



**Y-12  
NATIONAL  
SECURITY  
COMPLEX**

**Y-12 GROUNDWATER PROTECTION PROGRAM  
GROUNDWATER MONITORING DATA COMPENDIUM  
REVISION 3**

**December 2009**

**Prepared by**

**Elvado Environmental LLC  
Under Subcontract No. 4300068789**

**for the**

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

**Managed by**

**Babcock & Wilcox Technical Services Y-12, LLC  
for the U.S. DEPARTMENT OF ENERGY  
Under Contract No. DE-AC05-00OR22800**

**MANAGED BY  
B&W Y-12, LLC  
FOR THE UNITED STATES  
DEPARTMENT OF ENERGY**

UCN-13672 (1-08)

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- A    FIGURES
- B    TABLES

### ATTACHMENT: COMPACT DISK, containing:

- Vol2 to GW-199\_r3.pdf
- Vol3 to GW-699\_r3.pdf
- Vol4 to GW-960\_r3.pdf
- Vol5 SW/Springs\_r3.pdf



## **List of In-Text Summary Tables**

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## **1.0 INTRODUCTION**

This document is a compendium of water quality and hydrologic characterization data obtained from the network of groundwater monitoring wells and selected surface water sampling stations (including springs and building sumps) at the U.S. Department of Energy (DOE) Y-12 National Security Complex (Y-12) in Oak Ridge, Tennessee that have been sampled between January 2003 and December 2008. The primary objectives of this document, hereafter referenced as the Y-12 Groundwater Protection Program (GWPP) Compendium, are to:

- Serve as a single-source reference for monitoring data that meet the requirements of the Y-12 GWPP, as defined in the Y-12 GWPP Management Plan (Babcock & Wilcox Technical Services Y-12 LLC [B&W Y-12] 2009a);
- Maintain a detailed analysis and evaluation of the monitoring data for each applicable well, spring, and surface water sampling station, with a focus on results for the primary inorganic, organic, and radiological contaminants in groundwater and surface water at Y-12; and
- Ensure retention of “institutional knowledge” obtained over the long-term (>20-year) history of groundwater and surface water monitoring at Y-12 and the related sources of groundwater and surface water contamination.

To achieve these goals, the Y-12 GWPP Compendium brings together salient hydrologic, geologic, geochemical, water-quality, and environmental compliance information that is otherwise disseminated throughout numerous technical documents and reports prepared in support of completed and ongoing environmental contamination assessment, remediation, and monitoring activities performed at Y-12.

The following subsections provide background information regarding the overall scope and format of the Y-12 GWPP Compendium and the planned approach for distribution and revision (i.e., administration) of this document. Figures and tables (excluding data summary tables presented with the text) referenced in this introductory volume are provided in Appendix A and Appendix B, respectively.

### **1.1 SCOPE**

This Y-12 GWPP Compendium includes groundwater monitoring wells granted “active” status in accordance with the Y-12 GWPP Monitoring Optimization Plan (MOP) (B&W Y12 2009b), including wells for which the monitoring status has changed to “inactive” at some time following the sampling events described in this document. The MOP grants active status to any well that meets one or more of the following criteria: (1) the well is designated for monitoring in compliance with applicable state and/or federal regulations; (2) the well meets requirements of DOE Order 450.1A surveillance monitoring; (3) the well is designated for hydrologic monitoring (e.g., water level elevations); and (4) the well is considered suitable for objectives of the Y-12 GWPP. The Y-12 GWPP Compendium provides the following information for wells granted active status under the MOP:

- A summary of pertinent well-construction information (e.g., total depth);
- An overview of the groundwater sampling history for the well and a discussion of distinguishing sampling characteristics (e.g., unusually high or low total dissolved solids [TDS] concentration);

- A discussion of the hydrologic characteristics for the well, based primarily on presampling depth-to-water measurements/groundwater elevations, along with a summary of available results for hydrologic tests (e.g., hydraulic conductivity tests);
- A discussion of the geochemical characteristics of the groundwater in the well based on available analytical results for primary anions and cations, including a discussion of results showing unusually high or low ion concentrations, or other similarly distinctive geochemical characteristics;
- A detailed narrative evaluation of the available analytical results for the well, supported by time-series plots and data summary tables, based on monitoring results that meet the requirements of the Y-12 GWPP for the primary groundwater contaminants at Y-12: nitrate, uranium, volatile organic compounds (VOCs), and radioactivity (gross alpha activity and gross beta activity); and
- A list of plans, documents, and technical reports cited for more detailed information.

The Y-12 GWPP Compendium presents a *Brief* of the above-listed information for each well, which includes a *Summary Cover Sheet* and corresponding *Data Evaluation Narrative*, each of which is divided into the following sections: (1) Installation, Construction, and Location; (2) Sampling History and Characteristics; (3) Hydrologic Characteristics; (4) Geochemical Characteristics; (5) Contamination, with subsections for nitrate, uranium, VOCs, gross alpha activity, gross beta activity, and other contaminants (if any); and (6) References. Section 2 of this introductory report provides a detailed explanation of the data presented in the *Summary Cover Sheet* for each well and Section 3 outlines the types of information provided in the corresponding *Data Evaluation Narrative*.

This Y-12 GWPP Compendium also includes a number of natural springs and surface water sampling locations in the drainage basins associated with Y-12, including sampling locations that are outside the boundary of the DOE Oak Ridge Reservation. The Y-12 GWPP uses these sampling locations for the purposes of Exit Pathway/Perimeter monitoring in accordance with the requirements of DOE Order 450.1. Several of these sampling locations also meet the requirements of other monitoring programs and organizations at Y-12, including National Pollution Discharge Elimination System (NPDES) monitoring performed by the Y-12 Surface Water Program. Based only on selected sampling/analytical results that meet DOE Order monitoring requirements, the Y-12 GWPP Compendium provides the following information for each applicable spring and surface water sampling station:

- The general location of the spring or surface water sampling station, including the Y-12 grid coordinates;
- The purpose for monitoring the spring or surface water sampling station (e.g., DOE Order monitoring) and the sampling history;
- A discussion of the geochemical characteristics of the samples from the spring or surface water stations, based on available analytical results for primary anions and cations;
- A summary of water-quality conditions at each spring or surface water sampling station, based on sampling/analytical results for the following surface water contaminants at Y-12: nitrate, uranium, VOCs, radioactivity (gross alpha activity and gross beta activity), and mercury (selected locations only); and
- A list of plans, documents, and technical reports cited for more detailed information.



As with the wells, the Y-12 GWPP Compendium presents a *Brief* of the above-listed information for each spring and surface water station in a *Summary Cover Sheet* and corresponding *Data Evaluation Narrative*, each formatted with the following sections: (1) Location; (2) Sampling History; (3) Geochemical Characteristics; (4) Principal Contamination, with subsections for nitrate, uranium, VOCs, gross alpha activity, gross beta activity, and other contaminants, such as mercury; and (5) References. Much of the information included in the *Summary Cover Sheet* and *Data Evaluation Narrative* for each spring and surface water sampling station is self-explanatory or is otherwise addressed by the descriptions provided Section 2 and Section 3 of this introductory volume.

The Y-12 GWPP Compendium includes only the applicable wells (i.e., those granted “active” status under the MOP) and surface water monitoring stations (including springs) that have been used for groundwater or surface water quality sampling since January 2003. Nevertheless, as described in the following sections, the compendium format accommodates the addition of other sampling locations that may be included in ongoing groundwater and surface water monitoring activities. Additionally, the compendium maintains information regarding wells that were formerly granted active status, but whose monitoring status has changed to inactive (e.g., wells plugged and abandoned to make room for buildings). With this approach, the Y-12 GWPP Compendium encompasses nearly all of the wells at Y-12 that are granted “active” status under the MOP and are selected for water quality monitoring by the Y-12 GWPP.

