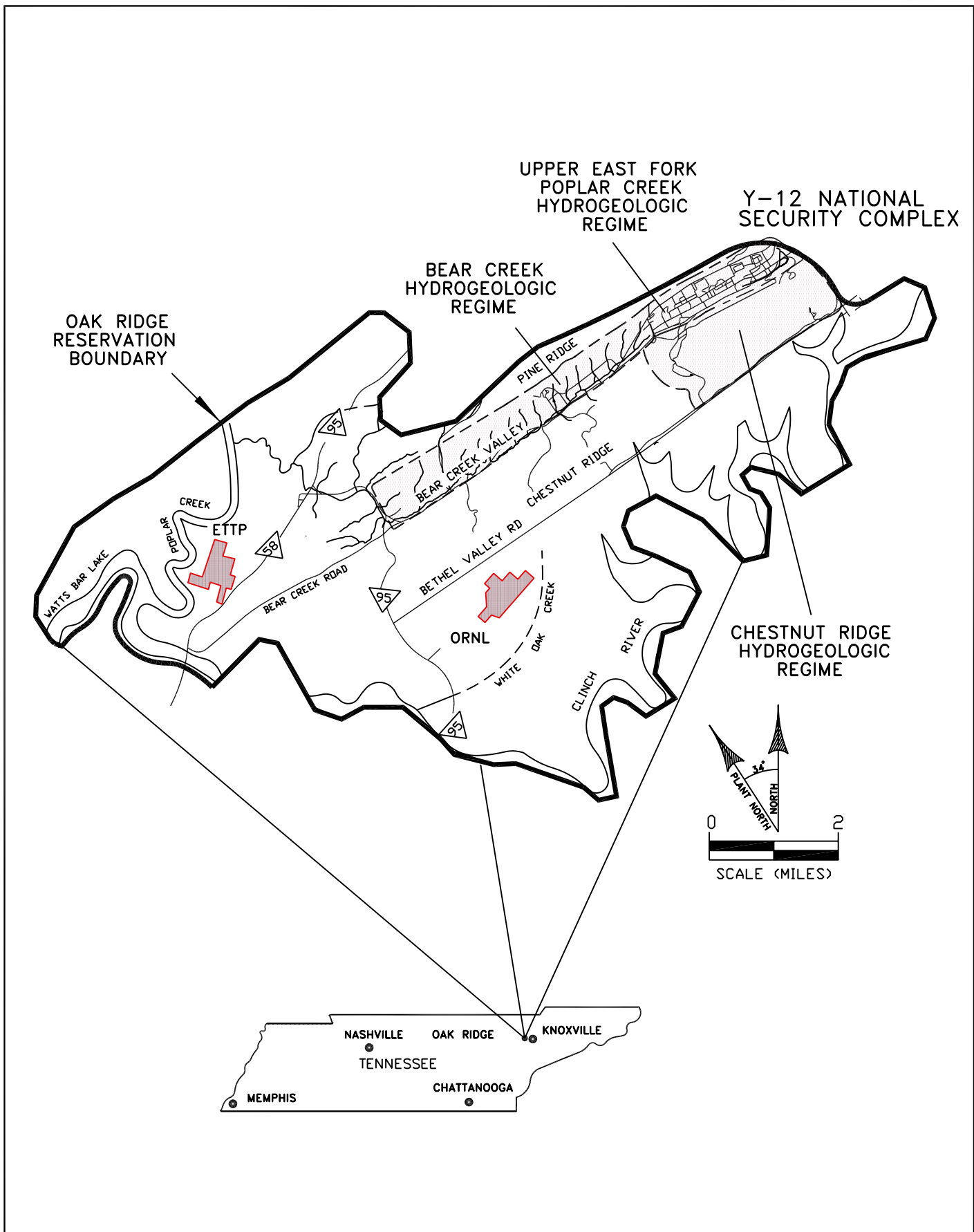
Wells in each hydrogeologic regime that are granted inactive status under the GWPP will be inspected once every three years. During each inspection, the security status of each well will be verified; the applicable above-ground components of each well will be assessed for visible damage, deterioration, and functionality; and the total depth to the bottom of each well will be measured and compared to the Reference Tag Depth for the well (BWXT 2002). Based on the outcome of each inspection, the GWPP Manager will initiate only those maintenance actions needed to ensure the security of each well, such as replacement of inoperable well locks.

5.0 REFERENCES

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APPENDIX A

FIGURES



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

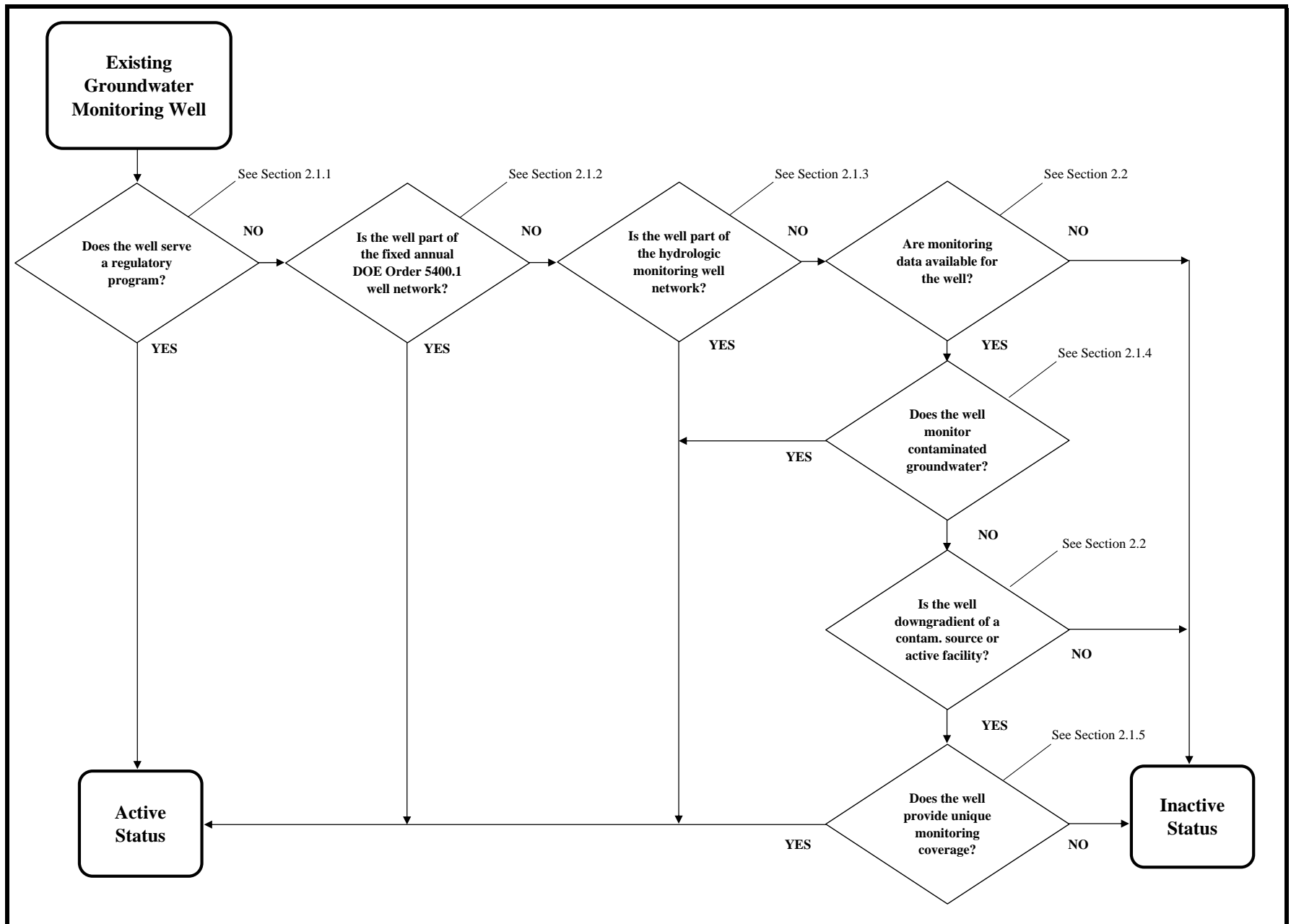


Figure 2. Process used to designate the status of groundwater monitoring wells at the Y-12 National Security Complex.

