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Bechtel Jacobs Company LLC Sampling and Analysis Plan for the Water Resources Restoration Program for Fiscal Year 2009 Oak Ridge Reservation Oak Ridge, Tennessee

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Date Issued—September 2008

Prepared for
U. S. Department of Energy
Office of Environmental Management
by
BECHTEL JACOBS COMPANY LLC
managing the
Environmental Management Activities at the
East Tennessee Technology Park
Y-12 National Security Complex Oak Ridge National Laboratory
under contract DE-AC05-98OR22700
for the
U. S. DEPARTMENT OF ENERGY

APPROVALS

Bechtel Jacobs Company LLC
Sampling and Analysis Plan
for the
Water Resources Restoration Program
for Fiscal Year 2009
Oak Ridge Reservation
Oak Ridge, Tennessee

BJC/OR-3121

September 2008

Prepared by:

_______________________________ 9/25/08
Richard Ketelle Date
Technical Lead
Bechtel Jacobs Company LLC

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Ross Harding

Concurred By:

_______________________________ 9-24-08
Mark Selecman, Sampling Manager Date
Commodore Advanced Sciences, Inc.

Approved By:

_______________________________ 9-25-08
Lynn Sims Date
WRRP Program Manager
Bechtel Jacobs Company LLC

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CONTENTS

ACRONYMS

AM	action memorandum
BCBG	Bear Creek Burial Grounds
BCK	Bear Creek Kilometer
BCV	Bear Creek Valley
BJC	Bechtel Jacobs Company LLC
BMP	best management practice
BSWTS	Big Spring Water Treatment System
BYBY	Boneyard/Burnyard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COC	contaminant of concern
CR/PC	Clinch River/Poplar Creek
CRSDB	Chestnut Ridge Sediment Disposal Basin
CRSP	Chestnut Ridge Security Pits
DARA	Disposal Area Remedial Action
D&D	decontamination and decommissioning
DNAPL	dense, nonaqueous-phase liquid
DMIP	Data Management Implementation Plan
DOE	U. S. Department of Energy
DQO	data quality objective
ECD	Environmental Compliance Department
ECP	Environmental Compliance Program
ECRWP	East Chestnut Ridge Waste Pile
EMEF	Environmental Management and Enrichment Facilities
EMP	Environmental Monitoring Plan
EMWMF	Environmental Management Waste Management Facility
ETTP	East Tennessee Technology Park
EWQP	ETTP Water Quality Project (implemented by EMEF)
FCAP	Filled Coal Ash Pond
FS	feasibility study
FY	fiscal year
FYR	Five-Year Review
GAAT	Gunite and Associated Tanks
HFIR	High Flux Isotope Reactor
HRE	Homogeneous Reactor Experiment
IP	integration point
IROD	Interim Record of Decision
ISG	in situ grouting
KHQ	Kerr Hollow Quarry
LEFPC	Lower East Fork Poplar Creek
LLLW	liquid low-level waste
LWBR	Lower Watts Bar Reservoir
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NT	North Tributary
OLFSCP	Oil Landfarm Soil Containment Pad
ORAU	Oak Ridge Associated Universities
OREIS	Oak Ridge Environmental Information System
ORNL	Oak Ridge National Laboratory

ORR	Oak Ridge Reservation
OU	operable unit
PCB	polychlorinated biphenyl
PCCR	Post Construction Completion Report
PEMS	Project Environmental Measurements System
RAR	Remedial Action Report
RCRA	Resource Conservation and Recovery Act of 1976
RER	Remediation Effectiveness Report
RI	remedial investigation
RmAR	Removal Action Report
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SCF	South Campus Facility
SIOU	Surface Impoundment Operable Unit
SRS	sediment retention structure
SWSA	solid waste storage area
TRU	transuranic
UEFPC	Upper East Fork Poplar Creek
UNC	United Nuclear Corporation
VOC	volatile organic compound
WAG	Waste Area Grouping
WEMA	West End Mercury Area
WOC	White Oak Creek
WOCE	White Oak Creek Embayment
WOD	White Oak Dam
WRRP	Water Resources Restoration Program
XWQP	ORNL Water Quality Project (implemented by EMEF)
Y-12	Y-12 National Security Complex
YWQP	Y-12 Water Quality Project (implemented by EMEF)

1. INTRODUCTION

The Oak Ridge Reservation (ORR) Water Resources Restoration Program (WRRP) was established by the U. S. Department of Energy (DOE) in 1996 to implement a consistent approach to long-term environmental monitoring across the ORR. The WRRP has four principal objectives: (1) to provide the data and technical analysis necessary to assess the performance of completed Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) actions on the ORR; (2) to perform monitoring to establish a baseline against which the performance of future actions will be gauged and to support watershed management decisions; (3) to perform interim-status and post-closure permit monitoring and reporting to comply with Resource Conservation and Recovery Act of 1976 (RCRA) requirements; and (4) to support ongoing waste management activities associated with WRRP activities.