## **1.2 FORMAT**

To facilitate use as a reference manual, the Y-12 GWPP Compendium is presented in a “handbook” format. This format is intended for wide distribution and consists of a hardcopy of this introductory report along with a compact disk containing four portable document format (PDF) files (Volumes 2, 3, 4, and 5) that have the most up-to-date *Brief* for each applicable well, spring, and surface water sampling station (see Attachment). The PDF files are fully searchable with compatible software (e.g., Adobe Acrobat™). The entire Y-12 GWPP Compendium is divided into five separate volumes in the manner of an encyclopedia, with this introduction being Volume 1 and the *Brief* for each applicable sampling location presented in Volume 2 (Table B.1), Volume 3 (Table B.2), Volume 4 (Table B.3), and Volume 5 (Table B.4). The referenced index tables identify the wells included in Volume 2 (wells 1090 – GW-199), Volume 3 (wells GW-200 – GW-699), and Volume 4 (wells GW-700 – GW-999) and the springs, sumps, and surface water sampling stations included in Volume 5.

## **1.3 REVISION**

The Y-12 GWPP Compendium will be revised (updated) annually or at an alternative frequency specified by the Y-12 GWPP Manager. The revisions will primarily involve: (1) updating the information presented in this introductory volume, particularly the above-referenced index tables and the data summary tables presented in Section 2; (2) updating the information presented in the *Summary Cover Sheet* and *Data Evaluation Narrative* for each applicable well, spring, or surface water station to incorporate the results of on-going groundwater and surface water quality monitoring activities; and/or (3) adding the *Summary Cover Sheet* and *Data Evaluation Narrative* for applicable wells, springs, or surface water stations not previously included in the Y-12 GWPP Compendium. The current revision of this document includes new *Briefs* for monitoring locations that were sampled at least once during CY 2007 and/or CY 2008 (the previous revision updated all locations with monitoring results through CY 2006); none of the existing *Briefs* were updated to reflect the sampling results during this time period.

Revised versions of this “handbook” format will include an updated hardcopy of the introductory report (this document) along with a compact disk that contains new PDF files with the updated *Brief* for each applicable well, spring, and surface water sampling station.

## 2.0 SUMMARY COVER SHEET

The *Summary Cover Sheet* for each applicable sampling location included in the Y-12 GWPP Compendium serves as a quick reference for general information about the well, spring, or surface water sampling station. This section provides background information regarding the contents of the *Summary Cover Sheet* for each well, which also addresses the contents of the *Summary Cover Sheet* for each spring and surface water station.

The *Summary Cover Sheet* for each applicable monitoring well included in the Y-12 GWPP Compendium, as detailed below, is divided into the following sections: (1) *Location*; (2) *Monitoring Purpose*; (3) *Well Construction*; (4) *Monitored Interval*; (5) *Sampling History*; (6) *Sampling Characteristics*, and (7) *Principal Contaminants*. Information is provided on the *Summary Cover Sheet* unless it is not available (NA) or is not applicable (“.”).

### 2.1 LOCATION

This section of the *Summary Cover Sheet* provides general location information for the well, including the hydrogeologic regime in which the well is located and the site (Functional Area) with which the well is affiliated. Often, the affiliated site is a source of contamination in the groundwater at the well. The Y-12 GWPP recognizes three hydrogeologic regimes at Y-12 (Figure A.1): (1) the Bear Creek Hydrogeologic Regime (referenced as the Bear Creek Regime), which encompasses a section of Bear Creek Valley (BCV) west of Y-12; (2) the Upper East Fork Poplar Creek Hydrogeologic Regime (referenced as the East Fork Regime), which encompasses the section of BCV that includes the bulk of the process and support buildings that comprise Y-12; and (3) the Chestnut Ridge Hydrogeologic Regime (referenced as the Chestnut Ridge Regime), which encompasses a section of Chestnut Ridge directly south of Y-12.

### 2.2 MONITORING PURPOSE

This section of the *Summary Cover Sheet* identifies the applicable groundwater monitoring program under which samples were collected during the most recent year. Although collected for a variety of monitoring purposes, all of the data presented in this document meet U.S. Department of Energy (DOE) Order 540.1 monitoring requirements. Ongoing groundwater quality monitoring activities in the hydrogeologic regimes at Y-12 are implemented in accordance with the following programs:

- Resource Conservation and Recovery Act (RCRA) post-closure groundwater quality monitoring, which includes RCRA post-closure detection monitoring and RCRA post-closure corrective action effectiveness monitoring. The former is performed at closed hazardous waste disposal units (HWDUs) that have not released hazardous waste and/or hazardous waste constituents to the groundwater system, and the latter is performed at HWDUs which have released hazardous waste and/or hazardous waste constituents. The requirements for these RCRA monitoring programs are defined in the respective RCRA post-closure permit issued by the Tennessee Department of Environment and Conservation (TDEC) for each hydrogeologic regime and the applicable TDEC regulations governing groundwater monitoring at HWDUs.

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) groundwater quality monitoring, which includes: (1) CERCLA baseline monitoring to evaluate pre-remediation groundwater quality; (2) monitoring performed in accordance with the applicable CERCLA record of decision (ROD) and or related decision documents pending final approval of the ROD; and (3) monitoring performed at the Environmental Management Waste Management Facility, which is an active CERCLA-regulated waste disposal site located in the Bear Creek Regime west of Y-12.
- Groundwater quality monitoring performed at several operating and closed non-hazardous waste landfills located south of Y-12 in the Chestnut Ridge Regime. Monitoring at each site is performed in accordance with the operating permit/post-closure plan issued and approved by the TDEC and the TDEC regulations governing groundwater monitoring at non-hazardous solid waste disposal facilities.
- Groundwater quality monitoring performed in each hydrogeologic regime in compliance the requirements of DOE Order 450.1, which mandates monitoring in areas at Y-12 that: (1) are known or suspected sources of groundwater contamination and (2) where contaminants from DOE operations at Y-12 may exit areas under DOE administrative control.

In addition to groundwater quality monitoring, respective networks of groundwater monitoring wells in the Bear Creek Regime, East Fork Regime, and Chestnut Ridge Regime are used for hydrologic monitoring (i.e., are used to determine contemporaneous, regime-wide groundwater surface elevations).

## 2.3 WELL CONSTRUCTION

This section of the *Summary Cover Sheet* provides selected information regarding the construction of the monitoring well, as reported in: *Updated Subsurface Data Base for Bear Creek Valley, Chestnut Ridge, and Parts of Bethel Valley on the U.S. Department of Energy Oak Ridge Reservation* (BWXT 2003), hereafter referenced as the Y-12 Subsurface Database. Many of the monitoring wells are completed in pairs or clusters, and the *Summary Cover Sheet* notes all clustered wells. For most wells, the total depth of the well (Tag Depth) is in reference to the top of the well casing, whereas other downhole measurements may be in reference to a designated measuring point marked on the top of the Well Wizard™ (TOWW) (a dedicated gas-driven bladder pump) in the well. The type of dedicated sampling equipment (to be used only for the specified well) installed in the well is noted in this section; most monitoring wells have a Well Wizard™ bladder pump. A few wells are equipped with Westbay™ multiport sampling systems that enable collection of representative samples from several discreet depth intervals. Additionally, the following acronyms and abbreviations are used for well casing materials and well screen types (if applicable):

PVC40	-	polyvinyl chloride, schedule 40
PVC/SL	-	PVC/slotted
PPK	-	pre-packed screen
SF25/SJ55	-	steel; American Petroleum Institute Grade
STL	-	carbon steel
SS	-	stainless steel
SS304	-	stainless steel type 304
SS/SW	-	stainless steel, spiral wound
slot size	-	size of screen openings, in inches (e.g., 0.01)

## 2.4 MONITORING INTERVAL

This section of the *Summary Cover Sheet* provides selected information regarding the monitored interval for the well, as reported in the Y-12 Subsurface Database. All the monitoring wells at Y-12 that are granted active status under the Y-12 GWPP are completed with manufactured well screens or open hole monitored intervals, respectively referenced as “Screened” and “Open Hole” on the *Summary Cover Sheet*. Also provided are the depths to the top, bottom, and midpoint of the monitored interval, as measured in ft below ground surface (bgs), and the corresponding elevations in ft above mean sea level (msl).