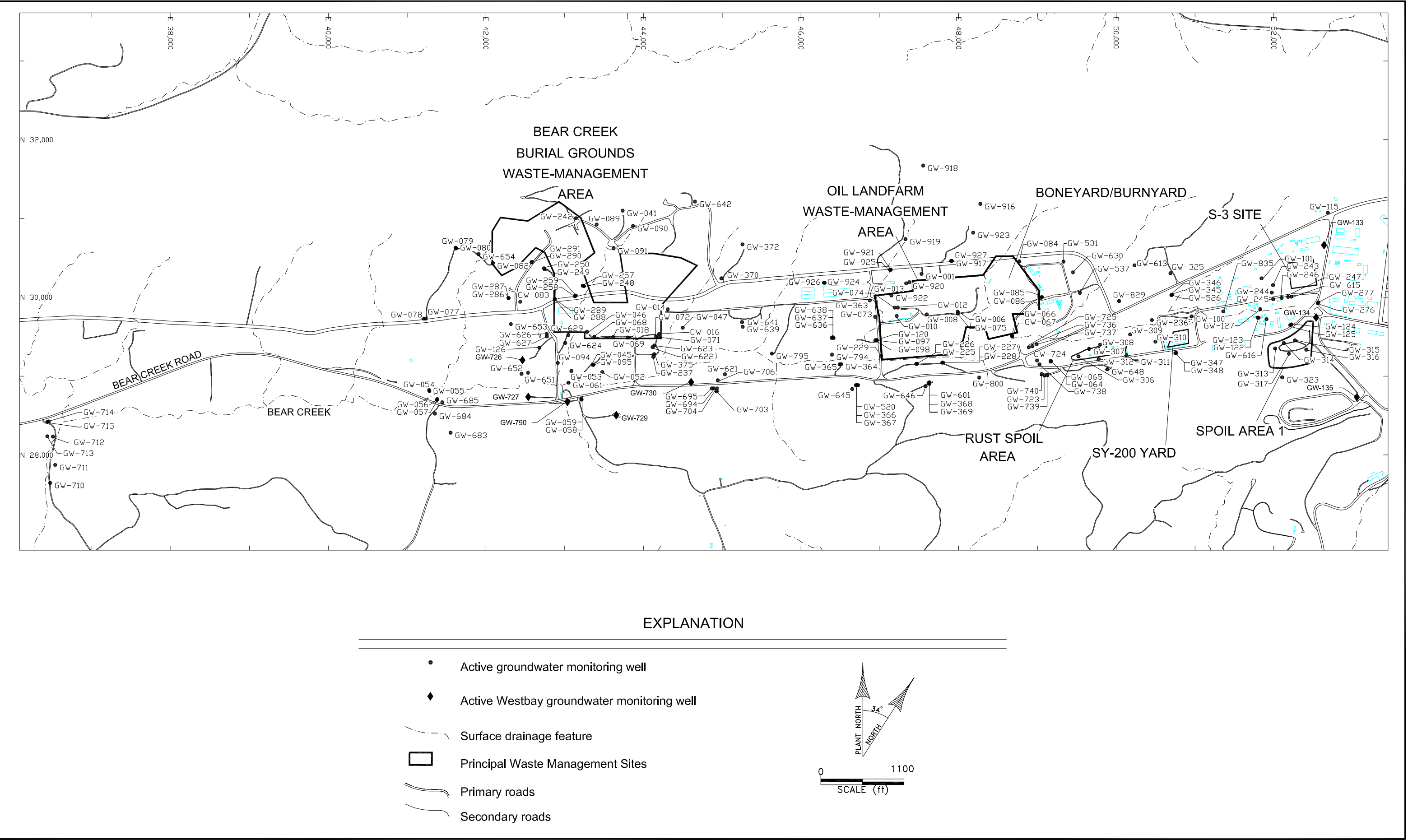
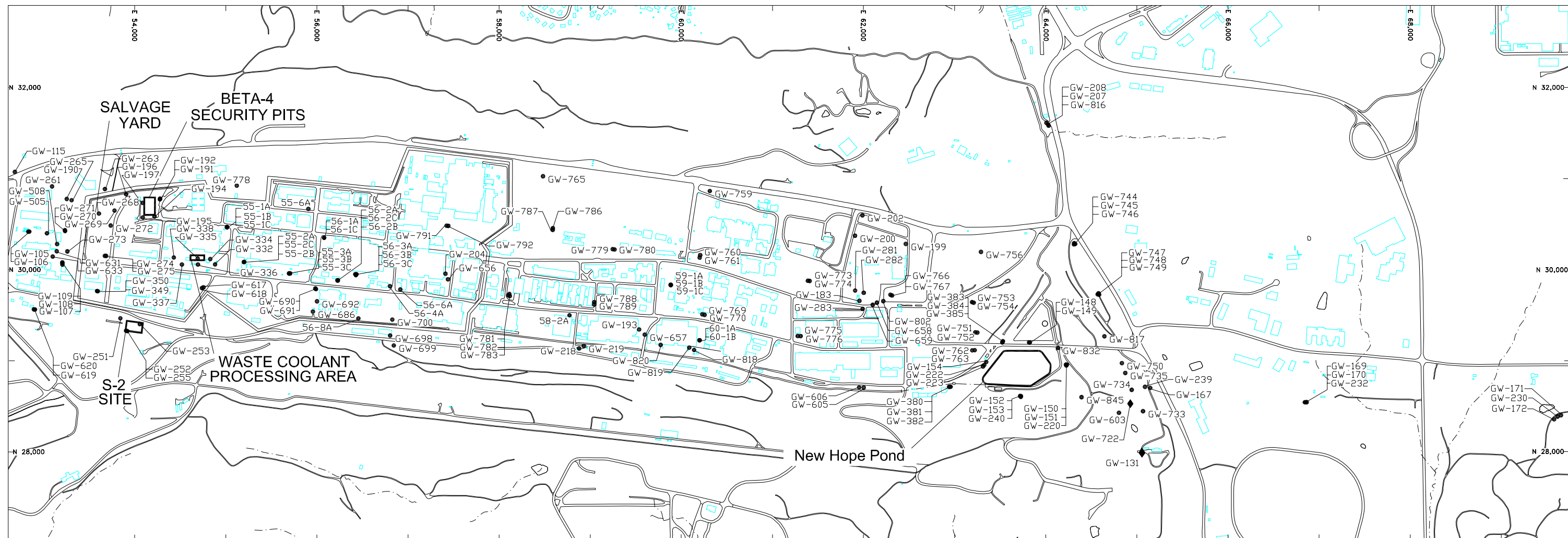


Figure 3. Locations of groundwater monitoring wells in the Bear Creek Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program.



EXPLANATION

- Active groundwater monitoring well
- ◆ Active Westbay groundwater monitoring well
- - - Surface drainage feature
- Principal Waste Management Sites

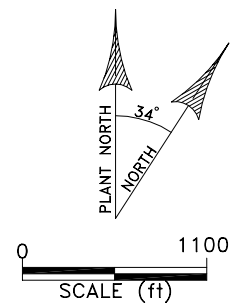


Figure 4. Locations of groundwater monitoring wells in the Upper East Fork Poplar Creek Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program.

CRITERIA		POINT VALUE	SCORE					
Is the well located in the hydrogeologic regime that is the focus of the GWPP sampling program?		YES						
	NO							
		5	5					
		-5						
How long since groundwater samples were collected from the well (beginning in January 1986)?		Years						
	>							
	5							
	4							
	3							
	2							
	1							
	<							
		5	5					
		4						
		3						
		2						
		1						
		0						
How many samples have been collected from the well since January 1986?		Total Number of Samples						
	>							
	9							
	8							
	7							
	6							
	5							
	4							
	3							
	2							
	1							
		-5						
		-4						
		-3						
		-2						
		-1						
		1						
		2						
		3	3					
		4						
		5						
Do the concentrations of the following contaminants in the well exceed the specified criteria?								
	Concentration Relative to the MCL							
YES	NO3	U	VOC	GA	GB	OTHER		
	MCL:	10	0.03	5	15	50	.	
	Units:	m/L	mg/L	ug/L	pCi/L	pCi/L	.	
	> MCL							1
	10 X MCL	x	x	x	x	x	x	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						
		9						
		8						
		7						
		6						
		5						
		4						
		3						
		<						
	NO							
		10	10					
		9						
		8						
		7						
		6						
		5						
		4						
		3						
		2						
		1						
		-5						
SAMPLING PRIORITY SCORE		35						

Figure 6. Example of the highest possible Y-12 Groundwater Protection Program sampling priority score for an applicable groundwater monitoring well.

CRITERIA		POINT VALUE	SCORE				
Is the well located in the hydrogeologic regime that is the focus of the GWPP sampling program?		YES	5				
		NO	-5				
How long since groundwater samples were collected from the well (beginning in January 1986)?		Years					
		>	5				
		5	4				
		4	3				
		3	2				
		2	1				
		<	0				
How many samples have been collected from the well since January 1986?		Total Number of Samples					
		>	-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					
YES	NO3	U	VOC	GA	GB	OTHER	
	MCL:	10	0.03	5	15	50	.
	Units:	m/L	mg/L	ug/L	pCi/L	pCi/L	.
	> MCL						1
	10 X MCL						2
	100 X MCL						2
	1000 X MCL						1
NO						x	-5
Does the well provide a long-term contaminant concentration trend?		Length of Trend (Years)					
(Minimum of 3 data points required for trend.)		YES	>	10			
			10	9			
			9	8			
			8	7			
			7	6			
			6	5			
			5	4			
			4	3			
			3	2			
			<	1			
		NO	x	-5			
SAMPLING PRIORITY SCORE				-20			

Figure 7. Example of the lowest possible Y-12 Groundwater Protection Program sampling priority score for an applicable groundwater monitoring well.

APPENDIX B

TABLES

Table 1. Groundwater monitoring wells in the Bear Creek Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program.

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴			DOE SURV. ⁵	HYDRO MON. ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	EMWMF			NO ₃	U	VOC	GA	GB	
GW-001	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-006	OLF	.	.	.	.	.	.	.	●	.	.	.
GW-008	OLF	●	.	.	.	.	.	.	.	.	.	.
GW-010	OLF	●	.	.	.	.	.	.	.	.	.	.
GW-012	OLF	●	.	.	.	.	.	.	.	.	.	.
GW-013	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-014	BG	●	.	.	.	.	.	.	.	.	.	.
GW-016	BG	.	.	.	.	●	.	.	.	.	.	.
GW-018	BG	.	.	.	.	●	.	.	.	.	.	.
GW-041	BG	.	.	.	.	●	.	.	.	.	.	.
GW-045	BG	.	.	.	.	●	.	.	.	.	.	.
GW-046	BG	●	.	.	.	.	.	.	.	.	.	.
GW-047	BG	.	.	.	.	●	.	.	.	.	.	.
GW-052	BG	.	.	.	.	●	.	.	.	.	.	.
GW-053	BG	.	.	.	.	●	.	.	.	.	.	.
GW-054	BG	.	.	.	.	.	.	.	.	.	.	●
GW-055	BG	.	.	.	.	●	.	.	.	.	.	.
GW-056	EXP-A	.	.	.	.	.	.	.	.	.	.	●
GW-057	EXP-A	.	.	.	.	●	.	.	.	.	.	.
GW-058	BG	.	.	.	.	.	.	.	.	.	.	●
GW-059	BG	.	.	.	.	●	.	.	.	.	.	.
GW-061	BG	.	.	.	.	●	.	.	.	.	.	.
GW-064	OLF	.	.	.	.	.	.	.	●	.	.	.
GW-065	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-066	OLF	.	.	.	.	.	.	.	●	.	.	.
GW-067	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-068	BG	.	.	.	.	.	.	.	●	.	.	.
GW-069	BG	●	.	.	.	.	.	.	.	.	.	.