Water quality projects were established for each of the major facilities on the ORR: East Tennessee Technology Park (ETTP); Oak Ridge National Laboratory (ORNL), including Bethel Valley and Melton Valley; and the Y-12 National Security Complex (Y-12 Complex *or* Y-12), including Bear Creek Valley (BCV), Upper East Fork Poplar Creek (UEFPC), and Chestnut Ridge. Off-site (i.e., located beyond the ORR boundary) sampling requirements are also managed as part of the Y-12 Water Quality Project (YWQP). Off-site locations include those at Lower East Fork Poplar Creek (LEFPC), the Clinch River/Poplar Creek (CR/PC), and Lower Watts Bar Reservoir (LWBR). The Oak Ridge Associated Universities (ORAU) South Campus Facility (SCF) is also included as an "off-site" location, although it is actually situated on property owned by DOE.

The administrative watersheds are shown in Fig. A.1 (Appendix A). The WRRP provides a central administrative and reporting function that integrates and coordinates the activities of the water quality projects, including preparation and administration of the WRRP Sampling and Analysis Plan (SAP).

Below is a brief summary of the organization of the SAP appendices, which provide the monitoring specifics and details of sampling and analytical requirements for each of the water quality programs on the ORR. Section 2 of this SAP provides a brief overview and monitoring strategy for the ETTP. Section 3 discusses monitoring strategy for Bethel Valley, and Melton Valley background information and monitoring strategy is provided in Section 4. BCV and UEFPC monitoring strategies are presented in Sect. 5 and 6, respectively. Section 7 provides background information and monitoring strategy for all off-site locations.

1.1 SAMPLING AND ANALYSIS PLAN

The WRRP SAP presents the monitoring approach for the WRRP and consolidates the monitoring requirements for each of the three sites and off-site locations. Much of the monitoring presented herein is derived from requirements provided in CERCLA decision and post-decision documents, as well as RCRA post-closure permits.[1]

Monitoring activities for each watershed and off-site locations are summarized in Planning Tables included in Appendix B of the SAP. The Planning Tables provide a summary-level description of specific sample locations within each watershed where monitoring data will be collected during the fiscal year (FY). As the WRRP takes advantage of extensive datasets obtained by other programs, the sampling programs providing those data are also identified in Appendix B tables. These tables present general information for each sampling location of interest to the WRRP, including media to be sampled, class of analytes [e.g., volatile organic compounds (VOCs), metals, or radiological], sampling frequency, and

[1] The post-closure permit for RCRA-regulated areas of SWSA 6 in Melton Valley remains pending as of October 1, 2008. Monitoring is performed to comply with interim-status requirements.

rationale for sampling. One table within Appendix B is devoted to each administrative watershed. To facilitate cross-referencing, the Appendix C Sample Group is also provided in Appendix B tables.

Appendix C includes the Administrative Sample Groups, which are subwatershed-level groups established for the purpose of managing the sampling work conducted by the WRRP. Monitoring conducted by other programs on the ORR are not included in Appendix C. Sample groupings are generally based on proximity of sampling locations in the field, the necessity of obtaining contemporaneous data to measure remedial performance, timing of sampling conducted by other programs, etc. In addition, sample locations are grouped together based on their regulatory driver. Because RCRA permit-driven monitoring is usually sampled first within the indicated sampling period, a separate table (Table C.6) is devoted to RCRA post-closure monitoring at Y-12. In addition, biological monitoring has been grouped together into a separate table (Table C.8) to better track implementation. Lastly, any future monitoring planned by the WRRP has been grouped into Table C.9 for tracking purposes. The specific analyte/parameter group for each sampling point is also identified in Appendix C. These analytes/parameters are grouped into Administrative Parameter Groups that are defined in Appendix D tables.

Appendix D includes all the Administrative Parameters Groups used to identify analytical requirements for individual WRRP sample locations. Table D.1 provides a listing of the principal WRRP parameter groups per media and their associated analytes, as well as identifies the corresponding table containing information about the parameter group. These tables identify the required analytical methods and quantitation levels for each individual analyte within the group.

Protocols for obtaining accurate and reliable flow data and flux measurements are provided in Appendix E.

All modifications to the SAP made during the course of the FY must be initiated by the appropriate WRRP technical lead, and require prior approval by the WRRP Manager or his/her designee. Modifications will be documented as addenda to this plan and are distributed to controlled-copy document recipients. The form "Addendum to the Sampling and Analysis Plan for the Water Resources Restoration Program Plan Fiscal Year 2009" will be used for this purpose. Appendix F provides a blank addendum form, along with instructions on initiating and processing a SAP addendum.