As noted in the Section 2.3, most of the monitoring wells granted active status under the Y-12 GWPP are equipped with a dedicated sampling pump. Therefore, this section of the *Summary Cover Sheet* for these wells shows the depth to the pump intake, which provides information regarding its relative location within the monitored interval for the well.

This section of the *Summary Cover Sheet* also identifies the geologic formation from which the monitoring well yields groundwater. The primary geologic formations in the vicinity of Y-12 are (listed in order from oldest to youngest): the Rome Formation, which forms Pine Ridge north of Y-12; the Conasauga Group formations (Pumpkin Valley Shale, Rutledge Limestone, Rogersville Shale, Mayville Limestone, Nolichucky Shale, and Maynardville Limestone), which underlie Bear Creek Valley (BCV) and the southern flank of Pine Ridge; and the Knox Group formations (Copper Ridge Dolomite, Chepultepec Dolomite, Longview Dolomite, Kingsport Formation, and Mascot Dolomite), which form Chestnut Ridge south of Y-12 (Figure A.2).

The geologic formations in the vicinity of Y-12 comprise two hydrogeologic units: the aquifer, consisting of the Maynardville Limestone (upper Conasauga Group) and Knox Group formations; and the aquitard, consisting of the remaining Conasauga Group formations and the Rome Formation. Fractures provide the principal groundwater flowpaths in both units, and dissolution of carbonates in the aquifer has enlarged fractures and produced solution cavities and conduits that greatly enhance its hydraulic conductivity relative to the aquitard. Flow in each unit decreases with depth, and flow through the porous rock matrix is minimal in both units. Also, the bulk of the groundwater flow in each unit occurs within a highly permeable hydrogeologic zone, referenced as the “Water Table” in this section of the *Summary Cover Sheet*, located near the interface between bedrock and weathered bedrock/residuum. In the aquifer, the water table interval represents an extensively interconnected network of solution conduits and cavities (shallow karst network). Wells completed below the water table interval are noted as monitoring a “Bedrock” hydrogeologic zone.

## 2.5 SAMPLING HISTORY

This section of the *Summary Cover Sheet* presents the groundwater sampling history for the well, including the total number of sampling events with the initial and most recent sampling dates of the current revision (see Section 1.3). The sampling history includes sampling events performed by the Y-12 GWPP (January 1986 – present), samples collected by various programs managed by Bechtel Jacobs Company LLC (October 1996 – present), and selected sampling results obtained for CERCLA remedial investigations in the Bear Creek and East Fork Regimes (1997 – 1998). The sampling history also shows the number of samples that have been obtained with the two groundwater sampling methods that have been employed by the Y-12 GWPP and other organizations: a low-flow minimal drawdown sampling method (hereafter referenced as low-flow sampling) and a “conventional” sampling method. The low-flow sampling method, which is intended to obtain representative groundwater samples that do not

include stagnant water in the well casing, involves pumping groundwater from the well at a flow rate that is low enough (<300 milliliters per minute) to minimize drawdown of the water level in the well (<0.1 feet [ft] per quarter-hour) and collecting groundwater samples when regular measurements of pH, conductivity, temperature, oxidation-reduction potential, and dissolved oxygen show minimal variation over four consecutive readings. In contrast, the conventional sampling method involves collecting groundwater samples immediately after purging at least three well volumes of groundwater from the well (if the well does not purge dry) at a much higher pumping rate (1.0 to 1.8 gallons per minute).

## 2.6 SAMPLING CHARACTERISTICS

Most of the groundwater monitoring wells at Y-12 that are granted active status under the Y-12 GWPP monitor uncontaminated groundwater, exhibit similar hydrologic characteristics (e.g., seasonal water level fluctuations), and yield groundwater samples with similar geochemical characteristics. As described in the following paragraphs, analytical results from some of the wells granted active status are conspicuous with regard to: (1) elevated chromium and/or nickel concentrations believed to be artifacts related to the corrosion of the stainless steel riser casing and/or well screen; (2) unusual geochemical characteristics indicative of residual contamination from the cement grout emplaced during well installation/construction; (3) analytical results that appear to reflect bias from the groundwater sampling method; (4) large temporal fluctuations in groundwater elevations; (5) unusually high or low TDS; (6) acidic (pH < 5.5) groundwater, and (7) some other distinguishing geochemical characteristic.

### 2.6.1 Well Casing/Screen Corrosion

This characteristic applies to wells that yield groundwater samples containing unusually high concentrations of chromium and/or nickel that are most likely attributable to chemical and/or microbiologically induced corrosion of the stainless steel well casing/screen. Elevated concentrations of these metals reported for samples from the following wells are believed to be artifacts of corrosion of the riser casing/well screen.

**Table 1. Wells with suspected corrosion of the riser casing/well screen**

<b>BEAR CREEK REGIME</b>	<b>EAST FORK REGIME</b>		<b>CHESTNUT RIDGE REGIME</b>
GW-056	55-1A	GW-508	GW-292
GW-715	56-1A	GW-696	GW-302
	59-1A	GW-760	GW-305
	59-1B	GW-776	GW-339
	GW-190	GW-783	
	GW-380	GW-792	

These wells are suitable for monitoring contaminants other than nickel and chromium (e.g., organics); however, redevelopment of these wells prior to sampling is recommended to ensure collection of the most representative groundwater samples.

## 2.6.2 Grout Contamination

This characteristic applies to wells that yield groundwater samples with unusual geochemical characteristics, including strongly basic pH (>9) and elevated concentrations of potassium (>10 mg/L), that are believed to be the result of localized contamination from cement grout circulated into the surrounding bedrock during installation and construction of the well. This grout contamination may occur several years after well installation, especially in karst areas where additional grout (significantly more than the calculated annular space) may have been used to install the well casing. Such geochemical characteristics are indicated by the monitoring results obtained from the wells listed below in Table 2.

**Table 2. Wells that exhibit indicators for grout contamination**

<b>BEAR CREEK REGIME</b>	<b>EAST FORK REGIME</b>	<b>CHESTNUT RIDGE REGIME</b>
None in the Compendium	GW-170 GW-620	GW-205 GW-679 GW-757

Redevelopment of these wells prior to sampling is recommended to ensure collection of the most representative (i.e., the least grout-contaminated) groundwater samples.

## 2.6.3 Water Level Fluctuation

This characteristic applies to wells that have presampling groundwater elevations which exhibit unusually wide fluctuations. The value shown on the *Summary Cover Sheet* is the difference (in ft) between maximum and minimum depth-to-water measurements recorded during successive quarterly or semiannual groundwater sampling events. Substantial temporal (seasonal) variations in the groundwater elevations may suggest that the monitored interval in the well intercepts highly permeable and well-connected groundwater flowpaths. Typically, wells located in the Chestnut Ridge Regime have higher water level fluctuations than wells located in the Bear Creek or East Fork Regimes. The following 22 wells, most of which are located in the Chestnut Ridge Regime, have seasonal water level fluctuations greater than 25 ft.