Table 1 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴			DOE SURV. ⁵	HYDRO MON. ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	EMWMF			NO ₃	U	VOC	GA	GB	
GW-071	BG	●	.	.	.	.	.	.	.	.	.	.
GW-072	BG	.	.	.	.	.	.	.	●	.	.	.
GW-073	OLF	.	.	.	.	.	.	.	.	.	.	●
GW-074	OLF	.	.	.	.	.	.	.	.	.	.	●
GW-075	OLF	●	.	.	.	.	.	.	.	.	.	.
GW-077	BG	.	●	.	.	.	.	.	.	.	.	.
GW-078	BG	.	●	.	.	.	.	.	.	.	.	.
GW-079	BG	.	●	.	.	.	.	.	.	.	.	.
GW-080	BG	.	●	.	.	.	.	.	.	.	.	.
GW-082	BG	●	.	.	.	.	.	.	.	.	.	.
GW-083	BG	.	.	.	.	.	.	.	.	.	.	●
GW-084	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-085	OLF	.	.	.	●	.	.	.	.	.	.	.
GW-086	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-089	BG	.	.	.	.	.	.	.	●	.	.	.
GW-090	BG	.	.	.	.	●	.	.	.	.	.	.
GW-091	BG	.	.	.	.	●	.	.	.	.	.	.
GW-094	BG	.	.	.	.	.	.	.	.	.	.	●
GW-095	BG	.	.	.	.	.	.	.	.	.	.	●
GW-097	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-098	OLF	.	.	.	●	.	.	.	.	.	.	.
GW-100	S3	.	.	.	.	●	.	.	.	.	.	.
GW-101	S3	●	.	.	.	.	.	.	.	.	.	.
GW-115	S3	●	.	.	.	.	.	.	.	.	.	.
GW-120	OLF	.	.	.	.	.	.	.	.	.	.	●
GW-122	S3	.	.	.	.	.	.	.	.	.	.	●
GW-123	S3	.	.	.	.	.	.	.	.	.	.	●
GW-124	S3	.	.	.	.	.	●	.	.	.	●	.
GW-125	S3	.	.	.	.	.	.	.	.	.	.	●

Table 1 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴			DOE SURV. ⁵	HYDRO MON. ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	EMWMF			NO ₃	U	VOC	GA	GB	
GW-126	BG	.	.	.	.	.	.	.	.	.	.	●
GW-127	S3	●	.	.	.	.	.	.	.	.	.	.
GW-133	S3	.	.	.	.	.	.	.	.	.	.	●
GW-134	S3	.	.	.	.	.	●	.	.	●	●	.
GW-135	S3	.	.	.	.	.	.	.	●	.	●	.
GW-225	OLF	.	.	.	●	.	.	.	.	.	.	.
GW-226	OLF	.	.	.	●	.	.	.	.	.	.	.
GW-227	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-228	OLF	.	.	.	.	.	.	.	●	.	.	.
GW-229	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-236	S3	.	.	.	.	●	.	.	.	.	.	.
GW-237	BG	.	.	.	.	.	.	.	●	.	.	.
GW-242	BG	.	.	.	.	●	.	.	.	.	.	.
GW-243	S3	●	.	.	.	.	.	.	.	.	.	.
GW-244	S3	●	.	.	.	.	.	.	.	.	.	.
GW-245	S3	●	.	.	.	.	.	.	.	.	.	.
GW-246	S3	●	.	.	.	.	.	.	.	.	.	.
GW-247	S3	●	.	.	.	.	.	.	.	.	.	.
GW-248	BG	.	.	.	.	.	.	.	.	.	.	●
GW-249	BG	.	.	.	.	●	.	.	.	.	.	.
GW-250	BG	.	.	.	.	.	.	.	.	.	.	●
GW-257	BG	●	.	.	.	.	.	.	.	.	.	.
GW-258	BG	.	.	.	.	.	.	.	●	.	.	.
GW-259	BG	.	.	.	.	.	.	.	●	.	.	.
GW-276	S3	●	.	.	.	.	.	.	.	.	.	.
GW-277	S3	.	.	.	.	.	●	.	●	.	●	.
GW-286	BG	.	.	.	.	.	.	.	.	.	.	●
GW-287	BG	.	.	.	.	●	.	.	.	.	.	.
GW-288	BG	.	.	.	.	.	.	.	●	.	.	.

Table 1 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴			DOE SURV. ⁵	HYDRO MON. ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	EMWMF			NO ₃	U	VOC	GA	GB	
GW-289	BG	●	.	.	.	.	.	.	.	.	.	.
GW-290	BG	.	.	.	.	.	.	.	.	.	.	●
GW-291	BG	●	.	.	.	.	.	.	.	.	.	.
GW-306	RS	.	.	.	.	.	.	.	●	.	.	.
GW-307	RS	.	.	.	.	●	.	.	.	.	.	.
GW-308	RS	.	.	.	.	.	.	.	●	.	.	.
GW-309	RS	.	.	.	.	●	.	.	.	.	.	.
GW-310	RS	.	.	.	.	●	.	.	.	.	.	.
GW-311	RS	.	.	.	●	.	.	.	.	.	.	.
GW-312	RS	.	.	.	.	.	.	.	●	.	.	.
GW-313	SPI	.	.	.	.	.	.	.	●	.	.	.
GW-314	SPI	.	.	.	.	.	●	.	●	.	.	.
GW-315	SPI	.	.	.	●	.	.	.	.	.	.	.
GW-316	SPI	.	.	.	.	●	.	.	.	.	.	.
GW-317	SPI	.	.	.	.	.	.	.	.	.	.	●
GW-323	SPI	.	.	.	.	●	.	.	.	.	.	.
GW-325	S3	.	.	.	.	●	.	.	.	.	.	.
GW-345	S3	.	.	.	.	●	.	.	.	.	.	.
GW-346	S3	.	.	.	.	.	.	.	.	.	.	●
GW-347	S3	.	.	.	.	●	.	.	.	.	.	.
GW-348	S3	.	.	.	.	.	.	.	.	.	.	●
GW-363	OLF	●	.	.	.	.	.	.	.	.	.	.
GW-364	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-365	OLF	.	.	.	.	.	.	.	●	.	.	.
GW-366	OLF	.	.	.	.	.	.	.	.	.	.	●
GW-367	OLF	.	.	.	.	.	.	.	●	.	.	.
GW-368	OLF	.	.	.	.	.	.	.	●	.	.	.
GW-369	OLF	.	.	.	.	.	●	.	●	.	.	.
GW-370	BG	.	.	.	.	●	.	.	.	.	.	.

Table 1 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴			DOE SURV. ⁵	HYDRO MON. ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	EMWMF			NO ₃	U	VOC	GA	GB	
GW-372	BG	.	.	.	.	●	.	.	.	.	.	.
GW-375	BG	.	.	.	.	.	.	.	.	.	.	●
GW-520	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-526	S3	.	●	.	.	.	.	.	.	.	.	.
GW-531	LD	.	.	.	.	●	.	.	.	.	.	.
GW-537	OLF	.	.	.	●	.	.	.	.	.	.	.
GW-601	OLF	.	.	.	.	.	●	.	●	.	.	.
GW-613	S3	.	.	.	.	●	.	.	.	.	.	.
GW-615	S3	●	.	.	.	.	.	.	.	.	.	.
GW-616	S3	.	.	.	.	.	●	.	.	.	.	.
GW-621	EXP-B	.	.	.	.	●	.	.	.	.	.	.
GW-622	BG	.	.	.	.	●	.	.	.	.	.	.
GW-623	BG	.	.	.	.	.	.	.	●	.	.	.
GW-624	BG	.	.	.	.	●	.	.	.	.	.	.
GW-626	BG	.	.	.	.	●	.	.	.	.	.	.
GW-627	BG	.	.	.	●	.	.	.	.	.	.	.
GW-629	BG	.	.	.	.	.	.	.	●	.	.	.
GW-630	LD	.	.	.	.	●	.	.	.	.	.	.
GW-636	OLF	.	.	.	.	.	.	.	.	.	.	●
GW-637	OLF	.	.	.	.	.	.	.	.	.	.	●
GW-638	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-639	BG	.	.	●	.	.	.	.	.	.	.	.
GW-641	BG	.	.	.	.	●	.	.	.	.	.	.
GW-642	BG	.	.	.	.	●	.	.	.	.	.	.
GW-645	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-646	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-648	RS	.	.	.	.	●	.	.	.	.	.	.
GW-651	BG	.	.	.	.	.	.	.	.	.	.	●
GW-652	BG	.	.	.	.	●	.	.	.	.	.	.