**Table 3. Wells that exhibit wide water-level fluctuations**

<b>BEAR CREEK REGIME</b>	<b>EAST FORK REGIME</b>	<b>CHESTNUT RIDGE REGIME</b>		
GW-123 GW-923	GW-253 GW-698 GW-735	1090 GW-173 GW-180 GW-322 GW-339 GW-513	GW-522 GW-540 GW-544 GW-560 GW-608 GW-709	GW-742 GW-743 GW-796 GW-798 GW-801

## 2.6.4 Total Dissolved Solids (TDS)

This characteristic applies to wells, listed in Table 4, that yield groundwater samples with unusually high (>850 milligrams per liter [mg/L]) or low TDS (<150 mg/L), as determined from average values reported for the samples collected since January 1990 (excluding suspected outliers).

**Table 4. Wells that yield groundwater with unusually high or unusually low TDS**

<b>WELL LOCATION</b>	<b>WELL DEPTH (ft bgs)</b>	<b>HIGH TDS (Average &gt;850 mg/L)</b>			<b>LOW TDS (Average &lt;150 mg/L)</b>	
<b>Bear Creek Regime</b>	<20	GW-100 GW-101 GW-105	GW-276 GW-537		GW-008 GW-237	
	20 – 200	GW-085 GW-106 GW-108 GW-109 GW-122	GW-134-33 GW-134-35 GW-134-36 GW-229 GW-244 GW-245	GW-246 GW-247 GW-277 GW-346 GW-526	GW-079 GW-080 GW-269 GW-287 GW-531 GW-653	
	>200	GW-071 GW-123 GW-133-01 GW-134-05 GW-134-11 GW-134-15 GW-134-18	GW-134-21 GW-134-25 GW-135-03 GW-135-06 GW-135-11 GW-135-23 GW-135-26	GW-615 GW-616 GW-623 GW-710 GW-711	GW-066 GW-228 GW-312	
<b>East Fork Regime</b>	<20	55-1A 55-2A GW-272	GW-633 GW-691		56-4A GW-269 GW-273 GW-508	GW-617 GW-761 GW-787
	20 – 200	55-2B 55-2C GW-253	GW-274 GW-275 GW-690	GW-698	GW-619	
<b>Chestnut Ridge Regime</b>	20 – 200				GW-300 GW-521 GW-542 GW-564	GW-796 GW-798 GW-799 GW-801
	>200				GW-608	

For some wells, the high TDS reflects the degree of groundwater contamination, particularly wells located near the former S-3 Ponds. However, other wells yield uncontaminated groundwater with unusually high TDS, including most of the deepest wells at Y-12 (TDS increases with depth) and shallower wells completed with monitored intervals that do not intercept highly permeable groundwater flowpaths. Similarly, some wells that monitor contaminated and uncontaminated groundwater yield samples with unusually low TDS, which is believed to reflect the relatively short residence time of the groundwater and implies that the wells intercept highly permeable and hydraulically active groundwater flowpaths.



### 2.6.5 Low pH

This characteristic applies to wells that yield groundwater samples with acidic pH (<5.5 standard units). Average pH values determined from data (field measurements) obtained during sampling events performed since January 1990 (excluding suspected outliers) show that, as summarized below in Table 5, twelve wells yield such acidic groundwater, most of which are located in the Bear Creek Regime.

**Table 5. Wells that yield acidic groundwater samples.**

<b>BEAR CREEK REGIME</b>		<b>EAST FORK REGIME</b>		<b>CHESTNUT RIDGE REGIME</b>
GW-008	GW-246	GW-108	GW-273	.
GW-046	GW-276	GW-109	GW-508	
GW-236	GW-531	GW-253	GW-633	
GW-243	GW-653			

Most of these wells (GW-108, GW-109, GW-236, GW-243, GW-246, GW-273, GW-276, and GW-633) monitor the highly contaminated, acidic groundwater in the aquitard formations (e.g., Nolichucky Shale) near the west end of Y-12 that is a legacy of the historical operation of the former S-3 Ponds. Other wells that yield groundwater samples with acidic pH (e.g., GW-008, GW-046, and GW-653) monitor groundwater contaminated by chlorinated hydrocarbons, with the low pH being an indicator of ongoing chemical and/or biologically-mediated degradation of the compounds.

### 2.6.6 Sampling Method Sensitivity

This characteristic applies to wells that yield groundwater samples with substantially different contaminant concentrations depending on the groundwater sampling method. An evaluation of the monitoring data available through August 2000 indicated potential bias related to the groundwater sampling method for 18 monitoring wells (BWXT 2001). Monitoring results obtained since CY 2000 for eight additional wells that had insufficient data for the original study likewise suggested potential sampling method bias. To confirm the apparent bias, the Y-12 GWPP uses a “paired” groundwater sampling approach, whereby the low-flow sampling method is used to collect a sample one day and the conventional sampling method is used to collect a sample the next day. Both samples are then analyzed for the same suite of analytes. As shown below on Table 6, paired sampling results have “confirmed” the sampling method bias for 12 wells and “disproved” the sampling bias for seven wells, with “suspected” sampling method bias pending results of paired sampling. Notably, results of paired sampling at well GW-225 disproved the suspected sampling method bias (higher conventional sampling results) for nitrate concentrations, but identified sampling method bias for VOC concentrations (Table 6).

**Table 6. Wells evaluated for apparent sampling method bias**

SAMPLING BIAS/WELL NUMBER/WELL LOCATION			PRINCIPAL CONTAMINANTS				
			NITRATE	URANIUM	VOCs	GROSS ALPHA	GROSS BETA
<b>Confirmed</b>	GW-072	BC	.	.	C	.	.
	GW-082	BC	.	.	C	.	.
	GW-204	EF	.	C	.	.	.
	GW-225	BC	X	.	C	.	.
	GW-226	BC	X	C	L	C	C
	GW-612	CR	.	.	C	.	.
	GW-627	BC	.	.	L	.	.
	GW-698	EF	L	.	L	.	.
	GW-706	BC	L	X	X	X	X
	GW-725	BC	C	.	C	.	.
	GW-763	EF	.	.	C	.	.
	GW-791	EF	.	.	C	.	.
<b>Suspected</b>	GW-142	CR	.	C	.	C	.
	GW-151	EF	.	.	L	.	.
	GW-190	EF	.	.	C	.	.
	GW-205	CR	.	.	.	.	L
	GW-273	EF	C	.	C	.	.
	GW-382	EF	.	.	C	.	.
	GW-605	EF	.	C	C	.	C
	GW-691	EF	.	.	L	.	.
<b>Disproved</b>	GW-225	BC	C	.	X	.	.
	GW-229	BC	.	L	L	L	L
	GW-624	BC	.	.	L	.	.
	GW-626	BC	.	.	L	.	.
	GW-633	EF	C	.	L	.	L
	GW-653	BC	.	.	L	.	.
	GW-782	EF	.	.	X	L	.

**Note:**

Confirmed = Results of paired sampling confirm the significant difference between concentrations of specified contaminants detected in samples obtained with the conventional sampling and low-flow sampling methods.

Suspected = Historical data show a significant difference between concentrations of specified contaminants detected in samples obtained with the conventional sampling and low-flow sampling methods, but paired sampling results not needed for confirmation.

Disproved = Results of paired sampling do not support the significant difference in the concentrations of specified contaminants indicated by historical conventional and low-flow sampling results.

BC = Bear Creek Regime

EF = East Fork Regime

CR = Chestnut Ridge Regime

“.” = Not a contaminant in the groundwater at the well.

X = A contaminant in the groundwater at the well, but there is no clear significant difference between conventional sampling and low-flow sampling results.