Table 1 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴			DOE SURV. ⁵	HYDRO MON. ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	EMWMF			NO ₃	U	VOC	GA	GB	
GW-653	BG	.	.	.	●	.	.	.	.	.	.	.
GW-654	BG	.	.	.	.	●	.	.	.	.	.	.
GW-683	EXP-A	.	●	.	.	.	.	.	.	.	.	.
GW-684	EXP-A	.	●	.	.	.	.	.	.	.	.	.
GW-685	EXP-A	.	.	.	.	●	.	.	.	.	.	.
GW-694	EXP-B	.	.	.	.	.	.	●	.	.	.	.
GW-695	EXP-B	.	.	.	●	.	.	.	.	.	.	.
GW-703	EXP-B	.	.	.	●	.	.	.	.	.	.	.
GW-704	EXP-B	.	.	.	●	.	.	.	.	.	.	.
GW-706	EXP-B	.	.	.	●	.	.	.	.	.	.	.
GW-710	EXP-W	.	.	.	.	●	.	.	.	.	.	.
GW-711	EXP-W	.	.	.	.	●	.	.	.	.	.	.
GW-712	EXP-W	●	.	.	.	.	.	.	.	.	.	.
GW-713	EXP-W	●	.	.	.	.	.	.	.	.	.	.
GW-714	EXP-W	●	.	.	.	.	.	.	.	.	.	.
GW-715	EXP-W	●	.	.	.	.	.	.	.	.	.	.
GW-723	EXP-C	.	.	.	.	.	.	.	●	.	.	.
GW-724	EXP-C	.	.	.	●	.	.	.	.	.	.	.
GW-725	EXP-C	.	.	.	●	.	.	.	.	.	.	.
GW-726	BG	.	.	.	.	.	.	●	.	.	.	.
GW-727	BG	.	.	.	.	.	.	.	.	.	.	●
GW-729	BG	.	.	.	.	.	.	.	.	.	.	●
GW-730	BG	.	.	.	.	.	.	.	.	.	.	●
GW-736	EXP-C	.	.	.	.	.	●	.	●	.	.	.
GW-737	EXP-C	.	.	.	.	●	.	.	.	.	.	.
GW-738	EXP-C	.	.	.	●	.	.	.	.	.	.	.
GW-739	EXP-C	.	.	.	.	.	.	.	●	.	.	.
GW-740	EXP-C	.	.	.	●	.	.	.	.	.	.	.
GW-790	BG	.	.	.	.	.	.	.	.	.	.	●

Table 1 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴			DOE SURV. ⁵	HYDRO MON. ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	EMWMF			NO ₃	U	VOC	GA	GB	
GW-794	AGLLSF	.	.	.	.	.	.	.	.	.	.	●
GW-795	AGLLSF	.	.	.	.	●	.	.	.	.	.	.
GW-800	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-829	OLF	.	.	.	.	●	.	.	.	.	.	.
GW-835	S3	.	●	.	.	.	.	.	.	.	.	.
GW-916	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-917	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-918	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-919	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-920	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-921	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-922	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-923	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-924	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-925	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-926	EMWMF	.	.	●	.	.	.	.	.	.	.	.
GW-927	EMWMF	.	.	●	.	.	.	.	.	.	.	.
Total Wells:	190	27	8	13	17	61	33					31

Notes:

1. Well locations are shown on Figure 3 in Appendix A.
2.
 - AGLLSF - Above Ground Low-Level Storage Facility
 - BG - Bear Creek Burial Grounds Waste Management Area
 - EMWMF - Environmental Management Waste Management Facility
 - EXP-A - Exit Pathway (Maynardville Limestone) Picket A
 - EXP-B - Exit Pathway (Maynardville Limestone) Picket B
 - EXP-C - Exit Pathway (Maynardville Limestone) Picket C
 - EXP-W - Exit Pathway (Maynardville Limestone) Picket W

Table 1 (continued)

Notes:

2. LD - Lysimeter Demonstration Site
OLF - Oil Landfarm
RS - Rust Spoil Area
SPI - Spoil Area I
S3 - S-3 Site
3. The primary criterion for the active status designation is shown for each well, although more than one criteria may apply to each well.
4. RCRA = Identified in the Resource Conservation and Recovery Act (RCRA) post-closure permit for the Bear Creek Hydrogeologic Regime (permit number TNHW-088).

CERCLA = Specified in an applicable Comprehensive Environmental Response, Liability, and Compensation Act (CERCLA) interim/final record of decision or related decision document(s), or otherwise used for CERCLA-related groundwater monitoring.

EMWMF = Used for groundwater monitoring in accordance with the Environmental Monitoring Plan for the EMWMF.
5. Included in the fixed network of groundwater sampling locations (wells and springs) used for DOE Order 5400.1 Surveillance Monitoring in the Bear Creek Regime.
6. Included in the network of wells used for regime-wide hydrologic monitoring (groundwater elevations); see Table 5.
7. NO₃ = Nitrate (as N) concentrations exceed 10 milligrams per liter (mg/L), which is the Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) for drinking water.

U = Total uranium concentrations exceed the MCL (0.03 mg/L).

VOC = Individual or summed concentrations of volatile organic compounds exceed 5 micrograms per liter (µg/L).

GA = Gross alpha activity above the 15 picoCuries per liter (pCi/L) MCL.

GB = Gross beta activity above the SDWA threshold level (50 pCi/L) for a 4 millirem per year dose equivalent (the MCL for gross beta activity).

Table 2. Groundwater monitoring wells in the Upper East Fork Poplar Creek Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program.

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										UNIQUE CHARACTERISTICS
		REGULATORY PROGRAM ⁴		DOE MONITORING ⁵		HYDRO MONITORING ⁶	GROUNDWATER CONTAMINATION ⁷					
		RCRA	CERCLA	SURV	EXP		NO ₃	U	VOC	GA	GB	
55-1A	Y12	.	.	.	.	●	.	.	.	.	.	.
55-1B	Y12	.	.	.	.	.	.	.	.	.	.	●
55-1C	Y12	.	.	.	.	.	.	.	.	.	.	●
55-2A	Y12	.	.	.	.	.	.	.	.	.	.	●
55-2B	Y12	.	.	.	.	.	●	.	●	.	.	.
55-2C	Y12	.	.	.	.	.	●	.	●	.	.	.
55-3A	Y12	.	.	.	.	●	.	.	.	.	.	.
55-3B	Y12	.	.	.	.	.	.	.	.	.	.	●
55-3C	Y12	.	.	.	.	.	.	.	.	.	.	●
55-6A	Y12	.	.	.	.	●	.	.	.	.	.	.
56-1A	Y12	.	.	.	.	●	.	.	.	.	.	.
56-1C	Y12	.	.	.	.	.	.	.	.	.	.	●
56-2A	Y12	.	.	.	.	●	.	.	.	.	.	.
56-2B	Y12	.	.	.	.	.	.	.	●	.	.	.
56-2C	Y12	.	.	.	.	.	.	.	●	.	.	.
56-3A	Y12	.	.	.	.	.	.	.	.	.	.	●
56-3B	Y12	.	.	.	.	.	.	.	.	.	.	●
56-3C	Y12	.	.	.	.	.	.	.	.	.	.	●
56-4A	Y12	.	.	.	.	.	.	.	.	.	.	●
56-6A	Y12	.	.	.	.	.	.	.	.	.	.	●
56-8A	Y12	.	.	.	.	●	.	.	.	.	.	.
58-2A	Y12	.	.	.	.	.	.	.	.	.	.	●
59-1A	Y12	.	.	.	.	.	.	.	.	.	.	●
59-1B	Y12	.	.	.	.	.	.	.	.	.	.	●
59-1C	Y12	.	.	.	.	.	.	.	●	.	.	.
60-1A	Y12	.	.	.	.	●	.	.	.	.	.	.
60-1B	Y12	.	.	.	.	.	.	.	.	.	.	●

Table 2 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴		DOE MONITORING ⁵		HYDRO MONITORING ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	SURV	EXP		NO ₃	U	VOC	GA	GB	
GW-105	S3	.	.	.	.	●	.	.	.	.	.	.
GW-106	S3	.	.	.	.	.	●	.	.	.	.	.
GW-107	S3	.	.	.	.	●	.	.	.	.	.	.
GW-108	S3	●	.	.	.	.	.	.	.	.	.	.
GW-109	S3	●	.	.	.	.	.	.	.	.	.	.
GW-115	S3	●	.	.	.	.	.	.	.	.	.	.
GW-131	SR	.	.	.	.	.	.	.	.	.	.	●
GW-148	NHP	.	.	.	.	●	.	.	.	.	.	.
GW-149	NHP	.	.	.	.	.	.	.	.	.	.	●
GW-150	NHP	.	.	.	.	.	.	.	.	.	.	●
GW-151	NHP	.	●	.	.	.	.	.	.	.	.	.
GW-152	NHP	.	.	.	.	●	.	.	.	.	.	.
GW-153	NHP	.	.	●	.	.	.	.	.	.	.	.
GW-154	NHP	.	●	.	.	.	.	.	.	.	.	.
GW-167	EXP	.	.	.	.	●	.	.	.	.	.	.
GW-169	EXP-UV	.	●	.	.	.	.	.	.	.	.	.
GW-170	EXP-UV	.	●	.	.	.	.	.	.	.	.	.
GW-171	EXP-UV	.	●	.	.	.	.	.	.	.	.	.
GW-172	EXP-UV	.	●	.	.	.	.	.	.	.	.	.
GW-183	FF	.	.	.	.	.	.	.	●	.	.	.
GW-190	Y12	.	.	.	.	.	.	.	●	.	.	.
GW-191	B4	.	.	.	.	.	.	.	.	.	.	●
GW-192	B4	.	.	.	.	●	.	.	.	.	.	.
GW-193	T2331	●	.	.	.	.	.	.	.	.	.	.
GW-194	B4	.	.	.	.	.	.	.	.	.	.	●
GW-195	B4	.	.	.	.	●	.	.	.	.	.	.
GW-196	B4	.	.	.	.	.	.	.	.	.	.	●
GW-197	B4	.	.	.	.	.	.	.	.	.	.	●