C = Conventional sampling results show significantly higher concentrations of specified contaminant.

L = Low-flow sampling results show significantly higher concentrations of specified contaminant.

## 2.6.7 Other Characteristics

This characteristic applies to wells that exhibit other distinguishing groundwater sampling characteristics. For example, a well located in the East Fork Regime near the west end of Y-12 (GW-108) yields groundwater samples that effervesce, indicating unusual geochemistry and water quality. Where other distinctive sampling characteristics exist, a detailed discussion of the sampling characteristic(s), including a summary of the applicable geochemical data and/or hydrograph of applicable hydrologic data, is provided in the appropriate section of the data evaluation for the well.

## 2.7 PRINCIPAL CONTAMINANTS

This section of the *Summary Cover Sheet* provides a summary of the analytical data obtained for the well since January 1991 regarding the concentrations of the principal groundwater contaminants at Y-12: nitrate, uranium, VOCs, gross alpha activity, and gross beta activity. The data summary for each contaminant includes the number of samples (since January 1991) with concentrations that meet the data quality objectives of the Y-12 GWPP and exceed the respective screening levels listed in Table 7; the historical maximum concentration of each contaminant (and associated sampling date); and the long-term contaminant concentration trend (increasing, decreasing, or indeterminate).

**Table 7. Principal contaminants and corresponding screening levels**

CONTAMINANT	SCREENING LEVEL
Nitrate (as N)	10 mg/L
Uranium	0.03 mg/L
Summed VOCs	5 micrograms per liter (µg/L)
Gross alpha activity	15 picoCuries per liter (pCi/L)
Gross beta activity	50 pCi/L

Each respective screening level for nitrate, total uranium, and gross alpha activity is the Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) for drinking water. The screening level for summed VOCs is set at a common MCL value. The screening level for gross beta activity is the SDWA screening value for a 4 millirem per year dose equivalent (the MCL for gross beta activity).

The maximum contaminant concentration reported for the location for the most recent revision to the Y-12 GWPP Compendium (see Section 1.3) is shown in a row of boxes located in the upper right corner of each *Summary Cover Sheet*. The contaminant levels that may be presented in the boxes are shown below in Table 8.

**Table 8. Explanation for the principal contaminant concentration summary**

CONTAMINANT	NITRATE (mg/L)	URANIUM (mg/L)	SUMMED VOCs (µg/L)	GROSS ALPHA (pCi/L)	GROSS BETA (pCi/L)
<b>Box Options/ Contaminant Concentration Range</b>	ND <5 5 - 10 10 - 100 100 - 1,000 >1,000	ND <0.015 0.015 - 0.03 0.03 - 0.3 0.3 - 3.0 >3	ND <5 5 - 50 50 - 500 500 - 5,000 >5,000	ND <7.5 7.5 - 15 15 - 150 150 - 1,500 >1,500	ND <25 25 - 50 50 - 500 500 - 5,000 >5,000
<b>Screening Level</b>	<b>10</b>	<b>0.03</b>	<b>5</b>	<b>15</b>	<b>50</b>
<b>Note:</b> “.” = not analyzed; “ND” = not detected					



### 3.0 DATA EVALUATION NARRATIVE

In conjunction with the *Summary Cover Sheet* for each applicable sampling location (see Section 1.1), each *Brief* in the Y-12 GWPP compendium provides a narrative description and evaluation of the hydrologic and groundwater quality data obtained to date. Each narrative follows a standard format that generally mirrors the corresponding *Summary Cover Sheet*. The following sections provide background information regarding the contents of the *Data Evaluation Narrative* for each monitoring well, which also address corresponding contents of the *Data Evaluation Narrative* for each spring and surface water station.

As detailed below, the *Data Evaluation Narrative* for each monitoring well included in the Y-12 GWPP compendium contains separate subsections regarding: (1) the installation, construction, and location of the well; (2) the sampling history for the well, including detailed descriptions of any distinguishing sampling characteristics; (3) the hydrologic characteristics of the well; (4) the geochemical characteristics of the groundwater samples from the well; (5) the concentrations and characteristics (e.g., long-term concentration trends) of the principal Y-12 groundwater contaminants in the well; and (6) the list of referenced technical reports and documents. Applicable subsections of the *Data Evaluation Narrative* define site-specific and other “special” acronyms and abbreviations, but the following “universal” acronyms and abbreviations are not defined.

bgs	-	below ground surface
CERCLA	-	Comprehensive Environmental Response, Compensation, and Liability Act
DOE	-	U.S. Department of Energy
EPA	-	U.S. Environmental Protection Agency
ft	-	feet
msl	-	mean sea level
mg/L	-	milligrams per liter
µg/L	-	micrograms per liter
PVC	-	polyvinyl chloride
pCi/L	-	picoCuries per liter
RCRA	-	Resource Conservation and Recovery Act
ROD	-	record of decision
SDWA	-	Safe Drinking Water Act

#### 3.1 INSTALLATION, CONSTRUCTION, AND LOCATION

This subsection of the *Data Evaluation Narrative* for each well provides a description of the location of the well, including a brief description of the applicable functional area (or other nearby topographic/geographic/cultural features), and a short overview of the construction of well. Unless noted otherwise, geographic directions are in reference to the Y-12 Administrative Grid. For wells that monitor contaminated groundwater, this section commonly provides a description of the site that is the known or suspected source of the contamination.

### **3.2 SAMPLING HISTORY AND CHARACTERISTICS**

This subsection of the *Data Evaluation Narrative* for each monitoring well describes the groundwater sampling history for the well, including the initial and most recent sampling dates of the current revision (see Section 1.3) for each applicable groundwater sampling method (conventional sampling and low-flow sampling). Additionally, if the well exhibits any of the sampling characteristics noted on the *Summary Cover Sheet*, as defined in Section 2.6, this subsection presents a detailed description of the sampling characteristic(s), including data summary tables and/or trend charts.

### **3.3 HYDROLOGIC CHARACTERISTICS**

This subsection of the *Data Evaluation Narrative* for each monitoring well describes the hydrologic characteristics of the well, including an overview of local hydrogeology, a summary of available hydraulic data for the well (e.g., hydraulic conductivity test results), the typical depth to the static water level in the well, and the range of water level fluctuations in the well. Hydrographs of presampling groundwater elevations are provided for wells that exhibit unusually large (>25 ft) water level fluctuations or other distinctive short- or long-term changes in static water levels in the well.

### **3.4 GEOCHEMICAL CHARACTERISTICS**

This subsection of the *Data Evaluation Narrative* for each monitoring well describes the geochemical characteristics of the groundwater samples from the well, including the range of TDS reported for the samples; the range of field pH measurements associated with each sampling event; the major-ion chemistry of the groundwater samples; and the typical concentrations of trace metals detected in the samples. The hydrochemical facies (e.g., calcium-magnesium bicarbonate), as calculated from milliequivalent proportions for a Piper Diagram (Fetter 1994), is provided in this section. Additional information, including applicable data summary tables and/or time-series plots, is provided for wells that yield groundwater samples with: (1) unusually high or unusually low TDS; (2) strongly basic pH and other geochemical indicators of localized grout contamination; or (3) unusually high concentrations of major ions (e.g., chloride).

### **3.5 CONTAMINATION**

This subsection of the *Data Evaluation Narrative* for each monitoring well presents separate descriptions of the analytical data for each of the primary groundwater contaminants at Y-12 (nitrate, uranium, VOCs, gross alpha activity, and gross beta activity) and a detailed evaluation of the results. For some wells, another section is included for other notable contaminants (primarily trace metals) that may be present in the groundwater at the well. The data evaluation includes analytical results that meet data quality objectives, as defined in the Y-12 GWPP Data Management Plan (BWXT 2006b). Where applicable, the data evaluation for each groundwater contaminant includes data summary tables and trend graphs.

The following “universal” acronyms and abbreviations are used without being defined in the applicable subsection of the narrative for monitoring locations.

CE	-	counting error (samples collected 1990-2005), or total propagated uncertainty (samples collected since January 2006)
CTET	-	carbon tetrachloride
MC	-	methylene chloride
MDA	-	minimum detectable activity
PCE	-	tetrachloroethene
TCE	-	trichloroethene
TCFM	-	trichlorofluoromethane
VC	-	Vinyl chloride
111TCA	-	1,1,1-trichloroethane
11DCA	-	1,1-dichloroethane
11DCE	-	1,1-dichloroethene
12DCA	-	1,2-dichloroethane
12DCE	-	1,2-dichloroethene
c12DCE	-	cis-1,2-dichloroethene
t12DCE	-	trans-1,2-dichloroethene



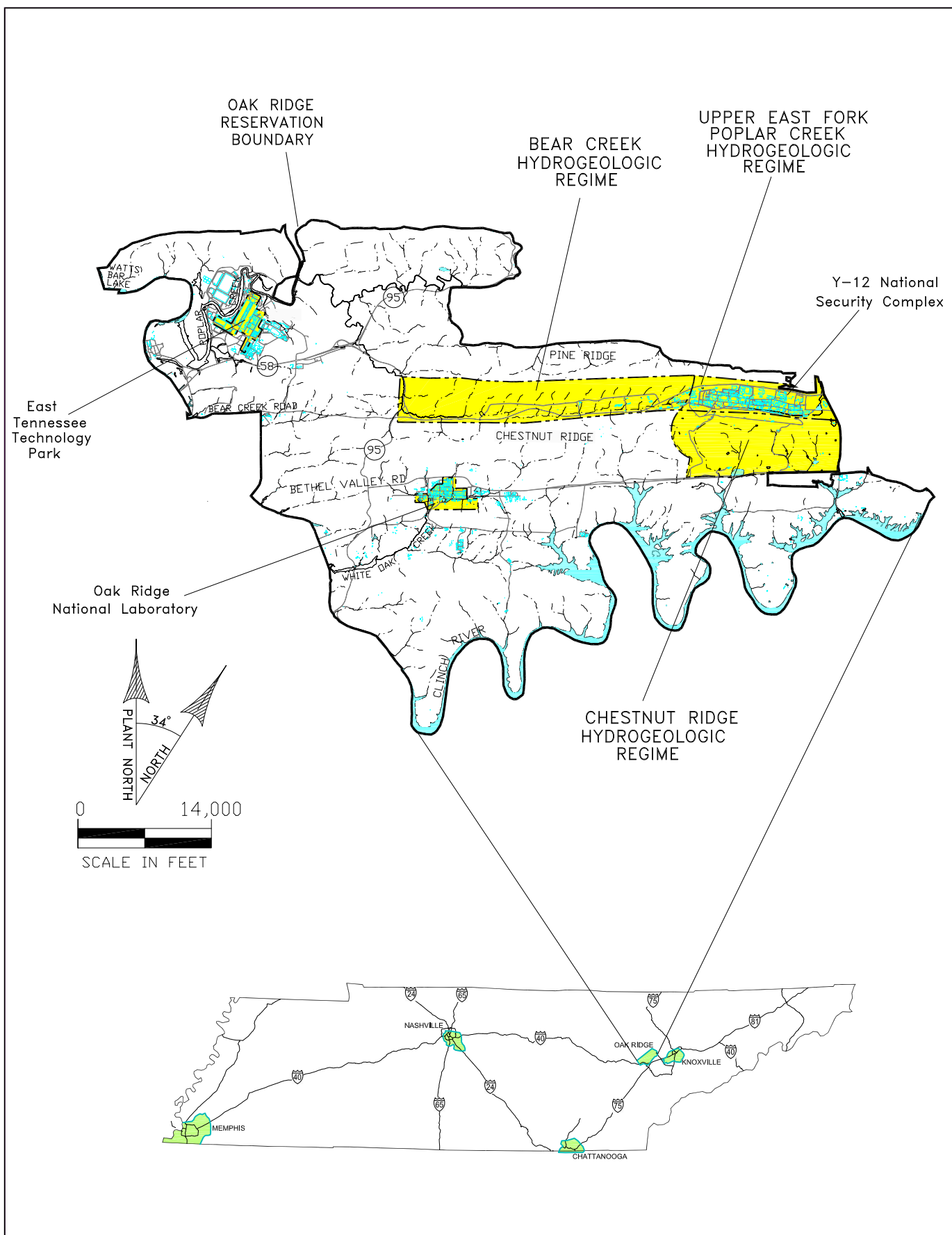


#### 4.0 REFERENCES

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## **APPENDIX A**

### **FIGURES**



GWPP Fig1 09/23/08

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

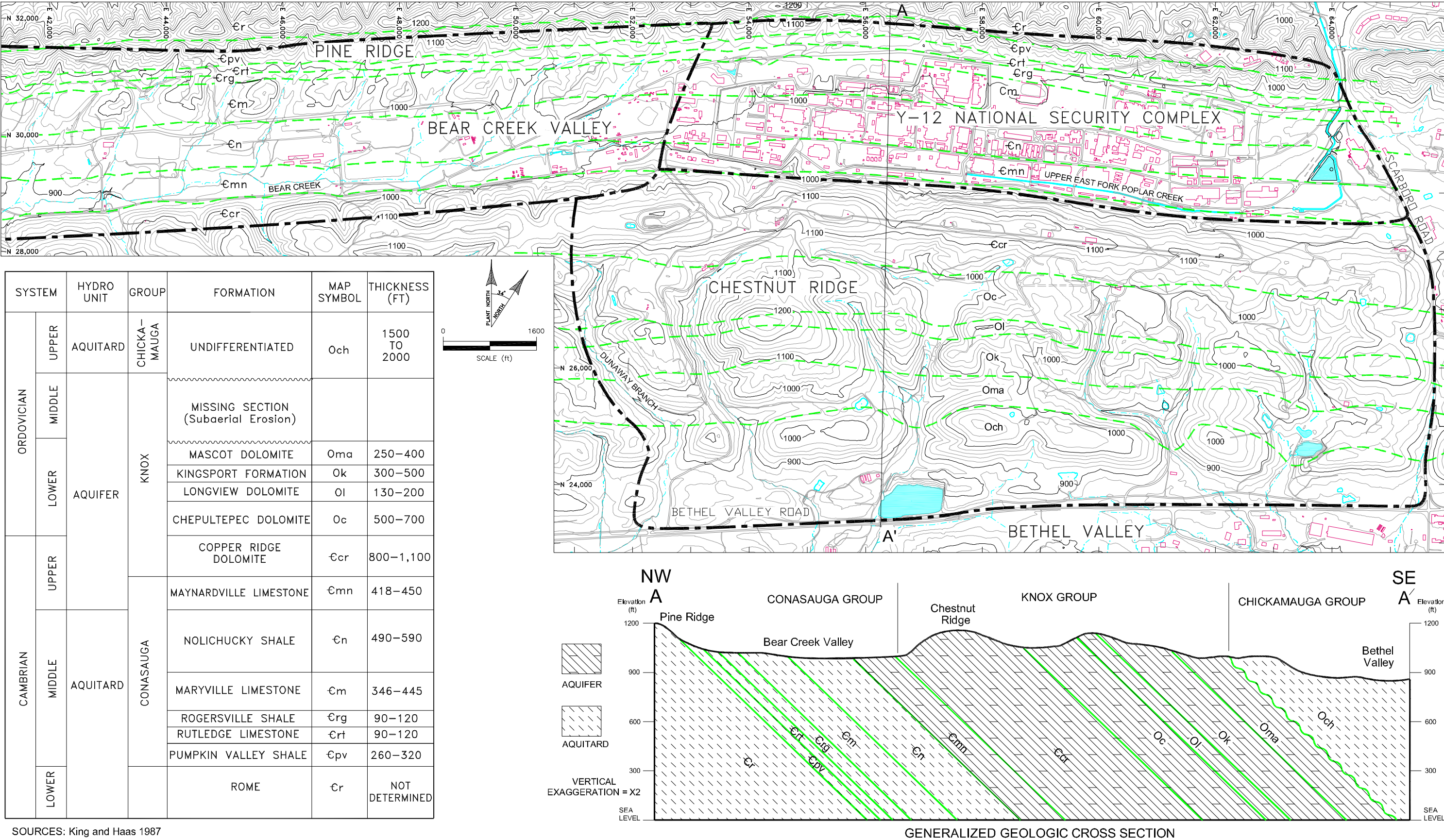


Fig. A.2. Topography and bedrock geology at the Y-12 National Security Complex.

## **APPENDIX B**

### **TABLES**

**Table B.1. Index of monitoring wells included in Volume 2  
of the Y-12 GWPP Compendium**

Monitoring Well	Regime	Revision Year	Monitoring Well	Regime	Revision Year	Monitoring Well	Regime	Revision Year
1090	CR	2006	GW-068	BC	2006	GW-134-33	BC	2004
55-1A	EF	2006	GW-071	BC	2006	GW-134-35	BC	2004
55-2A	EF	2006	GW-072	BC	2005	GW-134-36	BC	2004
55-2B	EF	2006	GW-077	BC	2006	GW-135-03	BC	2004
55-2C	EF	2006	GW-078	BC	2006	GW-135-06	BC	2004
55-3A	EF	2006	GW-079	BC	2006	GW-135-11	BC	2004
55-3B	EF	2006	GW-080	BC	2006	GW-135-15	BC	2004
55-3C	EF	2006	GW-082	BC	2006	GW-135-19	BC	2004
55-6A	EF	2004	GW-085	BC	2006	GW-135-23	BC	2004
56-1A	EF	2006	GW-089	BC	<b>2008</b>	GW-135-26	BC	2004
56-1C	EF	<b>2008</b>	GW-097	BC	2005	GW-135-30	BC	2004
56-2A	EF	2006	GW-098	BC	2006	GW-135-34	BC	2004
56-2B	EF	2006	GW-100	BC	2004	GW-135-39	BC	2004
56-2C	EF	2006	GW-101	BC	2004	GW-141	CR	2006
56-3A	EF	2006	GW-105	EF	2006	GW-142	CR	2003
56-3B	EF	2006	GW-106	EF	2006	GW-143	CR	2006
56-3C	EF	2006	GW-108	EF	2006	GW-144	CR	2006
56-4A	EF	2006	GW-109	EF	2006	GW-145	CR	2006
56-6A	EF	2006	GW-115	BC	2004	GW-148	EF	2006
56-8A	EF	2006	GW-122	BC	2006	GW-151	EF	2006
60-1A	EF	2006	GW-123	BC	2003	GW-153	EF	2006
59-1A	EF	2003	GW-124	BC	2005	GW-154	EF	2006
59-1B	EF	2004	GW-126	BC	2006	GW-156	CR	2006
59-1C	EF	2003	GW-127	BC	2005	GW-159	CR	2006
60-1A	EF	2006	GW-133-01	BC	2004	GW-161	CR	<b>2008</b>
60-1B	EF	2003	GW-133-05	BC	2004	GW-169	UV	2006
60-2A	EF	2003	GW-133-08	BC	2004	GW-170	UV	2006
GW-006	BC	<b>2008</b>	GW-133-10	BC	2004	GW-171	UV	2006
GW-008	BC	2006	GW-133-14	BC	2004	GW-172	UV	2006
GW-014	BC	2006	GW-133-17	BC	2004	GW-173	CR	2004
GW-046	BC	2006	GW-133-21	BC	2004	GW-174	CR	<b>2008</b>
GW-052	BC	2004	GW-133-24	BC	2004	GW-175	CR	2006
GW-053	BC	2005	GW-134-05	BC	2004	GW-176	CR	2004
GW-056	BC	2004	GW-134-11	BC	2004	GW-177	CR	2006