Table 2 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴		DOE MONITORING ⁵		HYDRO MONITORING ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	SURV	EXP		NO ₃	U	VOC	GA	GB	
GW-199	GRID11	.	.	.	.	●	.	.	.	.	.	.
GW-200	RDS	.	.	.	.	●	.	.	.	.	.	.
GW-202	RDS	.	.	.	.	●	.	.	.	.	.	.
GW-204	T0134	.	.	●	.	.	.	.	.	.	.	.
GW-207	EXP-SR	.	.	.	●	.	.	.	.	.	.	.
GW-208	EXP-SR	.	.	.	●	.	.	.	.	.	.	.
GW-218	UOV	.	.	.	.	.	.	.	.	.	.	●
GW-219	UOV	.	.	●	.	.	.	.	.	.	.	.
GW-220	NHP	.	.	.	●	.	.	.	.	.	.	.
GW-222	NHP	.	.	.	.	.	.	●	●	●	●	.
GW-223	NHP	.	●	.	.	.	.	.	.	.	.	.
GW-230	EXP-UV	.	●	.	.	.	.	.	.	.	.	.
GW-232	EXP-UV	.	●	.	.	.	.	.	.	.	.	.
GW-239	EXP	.	.	.	.	.	.	.	.	.	.	●
GW-240	NHP	.	.	.	.	.	.	.	●	.	.	.
GW-251	S2	.	.	●	.	.	.	.	.	.	.	.
GW-252	S2	.	.	.	.	.	.	.	.	.	.	●
GW-253	S2	●	.	.	.	.	.	.	.	.	.	.
GW-255	S2	.	.	.	.	●	.	.	.	.	.	.
GW-261	SY	.	.	.	.	●	.	.	.	.	.	.
GW-263	SY	.	.	.	.	●	.	.	.	.	.	.
GW-265	SY	.	.	.	.	.	.	.	●	.	.	.
GW-268	SY	.	.	.	.	.	.	.	.	.	.	●
GW-269	SY	.	.	.	.	.	.	.	●	.	.	.
GW-270	SY	.	.	.	.	.	●	.	.	.	.	.
GW-271	SY	.	.	.	.	.	.	.	.	.	.	●
GW-272	SY	.	.	.	.	.	.	.	.	.	.	●
GW-273	SY	.	.	.	.	.	●	.	●	.	●	.

Table 2 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										
		REGULATORY PROGRAM ⁴		DOE MONITORING ⁵		HYDRO MONITORING ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	SURV	EXP		NO ₃	U	VOC	GA	GB	
GW-274	SY	●	.	.	.	.	.	.	.	.	.	.
GW-275	SY	●	.	.	.	.	.	.	.	.	.	.
GW-281	FF	.	●	.	.	.	.	.	.	.	.	.
GW-282	FF	.	.	.	.	.	.	.	●	.	.	.
GW-283	FF	.	.	.	.	.	.	.	.	.	.	●
GW-332	WC	.	.	.	.	.	.	.	●	.	.	.
GW-334	WC	.	.	.	.	●	.	.	.	.	.	.
GW-335	WC	.	.	.	.	●	.	.	.	.	.	.
GW-336	WC	.	.	.	.	.	.	.	●	.	.	.
GW-337	WC	.	.	.	.	.	.	.	●	.	.	.
GW-338	WC	.	.	.	.	.	.	.	.	.	.	●
GW-349	S2	.	.	.	.	●	.	.	.	.	.	.
GW-350	S2	.	.	.	.	.	.	.	.	.	.	●
GW-380	NHP	.	●	.	.	.	.	.	.	.	.	.
GW-381	NHP	.	.	●	.	.	.	.	.	.	.	.
GW-382	NHP	.	●	.	.	.	.	.	.	.	.	.
GW-383	NHP	.	.	●	.	.	.	.	.	.	.	.
GW-384	NHP	.	.	.	.	.	.	.	.	.	.	●
GW-385	NHP	.	.	.	.	.	.	.	.	.	.	●
GW-505	RG	.	.	.	.	.	.	.	.	●	.	.
GW-508	RG	.	.	.	.	.	.	.	●	.	.	.
GW-603	EXP-J	.	.	.	.	●	.	.	.	.	.	.
GW-605	EXP-I	●	.	.	.	.	.	.	.	.	.	.
GW-606	EXP-I	●	.	.	.	.	.	.	.	.	.	.
GW-617	EXP-E	.	.	.	.	●	.	.	.	.	.	.
GW-618	EXP-E	.	●	.	.	.	.	.	.	.	.	.
GW-619	FTF	.	.	.	.	●	.	.	.	.	.	.
GW-620	FTF	.	.	●	.	.	.	.	.	.	.	.

Table 2 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³											
		REGULATORY PROGRAM ⁴		DOE MONITORING ⁵		HYDRO MONITORING ⁶	GROUNDWATER CONTAMINATION ⁷					UNIQUE CHARACTERISTICS	
		RCRA	CERCLA	SURV	EXP		NO ₃	U	VOC	GA	GB		
GW-631	RG	.	.	.	.	.	.	.	.	.	.	.	●
GW-633	RG	.	.	●	.	.	.	.	.	.	.	.	.
GW-656	T0134	.	.	.	.	.	.	.	●	.	.	.	.
GW-657	T2331	.	.	.	.	.	.	.	.	.	.	.	●
GW-658	FF	.	●	.	.	.	.	.	.	.	.	.	.
GW-659	FF	.	.	.	.	.	.	.	●	.	.	.	.
GW-686	CPT	.	.	.	.	●	.	.	.	.	.	.	.
GW-690	CPT	.	.	.	.	.	.	.	●	.	.	.	.
GW-691	CPT	.	.	.	.	●	.	.	.	.	.	.	.
GW-692	CPT	.	.	.	.	.	.	.	●	.	.	.	.
GW-698	B8110	.	.	●	.	.	.	.	.	.	.	.	.
GW-699	B8110	.	.	.	.	●	.	.	.	.	.	.	.
GW-700	B8110	.	.	.	.	.	.	.	●	.	.	.	.
GW-722	NHP	.	.	.	●	.	.	.	.	.	.	.	.
GW-733	EXP-J	●	.	.	.	.	.	.	.	.	.	.	.
GW-734	EXP-J	.	.	.	.	●	.	.	.	.	.	.	.
GW-735	EXP-J	.	.	.	●	.	.	.	.	.	.	.	.
GW-744	GRIDK1	.	.	.	●	.	.	.	.	.	.	.	.
GW-745	GRIDK1	.	.	.	.	.	.	.	.	.	.	.	●
GW-746	GRIDK1	.	.	.	.	●	.	.	.	.	.	.	.
GW-747	GRIDK2	.	.	.	●	.	.	.	.	.	.	.	.
GW-748	GRIDK2	.	.	.	.	.	.	.	.	.	.	.	●
GW-749	GRIDK2	.	.	.	.	●	.	.	.	.	.	.	.
GW-750	EXP-J	.	.	.	●	.	.	.	.	.	.	.	.
GW-751	GRIDJ3	.	.	.	.	.	.	.	.	.	.	.	●
GW-752	GRIDJ3	.	.	.	.	●	.	.	.	.	.	.	.
GW-753	GRIDJ2	.	.	.	.	.	.	.	.	.	.	.	●
GW-754	GRIDJ2	.	.	.	.	●	.	.	.	.	.	.	.

Table 2 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										UNIQUE CHARACTERISTICS
		REGULATORY PROGRAM ⁴		DOE MONITORING ⁵		HYDRO MONITORING ⁶	GROUNDWATER CONTAMINATION ⁷					
		RCRA	CERCLA	SURV	EXP		NO ₃	U	VOC	GA	GB	
GW-756	GRIDJ1	.	.	.	.	●	.	.	.	.	.	.
GW-759	GRIDG1	.	.	.	.	●	.	.	.	.	.	.
GW-760	GRIDG2	.	.	.	.	.	.	.	.	.	.	●
GW-761	GRIDG2	.	.	.	.	●	.	.	.	.	.	.
GW-762	GRIDJ3	.	●	.	.	.	.	.	.	.	.	.
GW-763	GRIDJ3	.	.	●	.	.	.	.	.	.	.	.
GW-765	GRIDE1	.	.	.	.	●	.	.	.	.	.	.
GW-766	GRIDI2	.	.	.	.	.	.	.	.	.	.	●
GW-767	GRIDI2	.	.	.	.	●	.	.	.	.	.	.
GW-769	GRIDG3	.	.	●	.	.	.	.	.	.	.	.
GW-770	GRIDG3	.	.	●	.	.	.	.	.	.	.	.
GW-773	GRIDH2	.	.	.	.	.	.	.	.	.	.	●
GW-774	GRIDH2	.	.	.	.	●	.	.	.	.	.	.
GW-775	GRIDH3	.	.	.	.	.	.	.	●	.	.	.
GW-776	GRIDH3	.	.	.	.	●	.	.	.	.	.	.
GW-778	GRIDB2	.	.	.	.	●	.	.	.	.	.	.
GW-779	GRIDF2	.	.	.	.	.	.	.	.	.	.	●
GW-780	GRIDF2	.	.	.	.	●	.	.	.	.	.	.
GW-781	GRIDE3	.	.	.	.	.	.	.	.	.	.	●
GW-782	GRIDE3	.	.	●	.	.	.	.	.	.	.	.
GW-783	GRIDE3	.	.	.	.	●	.	.	.	.	.	.
GW-786	GRIDE2	.	.	.	.	.	.	.	.	.	.	●
GW-787	GRIDE2	.	.	.	.	●	.	.	.	.	.	.
GW-788	GRIDF3	.	.	.	.	.	.	.	.	.	.	●
GW-789	GRIDF3	.	.	.	.	●	.	.	.	.	.	.
GW-791	GRIDD2	.	.	●	.	.	.	.	.	.	.	.
GW-792	GRIDD2	.	.	.	.	●	.	.	.	.	.	.
GW-802	FF	.	●	.	.	.	.	.	.	.	.	.

Table 2 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE STATUS DESIGNATION ³										UNIQUE CHARACTERISTICS
		REGULATORY PROGRAM ⁴		DOE MONITORING ⁵		HYDRO MONITORING ⁶	GROUNDWATER CONTAMINATION ⁷					
		RCRA	CERCLA	SURV	EXP		NO ₃	U	VOC	GA	GB	
GW-816	EXP-SR	.	.	.	●	.	.	.	.	.	.	.
GW-817	GRIDK3	.	.	.	.	●	.	.	.	.	.	.
GW-818	B9201-2	.	.	.	.	.	.	.	●	.	.	.
GW-819	B9201-2	.	.	.	.	.	.	.	.	.	.	●
GW-820	B9201-2	.	.	.	.	.	.	.	●	.	.	.
GW-832	NHP	.	●	.	.	.	.	.	.	.	.	.
GW-845	EXP	.	.	.	.	.	.	.	●	.	.	.
Total Wells:	173	10	17	14	9	48	29					46

Notes:

- Includes wells located in Union Valley east of the Y-12 National Security Complex; well locations shown on Figure 4 in Appendix A.
- B4 - Beta-4 Security Pits
 - B8110 - Building 8110
 - B9201-2 - Building 9201-2
 - CPT - Coal Pile Trench
 - EXP-E - Exit Pathway (Maynardville Limestone) Picket E
 - EXP-I - Exit Pathway Picket I
 - EXP-J - Exit Pathway Picket J
 - EXP-SR - Exit Pathway (Scarboro Road)
 - EXP-UV - Exit Pathway (Maynardville Limestone) in Union Valley
 - FF - Fuel Facility (Building 9754-2)
 - FTF - Fire Training Facility
 - GRID - Comprehensive Monitoring Plan Grid Location
 - NHP - New Hope Pond
 - RDS - Ravine Disposal Site
 - RG - Rust Garage Area
 - S2 - S-2 Site
 - S3 - S-3 Site

Table 2 (continued)

Notes:

2.
 - SR - Scarboro Road
 - SY - Y-12 Salvage Yard
 - T0134 - Tank 0134-U
 - T2231 - Tank 2331-U
 - UOV - Uranium Oxide Vault
 - UV - Union Valley
 - WC - Waste Coolant Processing Area
 - Y12 - Y-12 Complex
3. The primary criterion for the active status designation is shown for each well, although more than one criteria may apply to each well.
4.
 - RCRA = Identified in the RCRA post-closure permit for the Upper East Fork Poplar Creek Hydrogeologic Regime (permit number TNHW-087). Note that the RCRA background well (GW-115) is located in the Bear Creek Hydrogeologic Regime.
 - CERCLA = Specified in an applicable CERCLA interim/final record of decision or related decision document(s), or otherwise used for CERCLA-related groundwater monitoring.
5. Included in the fixed network of groundwater sampling locations (wells and springs) used for DOE Order 5400.1 Surveillance Monitoring (SURV) and DOE Order 5400.1 Exit-Pathway/Perimeter Monitoring (EXP) in the East Fork Regime.
6. Included in the network of wells used for regime-wide hydrologic monitoring (groundwater elevations); see Table 6.
7.
 - NO₃ = Nitrate (as N) concentrations exceed the MCL (10 mg/L).
 - U = Total uranium concentrations exceed the MCL (0.03 mg/L).
 - VOC = Individual or summed concentrations of volatile organic compounds exceed 5 µg/L.
 - GA = Gross alpha activity exceeds the MCL (15 pCi/L).
 - GB = Gross beta activity exceeds the SDWA threshold level (50 pCi/L) for a 4 millirem per year dose equivalent (the MCL for gross beta activity).

Table 3. Groundwater monitoring wells in the Chestnut Ridge Hydrogeologic Regime that are granted active status under the Y-12 Groundwater Protection Program.

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE OPERATIONAL STATUS DESIGNATION ³									
		REGULATORY PROGRAM ⁴			HYDROLOGIC MONITORING ⁵	GROUNDWATER CONTAMINATION ⁶					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	SWDF		NO ₃	U	VOC	GA	GB	
1082	ORSF	.	.	.	●	.	.	.	.	.	.
1084	ORSF	.	.	.	●	.	.	.	.	.	.
1090	UNCS	.	●	.	.	.	.	.	.	.	.
GW-141	LIV	.	.	●	.	.	.	.	.	.	.
GW-142	KHQ	●	.	.	.	.	.	.	.	.	.
GW-143	KHQ	●	.	.	.	.	.	.	.	.	.
GW-144	KHQ	●	.	.	.	.	.	.	.	.	.
GW-145	KHQ	●	.	.	.	.	.	.	.	.	.
GW-156	CRSDB	●	.	.	.	.	.	.	.	.	.
GW-159	CRSDB	●	.	.	.	.	.	.	.	.	.
GW-160	CRBAWP	.	.	.	●	.	.	.	.	.	.
GW-173	CRSP	.	.	.	●	.	.	.	.	.	.
GW-174	CRSP	.	.	.	●	.	.	.	.	.	.
GW-175	CRSP	●	.	.	.	.	.	.	.	.	.
GW-176	CRSP	.	.	.	●	.	.	.	.	.	.
GW-177	CRSP	●	.	.	.	.	.	.	.	.	.
GW-178	CRSP	.	.	.	●	.	.	.	.	.	.
GW-179	CRSP	.	.	.	●	.	.	.	.	.	.
GW-180	CRSP	.	.	.	●	.	.	.	.	.	.
GW-181	CRSP	.	.	.	.	.	.	.	.	.	●
GW-184	RQ	.	.	.	●	.	.	.	.	.	.
GW-186	RQ	.	.	.	●	.	.	.	.	.	.
GW-188	RQ	.	.	.	●	.	.	.	.	.	.
GW-203	UNCS	.	●	.	.	.	.	.	.	.	.
GW-205	UNCS	.	●	.	.	.	.	.	.	.	.
GW-217	LIV	.	.	●	.	.	.	.	.	.	.
GW-221	UNCS	.	●	.	.	.	.	.	.	.	.
GW-231	KHQ	●	.	.	.	.	.	.	.	.	.
GW-241	CRSDB	.	.	.	●	.	.	.	.	.	.

Table 3 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE OPERATIONAL STATUS DESIGNATION ³									
		REGULATORY PROGRAM ⁴			HYDROLOGIC MONITORING ⁵	GROUNDWATER CONTAMINATION ⁶					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	SWDF		NO ₃	U	VOC	GA	GB	
GW-292	ECRWP	.	.	.	●	.	.	.	.	.	.
GW-293	ECRWP	.	.	.	.	.	.	.	.	.	●
GW-298	CRBAWP	.	.	.	●	.	.	.	.	.	.
GW-299	CRBAWP	.	.	.	●	.	.	.	.	.	.
GW-300	CRBAWP	.	.	.	●	.	.	.	.	.	.
GW-301	CRBAWP	●	.	.	.	.	.	.	.	.	.
GW-302	UNCS	.	●	.	.	.	.	.	.	.	.
GW-303	CRSDB	.	.	.	●	.	.	.	.	.	.
GW-304	CRSDB	.	.	.	●	.	.	.	.	.	.
GW-305	LIV	.	.	●	.	.	.	.	.	.	.
GW-322	CRSP	.	.	.	●	.	.	.	.	.	.
GW-339	UNCS	.	●	.	.	.	.	.	.	.	.
GW-511	CRSP	.	.	.	●	.	.	.	.	.	.
GW-512	FCAP	.	.	.	●	.	.	.	.	.	.
GW-513	FCAP	.	.	.	.	.	.	.	.	.	●
GW-514	FCAP	●	.	.	.	.	.	.	.	.	.
GW-521	LIV	●	.	●	.	.	.	.	.	.	.
GW-522	LIV	.	.	●	.	.	.	.	.	.	.
GW-539	SLII	.	.	.	●	.	.	.	.	.	.
GW-540	SLII	.	.	●	.	.	.	.	.	.	.
GW-541	CDLVI	.	.	.	●	.	.	.	.	.	.
GW-542	CDLVI	.	.	●	.	.	.	.	.	.	.
GW-543	CDLVI	.	.	●	.	.	.	.	.	.	.
GW-544	CDLVI	.	.	●	.	.	.	.	.	.	.
GW-546	CDLVI	.	.	.	●	.	.	.	.	.	.
GW-557	LV	●	.	●	.	.	.	.	.	.	.
GW-558	SSCR	.	.	.	●	.	.	.	.	.	.
GW-559	SSCR	.	.	.	●	.	.	.	.	.	.
GW-560	CDLVII	.	.	●	.	.	.	.	.	.	.
GW-562	CDLVII	.	.	●	.	.	.	.	.	.	.