GW-058	BC	2006	GW-134-15	BC	2004	GW-178	CR	2006
GW-061	BC	2005	GW-134-18	BC	2004	GW-179	CR	2004
GW-064	BC	2005	GW-134-21	BC	2004	GW-180	CR	<b>2008</b>
GW-065	BC	<b>2008</b>	GW-134-25	BC	2004	GW-190	EF	2003
GW-066	BC	2005	GW-134-29	BC	2004	GW-192	EF	2006
						GW-193	EF	2006

**Notes:**

BC = Bear Creek Hydrogeologic Regime  
CR = Chestnut Ridge Hydrogeologic Regime  
EF = Upper East Fork Poplar Creek Hydrogeologic Regime  
UV = Union Valley (East of the EF Regime)



**Table B.2. Index of monitoring wells included in Volume 3  
of the Y-12 GWPP Compendium**

Monitoring Well	Regime	Revision Year	Monitoring Well	Regime	Revision Year	Monitoring Well	Regime	Revision Year
GW-203	CR	2006	GW-289	BC	2006	GW-542	CR	2006
GW-204	EF	2006	GW-291	BC	2005	GW-543	CR	2006
GW-205	CR	2006	GW-292	CR	<b>2008</b>	GW-544	CR	2006
GW-207	EF	2005	GW-293	CR	<b>2008</b>	GW-557	CR	2006
GW-208	EF	2005	GW-294	CR	<b>2008</b>	GW-560	CR	2006
GW-217	CR	2006	GW-296	CR	<b>2008</b>	GW-562	CR	2006
GW-219	EF	2005	GW-298	CR	<b>2008</b>	GW-564	CR	2006
GW-220	EF	2006	GW-300	CR	2004	GW-601	BC	2005
GW-221	CR	2006	GW-301	CR	2006	GW-605	EF	2006
GW-222	EF	2004	GW-302	CR	2003	GW-606	EF	2006
GW-223	EF	2006	GW-305	CR	2006	GW-608	CR	<b>2008</b>
GW-225	BC	2006	GW-306	BC	<b>2008</b>	GW-609	CR	2006
GW-226	BC	2006	GW-307	BC	2005	GW-610	CR	2004
GW-227	BC	2005	GW-309	BC	<b>2008</b>	GW-611	CR	2004
GW-228	BC	2005	GW-310	BC	2006	GW-612	CR	2006
GW-229	BC	2006	GW-311	BC	2006	GW-615	BC	2006
GW-230	UV	2006	GW-312	BC	2005	GW-616	BC	2006
GW-231	CR	2006	GW-313	BC	2005	GW-617	EF	2006
GW-232	UV	2006	GW-314	BC	<b>2008</b>	GW-618	EF	2006
GW-236	BC	2004	GW-315	BC	2006	GW-619	EF	2006
GW-237	BC	2004	GW-322	CR	2006	GW-620	EF	2006
GW-240	EF	2006	GW-332	EF	2006	GW-623	BC	<b>2008</b>
GW-242	BC	2005	GW-336	EF	2006	GW-624	BC	2005
GW-244	BC	2005	GW-337	EF	2006	GW-626	BC	2006
GW-245	BC	2005	GW-339	CR	2003	GW-627	BC	2006
GW-246	BC	2006	GW-346	BC	2005	GW-629	BC	2006
GW-247	BC	2005	GW-363	BC	2006	GW-631	EF	2003
GW-251	EF	2006	GW-364	BC	2005	GW-633	EF	2006
GW-253	EF	2006	GW-365	BC	2005	GW-639	BC	2006
GW-257	BC	2006	GW-367	BC	<b>2008</b>	GW-648	BC	<b>2008</b>
GW-259	BC	<b>2008</b>	GW-368	BC	2005	GW-653	BC	2006
GW-265	EF	2006	GW-369	BC	<b>2008</b>	GW-656	EF	2006
GW-269	EF	2006	GW-380	EF	2006	GW-658	EF	2006
GW-270	EF	2003	GW-381	EF	2006	GW-679	CR	2004
GW-271	EF	2003	GW-382	EF	2006	GW-680	CR	2004
GW-272	EF	2003	GW-383	EF	2006	GW-683	BC	2006
GW-273	EF	2003	GW-505	EF	2003	GW-684	BC	2006
GW-274	EF	2006	GW-508	EF	<b>2008</b>	GW-686	EF	2006
GW-275	EF	2006	GW-513	CR	2004	GW-690	EF	2006
GW-276	BC	2006	GW-514	CR	2006	GW-691	EF	2006
GW-277	BC	2005	GW-521	CR	2006	GW-692	EF	2006
GW-281	EF	2006	GW-522	CR	2006	GW-694	BC	2006
GW-286	BC	2005	GW-526	BC	2006	GW-695	BC	2006
GW-287	BC	2005	GW-531	BC	<b>2008</b>	GW-696	EF	2003
GW-288	BC	2005	GW-537	BC	2006	GW-698	EF	2006
			GW-540	CR	2006			