Table 3 (continued)

WELL NUMBER ¹	SITE ²	PRIMARY CRITERIA FOR ACTIVE OPERATIONAL STATUS DESIGNATION ³									
		REGULATORY PROGRAM ⁴			HYDROLOGIC MONITORING ⁵	GROUNDWATER CONTAMINATION ⁶					UNIQUE CHARACTERISTICS
		RCRA	CERCLA	SWDF		NO ₃	U	VOC	GA	GB	
GW-564	CDLVII	.	.	●	.	.	.	.	.	.	.
GW-608	CRSP	●	.	.	.	.	.	.	.	.	.
GW-609	CRSP	●	.	.	.	.	.	.	.	.	.
GW-610	CRSP	.	.	.	●	.	.	.	.	.	.
GW-611	CRSP	.	.	.	●	.	.	.	.	.	.
GW-612	CRSP	.	.	.	●	.	.	.	.	.	.
GW-674	FCAP	.	.	.	●	.	.	.	.	.	.
GW-676	FCAP	.	.	.	●	.	.	.	.	.	.
GW-677	FCAP	.	.	.	●	.	.	.	.	.	.
GW-678	FCAP	.	.	.	●	.	.	.	.	.	.
GW-679	FCAP	.	.	.	●	.	.	.	.	.	.
GW-680	FCAP	.	.	.	●	.	.	.	.	.	.
GW-709	SLII	.	.	●	.	.	.	.	.	.	.
GW-731	CRSDB	●	.	.	.	.	.	.	.	.	.
GW-732	CRSDB	●	.	.	.	.	.	.	.	.	.
GW-742	CRSP	.	.	.	.	.	.	.	.	.	●
GW-743	CRSP	.	.	.	●	.	.	.	.	.	.
GW-757	SLII	.	.	●	.	.	.	.	.	.	.
GW-796	LV	●	.	●	.	.	.	.	.	.	.
GW-797	LV	.	.	●	.	.	.	.	.	.	.
GW-798	CDLVII	●	.	●	.	.	.	.	.	.	.
GW-799	LV	●	.	●	.	.	.	.	.	.	.
GW-801	LV	●	.	●	.	.	.	.	.	.	.
GW-827	CDLVI	.	.	●	.	.	.	.	.	.	.
GW-831	FCAP	●	.	.	.	.	.	.	.	.	.
GW-841	SCF	.	●	.	.	.	.	.	.	.	.
GW-842	SCF	.	●	.	.	.	.	.	.	.	.
GW-843	SCF	.	●	.	.	.	.	.	.	.	.
GW-844	SCF	.	●	.	.	.	.	.	.	.	.
Total Wells:	88	22	10	21	37	0					5

Table 3 (continued)

Notes:

1. Well locations are shown on Figure 5 in Appendix A.
2.
 - 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
 - FCAP - Filled Coal Ash Pond
 - KHQ - Kerr Hollow Quarry
 - LIV - Industrial Landfill IV
 - LV - Industrial Landfill V
 - ORSF - Oak Ridge Sludge Farm
 - RQ - Rogers Quarry
 - SCF - South Campus Facility
 - SLII - Sanitary Landfill II
 - SSCR - South Side Chestnut Ridge
 - UNCS - United Nuclear Corporation Site
3. The primary criterion for the active status designation is shown for each well, although more than one criteria may apply to each well.
4.
 - RCRA = Identified in the RCRA post-closure permit for the Chestnut Ridge Hydrogeologic Regime (permit number TNHW-089). Note that six of these wells also serve the purposes of groundwater monitoring at a nonhazardous solid waste disposal facility (SWDF).
 - CERCLA = Specified in an applicable CERCLA interim/final record of decision or related decision document(s), or otherwise used for CERCLA-related groundwater monitoring.
 - SWDF = Required for groundwater monitoring in accordance with the operating permit for the specified nonhazardous SWDF. Note that six of these wells also serve RCRA monitoring purposes.
5. Included in the network of wells used for regime-wide hydrologic monitoring (groundwater elevations); see Table 7.
6.
 - NO₃ = Nitrate (as N) concentrations exceed the MCL (10 mg/L).
 - U = Total uranium concentrations exceed the MCL (0.03 mg/L).

Table 3 (continued)

Notes:

6. VOC = Individual or summed concentrations of volatile organic compounds exceed 5 µg/L.
- GA = Gross alpha activity exceeds the MCL (15 pCi/L).
- GB = Gross beta activity exceeds the SDWA threshold level (50 pCi/L) for a 4 millirem per year dose equivalent (the MCL for gross beta activity).

Table 4. Groundwater monitoring wells at the Y-12 National Security Complex that are granted inactive status under the Y-12 Groundwater Protection Program.

WELL NUMBER/REGIME ¹		WELL NUMBER/REGIME ¹		WELL NUMBER/REGIME ¹	
53-1A	EF	GW-206	EF	GW-418	BC
54-2B	EF	GW-210	BC	GW-419	BC
56-7A	EF	GW-211	BC	GW-420	BC
56-9A	EF	GW-212	BC	GW-421	BC
60-2A	EF	GW-214	BC	GW-422	BC
CH-143	CR	GW-224	CR	GW-423	BC
CH-157	CR	GW-238	BC	GW-424	BC
CH-185	CR	GW-262	EF	GW-425	BC
CH-189	CR	GW-264	EF	GW-426	BC
GW-011	BC	GW-284	EF	GW-427	BC
GW-015	BC	GW-285	EF	GW-428	BC
GW-017	BC	GW-294	CR	GW-429	BC
GW-040	BC	GW-296	CR	GW-430	BC
GW-042	BC	GW-318	CR	GW-431	BC
GW-062	BC	GW-319	CR	GW-432	BC
GW-070	BC	GW-324	BC	GW-434	BC
GW-081	BC	GW-331	EF	GW-435	BC
GW-096	BC	GW-333	EF	GW-436	BC
GW-097A	BC	GW-342	BC	GW-437	BC
GW-112	BC	GW-343	BC	GW-438	BC
GW-113	BC	GW-344	BC	GW-439	BC
GW-117	BC	GW-371	BC	GW-440	BC
GW-118	BC	GW-373	BC	GW-441	BC
GW-119	BC	GW-374	BC	GW-442	BC
GW-121	BC	GW-376	BC	GW-443	BC
GW-132	EF	GW-400	BC	GW-445	BC
GW-146	CR	GW-404	BC	GW-449	BC
GW-147	CR	GW-405	BC	GW-450	BC
GW-158	CR	GW-406	BC	GW-451	BC
GW-161	CR	GW-407	BC	GW-455	BC
GW-162	BC	GW-408	BC	GW-456	BC
GW-163	BC	GW-409	BC	GW-457	BC
GW-164	BC	GW-410	BC	GW-458	BC
GW-165	CR	GW-411	BC	GW-459	BC
GW-166	CR	GW-412	BC	GW-460	BC
GW-168	EF	GW-413	BC	GW-461	BC
GW-185	CR	GW-414	BC	GW-462	BC
GW-187	CR	GW-415	BC	GW-463	BC
GW-189	CR	GW-416	BC	GW-464	BC
GW-198	EF	GW-417	BC	GW-465	BC
GW-466	BC	GW-499H	BC	GW-697	EF

Table 4 (continued)

WELL NUMBER/REGIME ¹		WELL NUMBER/REGIME ¹		WELL NUMBER/REGIME ¹	
GW-467	BC	GW-499K	BC	GW-728	BC
GW-468	BC	GW-499L	BC	GW-755	EF
GW-469	BC	GW-499M	BC	GW-758	EF
GW-470	BC	GW-499N	BC	GW-764	EF
GW-472	BC	GW-499O	BC	GW-768	EF
GW-473	BC	GW-499P	BC	GW-771	EF
GW-474	BC	GW-499R	BC	GW-772	EF
GW-475A	BC	GW-499S	BC	GW-777	EF
GW-475B	BC	GW-499T	BC	GW-784	EF
GW-475C	BC	GW-499U	BC	GW-785	EF
GW-476A	BC	GW-499V	BC	GW-803	EF
GW-476B	BC	GW-499X	BC	GW-804	EF
GW-476C	BC	GW-532	BC	GW-811	BC
GW-477A	BC	GW-533	BC	GW-812	BC
GW-477B	BC	GW-534	BC	GW-813	BC
GW-477C	BC	GW-535	BC	GW-814	BC
GW-478A	BC	GW-538	BC	GW-815	BC
GW-478B	BC	GW-563	CR	GW-825	CR
GW-478C	BC	GW-567	CR	GW-826	CR
GW-479	BC	GW-569	CR	GW-828	BC
GW-483	BC	GW-576	CR	GW-834	BC
GW-484	BC	GW-602	BC	GW-836	BC
GW-485	BC	GW-604	EF	GW-902	BC
GW-486	BC	GW-614	BC	LL/HAZ-01	BC
GW-487	BC	GW-625	BC	LL/HAZ-02	BC
GW-488	BC	GW-628	BC	LL/HAZ-05	BC
GW-489	BC	GW-632	EF	LL/HAZ-07	BC
GW-490	BC	GW-634	EF	LL/HAZ-08	BC
GW-491	BC	GW-640	BC	LL/HAZ-09	BC
GW-492	BC	GW-643	BC	LL/HAZ-10	BC
GW-493	BC	GW-647	BC	LL/HAZ-13	BC
GW-494	BC	GW-649	BC	LL/HAZ-16	BC
GW-495	BC	GW-655	BC	LL/HAZ-17	BC
GW-496	BC	GW-673	CR	LL/HAZ-18	BC
GW-497	BC	GW-681	CR	LL/HAZ-19	BC
GW-498	BC	GW-682	CR	SAN-2	BC
GW-499	BC	GW-688	EF	SAN-3	BC
GW-499A	BC	GW-693	EF	SAN-4	BC
GW-499AB	BC	GW-696	EF	SAN-5	BC
GW-49G	BC	GW-701	EF	SAN-6	BC
GW-499I	BC	GW-702	EF	SAN-7	BC
GW-499J	BC	GW-705	BC	SAN-8	BC

Table 4 (continued)

WELL NUMBER/REGIME ¹		WELL NUMBER/REGIME ¹		WELL NUMBER/REGIME ¹	
SAN-9	BC	.	.	.	.
SAN-10	BC	.	.	.	.

Notes:

1. BC - Bear Creek Hydrogeologic Regime
EF - Upper East Fork Poplar Creek Hydrogeologic Regime
CR - Chestnut Ridge Hydrogeologic Regime

Table 5. Hydrologic monitoring wells in the Bear Creek Hydrogeologic Regime.

WELL NUMBER ¹ /LOCATION ²		WELL NUMBER ¹ /LOCATION ²		WELL NUMBER ¹ /LOCATION ²	
GW-001	OLF	GW-127	S3	GW-630	LD
GW-008	OLF	GW-226	OLF	GW-638	OLF
GW-010	OLF	GW-227	OLF	GW-641	BG
GW-012	OLF	GW-229	OLF	GW-642	BG
GW-013	OLF	GW-236	S3	GW-645	OLF
GW-014	BG	GW-242	BG	GW-646	OLF
GW-016	BG	GW-245	S3	GW-648	RS
GW-018	BG	GW-249	BG	GW-652	BG
GW-041	BG	GW-257	BG	GW-653	BG
GW-045	BG	GW-276	S3	GW-654	BG
GW-046	BG	GW-287	BG	GW-683	EXP-A
GW-047	BG	GW-289	BG	GW-684	EXP-A
GW-052	BG	GW-291	BG	GW-685	EXP-A
GW-053	BG	GW-307	RS	GW-695	EXP-B
GW-055	BG	GW-309	RS	GW-710	EXP-W
GW-057	EXP-A	GW-310	RS	GW-711	EXP-W
GW-059	BG	GW-316	SPI	GW-713	EXP-W
GW-061	BG	GW-323	SPI	GW-715	EXP-W
GW-065	OLF	GW-325	S3	GW-737	EXP-C
GW-067	OLF	GW-345	S3	GW-740	EXP-C
GW-069	BG	GW-347	RS	GW-795	AGLLSF
GW-078	BG	GW-364	OLF	GW-800	OLF
GW-080	BG	GW-370	BG	GW-829	OLF
GW-082	BG	GW-372	BG	GW-835	S3
GW-084	OLF	GW-520	OLF	GW-916	EMWMF
GW-086	OLF	GW-531	LD	GW-917	EMWMF
GW-090	BG	GW-537	OLF	GW-918	EMWMF
GW-091	BG	GW-613	S3	GW-921	EMWMF
GW-097	OLF	GW-621	EXP-B	GW-922	EMWMF
GW-100	S3	GW-622	BG	GW-923	EMWMF
GW-101	S3	GW-624	BG	GW-924	EMWMF
GW-115	S3	GW-626	BG	.	.

Notes:

1. The location of each well is shown on Figure 3 in Appendix A.
2.
 - AGLLSF - Above Ground Low Level Storage Facility
 - BG - Bear Creek Burial Grounds Waste Management Area
 - EMWMF - Environmental Management Waste Management Facility
 - EXP-A - Exit Pathway (Maynardville Limestone) Picket A
 - EXP-B - Exit Pathway (Maynardville Limestone) Picket B

Table 5 (continued)

Notes:

- 2. EXP-C - Exit Pathway (Maynardville Limestone) Picket C
- EXP-W - Exit Pathway (Maynardville Limestone) Picket W
- LD - Lysimeter Demonstration Site
- OLF - Oil Landfarm
- RS - Rust Spoil Area
- SPI - Spoil Area I
- S3 - S-3 Site

Table 6. Hydrologic monitoring wells in the Upper East Fork Poplar Creek Hydrogeologic Regime.

WELL NUMBER ¹ /LOCATION ²		WELL NUMBER ¹ /LOCATION ²	
55-1A	Y12	GW-383	NHP
55-3A	Y12	GW-603	EXP-J
55-6A	Y12	GW-605	EXP-I
56-1A	Y12	GW-606	EXP-I
56-2A	Y12	GW-617	EXP-E
56-8A	Y12	GW-619	FTF
60-1A	Y12	GW-686	CPT
GW-105	S3	GW-691	CPT
GW-107	S3	GW-699	B8110
GW-108	S3	GW-733	EXP-J
GW-148	NHP	GW-734	EXP-J
GW-151	NHP	GW-735	EXP-J
GW-152	NHP	GW-746	GRID
GW-154	NHP	GW-749	GRID
GW-167	EXP	GW-752	GRID
GW-169	UV	GW-754	GRID
GW-171	UV	GW-756	GRID
GW-192	B4	GW-759	GRID
GW-193	T2331	GW-761	GRID
GW-195	B4	GW-763	GRID
GW-199	GRID	GW-765	GRID
GW-200	RDS	GW-767	GRID
GW-202	RDS	GW-770	GRID
GW-204	T0134	GW-774	GRID
GW-219	UOV	GW-776	GRID
GW-251	S2	GW-778	GRID
GW-253	S2	GW-780	GRID
GW-255	S2	GW-783	GRID
GW-261	SY	GW-787	GRID
GW-263	SY	GW-789	GRID
GW-334	WC	GW-792	GRID
GW-335	WC	GW-816	EXP-SR
GW-349	S2	GW-817	GRID
GW-380	NHP	.	.

Notes:

1. Some wells are located in Union Valley east of the Y-12 National Security Complex; all well locations shown on Figure 4 in Appendix A.

Table 6 (continued)

Notes:

- 2. B4 - Beta-4 Security Pits
- B8110 - Building 8110
- EXP-E - Exit Pathway (Maynardville Limestone) Picket E
- EXP-I - Exit Pathway (Maynardville Limestone) Picket I
- EXP-J - Exit Pathway (Maynardville Limestone) Picket J
- EXP-SR - Exit Pathway (Scarboro Road)
- FTF - Fire Training Facility
- GRID - Comprehensive Monitoring Plan Grid Location
- NHP - New Hope Pond
- RDS - Ravine Disposal Site
- RG - Rust Garage Area
- S2 - S-2 Site
- S3 - S-3 Site
- SY - Y-12 Salvage Yard
- T0134 - Tank 0134-U
- T2231 - Tank 2331-U
- UOV - Uranium Oxide Vault
- UV - Union Valley
- WC - Waste Coolant Processing Area
- Y12 - Y-12 Complex

Table 7. Hydrologic monitoring wells in the Chestnut Ridge Hydrogeologic Regime.

WELL NUMBER ¹ /LOCATION ²		WELL NUMBER/LOCATION ²		WELL NUMBER ¹ /LOCATION ²	
1082	ORSF	GW-231	KHQ	GW-560	CDLVII
1084	ORSF	GW-241	CRSDB	GW-562	CDLVII
1090	UNCS	GW-292	ECRWP	GW-564	CDLVII
GW-141	LIV	GW-298	CRBAWP	GW-608	CRSP
GW-142	KHQ	GW-299	CRBAWP	GW-609	CRSP
GW-144	KHQ	GW-300	CRBAWP	GW-610	CRSP
GW-145	KHQ	GW-301	CRBAWP	GW-611	CRSP
GW-156	CRSDB	GW-302	UNCS	GW-612	CRSP
GW-159	CRSDB	GW-303	CRSDB	GW-674	FCAP
GW-160	CRBAWP	GW-304	CRSDB	GW-676	FCAP
GW-165	CRDT	GW-305	LIV	GW-677	FCAP
GW-173	CRSP	GW-322	CRSP	GW-678	FCAP
GW-174	CRSP	GW-339	UNCS	GW-679	FCAP
GW-175	CRSP	GW-511	CRSP	GW-680	FCAP
GW-176	CRSP	GW-512	FCAP	GW-709	SLII
GW-177	CRSP	GW-521	LIV	GW-731	CRSDB
GW-178	CRSP	GW-522	LIV	GW-732	CRSDB
GW-179	CRSP	GW-539	SLII	GW-743	CRSP
GW-180	CRSP	GW-541	CDLVI	GW-757	SLII
GW-184	RQ	GW-542	CDLVI	GW-796	LV
GW-186	RQ	GW-543	CDLVI	GW-797	LV
GW-188	RQ	GW-544	CDLVI	GW-798	CDLVII
GW-203	UNCS	GW-546	CDLVI	GW-799	LV
GW-205	UNCS	GW-557	LV	GW-801	LV
GW-217	LIV	GW-558	SSCR	GW-827	CDLVI
GW-221	UNCS	GW-559	SSCR	GW-831	FCAP

Notes:

1. The location of each well is shown on Figure 5 in Appendix A.
2.
 - CDLVI - Construction/Demolition Landfill VI
 - CDLVII - Construction/Demolition Landfill VII
 - CRBAWP - Chestnut Ridge Borrow Area Waste Pile
 - CRDT - Chestnut Ridge Deer Trap
 - CRSDB - Chestnut Ridge Sediment Disposal Basin
 - CRSP - Chestnut Ridge Security Pits
 - ECRWP - East Chestnut Ridge Waste Pile
 - FCAP - Filled Coal Ash Pond
 - KHQ - Kerr Hollow Quarry
 - LIV - Industrial Landfill IV
 - LV - Industrial Landfill V

Table 7 (continued)

Notes:

- 2. ORSF - Oak Ridge Sludge Farm
- RQ - Rogers Quarry
- SLII - Sanitary Landfill II
- UNCS - United Nuclear Corporation Site

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