**Notes:**

BC = Bear Creek Hydrogeologic Regime  
CR = Chestnut Ridge Hydrogeologic Regime  
EF = Upper East Fork Poplar Creek Hydrogeologic Regime  
UV = Union Valley (East of the EF Regime)

**Table B.3. Index of monitoring wells included in Volume 4  
of the Y-12 GWPP Compendium**

Monitoring Well	Regime	Revision Year	Monitoring Well	Regime	Revision Year	Monitoring Well	Regime	Revision Year
GW-700	EF	2006	GW-740	BC	2006	GW-801	CR	2006
GW-703	BC	2006	GW-742	CR	2004	GW-802	EF	2006
GW-704	BC	2006	GW-743	CR	2004	GW-816	EF	2006
GW-706	BC	2006	GW-744	EF	2006	GW-818	EF	2004
GW-709	CR	2006	GW-747	EF	2006	GW-820	EF	2006
GW-710	BC	2003	GW-748	EF	2006	GW-827	CR	2006
GW-711	BC	2003	GW-749	EF	2006	GW-829	BC	2006
GW-712	BC	2006	GW-750	EF	2005	GW-831	CR	2006
GW-713	BC	2006	GW-757	CR	2006	GW-832	EF	2006
GW-714	BC	2006	GW-760	EF	2004	GW-835	BC	2003
GW-715	BC	2004	GW-761	EF	2003	GW-916	BC	2006
GW-722-06	EF	2006	GW-762	EF	2006	GW-917	BC	2006
GW-722-10	EF	2006	GW-763	EF	2006	GW-918	BC	2006
GW-722-14	EF	2006	GW-764	EF	2003	GW-919	BC	2003
GW-722-17	EF	2006	GW-765	EF	2004	GW-920	BC	2006
GW-722-20	EF	2006	GW-769	EF	2006	GW-921	BC	2006
GW-722-22	EF	2006	GW-770	EF	2006	GW-922	BC	2006
GW-722-26	EF	2006	GW-775	EF	2004	GW-923	BC	2006
GW-722-30	EF	2006	GW-776	EF	<b>2008</b>	GW-924	BC	2006
GW-722-32	EF	2006	GW-779	EF	<b>2008</b>	GW-925	BC	2006
GW-722-33	EF	2006	GW-781	EF	2006	GW-926	BC	2006
GW-723	BC	2005	GW-782	EF	2006	GW-927	BC	2006
GW-724	BC	2006	GW-783	EF	2006	GW-954-1	EF	2006
GW-725	BC	2006	GW-786	EF	2003	GW-954-2	EF	2006
GW-731	CR	2006	GW-787	EF	2003	GW-954-3	EF	2006
GW-732	CR	2006	GW-791	EF	2006	GW-956-1	EF	2006
GW-733	EF	2006	GW-792	EF	2006	GW-956-2	EF	2006
GW-735	EF	2005	GW-795	BC	2004	GW-956-3	EF	2006
GW-736	BC	2005	GW-796	CR	2006	GW-956-4	EF	2006
GW-737	BC	2005	GW-797	CR	2006	GW-959	EF	2006
GW-738	BC	2006	GW-798	CR	2006	GW-960	EF	<b>2008</b>
GW-739	BC	2005	GW-799	CR	2006			

**Notes:**

BC = Bear Creek Hydrogeologic Regime

CR = Chestnut Ridge Hydrogeologic Regime

EF = Upper East Fork Poplar Creek Hydrogeologic Regime



**Table B.4. Index of sampling stations included in Volume 5  
of the Y-12 GWPP Compendium**

<b>Sampling Station</b>	<b>Regime</b>	<b>Revision Year</b>	<b>Sampling Station</b>	<b>Regime</b>	<b>Revision Year</b>
200A6	EF	2006	NT-04	BC	2006
9201-1K-22SU	EF	2004	NT-07	BC	2006
9201-3C-4SP	EF	2004	NT-08	BC	2006
BCK-00.63	BC	2005	NT-8-E	BC	2003
BCK-03.30	BC	2006	NT-8-W	BC	2003
BCK-04.55	BC	2006	OF 51	EF	2006
BCK-07.87	BC	2006	S07	BC	2006
BCK-09.20	BC	2006	S17	CR	2006
BCK-09.40	BC	2003	SCR1.25SP	CR	2006
BCK-09.47	BC	2006	SCR1.5SW	CR	2006
BCK-11.54	BC	2006	SCR2.1SP	CR	2006
BCK-11.84	BC	2006	SCR2.2SP	CR	2006
BCK-11.97	BC	2003	SCR3.5SP	CR	2006
BCK-12.34	BC	2006	SCR3.5SW	CR	2006
BCK-12.47	BC	2006	SCR4.3SP	CR	2006
EMW-VWEIR	BC	2006	SCR7.1SP	UV	2006
EMW-VWUNDER	BC	2006	SCR7.8SP	UV	2006
EMWNT-03A	BC	2006	SP-17	EF	2006
EMWNT-05	BC	2006	SPR14.0SP	EF	2004
ET-4	BC	2003	SS-1	BC	2006
GHK2.51ESW	NPR	2005	SS-4	BC	2006
GHK2.51WSW	NPR	2006	SS-5	BC	2006
MCK 2.0	CR	2006	SS-6	BC	2006
MCK 2.05	CR	2006	SS-6.6	BC	2006
NPR07.0SW	NPR	2006	SS-7	BC	2006
NPR12.0SW	NPR	2006	SS-8	BC	2006
NPR23.0SW	NPR	2006	STATION 8	EF	2006
NT-01	BC	2006	STATION 17	EF	2006
NT-03	BC	2006	UNC-SW1	CR	<b>2008</b>

**Notes:**

BC = Bear Creek Hydrogeologic Regime  
CR = Chestnut Ridge Hydrogeologic Regime  
EF = Upper East Fork Poplar Creek Hydrogeologic Regime  
NPR = North of Pine Ridge  
UV = Union Valley (East of the EF Regime)

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