1.2 DATA MANAGEMENT AND QUALITY ASSURANCE

Monitoring data and meta-data generated by WRRP sampling activities, together with appropriate historical data required for data analysis and interpretations are managed using the Project Environmental Measurements System (PEMS) and the Oak Ridge Environmental Information System (OREIS). The Data Management Implementation Plan (DMIP) [Bechtel Jacobs Company LLC (BJC 2007a)] serves as the project-level plan for managing all data collected by the WRRP. This plan outlines the data management requirements for the program, following the requirements of *Developing, Implementing, and Maintaining Data Management Implementation Plans* (BJC-ES-1003). The plan outlines the program's data management activities, roles and responsibilities, and identifies data management interfaces among the various programs on the ORR involved in data acquisition, management, and reporting.

The Quality Assurance Project Plan for the WRRP (BJC 2007b) includes requirements for sample collection, laboratory analysis, and data management activities to ensure that appropriate levels of quality assurance and quality control are achieved. This plan identifies the procedures that will be followed in the collection, custody, and handling of samples and environmental/laboratory data used in the WRRP.

2. EAST TENNESSEE TECHNOLOGY PARK

2.1 BACKGROUND

The ETTP, formerly known as the Oak Ridge K-25 Site, originally served as the location of the Oak Ridge Gaseous Diffusion Plant. The plant was shut down permanently in 1987, and the current mission of ETTP is to reindustrialize and reuse site assets through leasing of vacated facilities. ETTP, comprised of several hydrologic watersheds, has been designated as a single watershed primarily for administrative purposes (Fig. A.1).

The ETTP is located about 12.9 km (8 miles) southwest of the population center of Oak Ridge, adjacent to the Clinch River in the northwest corner of the ORR. The site occupies ~ 688 ha (2200 acres) in East Fork Valley, bounded by Black Oak Ridge to the north, Pine Ridge to the south, and McKinney Ridge to the east. The Clinch River bounds the site on the west, and Poplar Creek, a tributary to the Clinch River, meanders through the site. Buildings occupy ~ 71 ha (176 acres), while paved roads and parking lots occupy another 95 ha (236 acres). Forested areas are limited to the Duct Island Peninsula and the slopes of Pine Ridge, Black Oak Ridge, and McKinney Ridge.

The hydrogeologic framework of ETTP is characterized by complex geology, large-scale cut and fill, transient interactions with bounding surface water bodies, and a high degree of anthropogenic influences, including building sumps, french drains, and leaking subsurface utilities. Groundwater quality at ETTP is characterized by the widespread occurrence of VOCs, with discrete areas of radiological contamination and minor metals contamination. Surface water, monitored at the weirs for the three major surface water discharges and at storm drain outfalls, also contains evidence of contamination. Constituents that have been detected in the past include polychlorinated biphenyls (PCBs) at the K-1007-B and K-1700 weirs, VOCs at the K-1700 weir and storm drains discharging to Mitchell Branch, metals and radionuclides at all three weirs. However, in general, surface water discharged from ETTP does not exceed applicable water quality standards.

Most of the completed remedies at the ETTP to date have been single-action project decisions to address primary sources of contamination or primary release mechanisms. Concurrent with these actions, decontamination and decommissioning (D&D) of most buildings at the ETTP is occurring under CERCLA removal authority. While these actions ultimately help to reduce contaminant loading or minimize the potential for future releases to exit pathways from ETTP, the goals of many of these actions have not included specific, measurable performance criteria for reductions in flux or risk in surface water and groundwater at the watershed scale. A second set of decisions at the ETTP relate to soil, buried waste, and subsurface structures. Through the Zone 1 and Zone 2 Records of Decision (RODs), decisions have been made on these media for the protection of human health and to limit further contamination of groundwater.

A remedial investigation/feasibility study (RI/FS) is underway that addresses sitewide residual contamination not addressed in previous CERCLA decisions at the ETTP. This sitewide decision will address groundwater remediation, downgradient surface water and sediment remediation, and any additional soil remediation necessary to protect groundwater and ecological receptors. To allow for a quick decision and less potential for schedule delays, the two major pond networks (K-901 and K-1007), the K-720 slough, and the K-770 Embayment decisions have been moved into a parallel removal action decision process.

2.2 MONITORING STRATEGY

Three main categories of monitoring are conducted at ETTP: (1) performance assessment monitoring; (2) exit pathway monitoring; and (3) interior monitoring near the source units. The FY 2009 sampling locations are shown on Fig. A.2 and are provided in Table B.1. Table C.1 includes monitoring details for each sampling location implemented by the ETTP Water Quality Program (EWQP). Surface water monitoring objectives of the ETTP environmental compliance programs frequently overlap with those of the EWQP. Therefore, to avoid a duplication of efforts, the EWQP will use monitoring data collected by the compliance organizations whenever possible.

Performance monitoring is conducted in Zone 2 at the K-1070-C/D area until a site-wide ROD is finalized. Wells TMW-011, UNW-064, and UNW-114 are monitored semiannually for VOCs. The ROD for the K-1070-A Burial Ground does not specifically require monitoring but implies that monitoring will be initiated if contaminants are observed in Spring 21-002. The Remedial Action Report (RAR) for the K-1407-B/C Ponds proposes semiannual groundwater monitoring for nitrate, metals, and selected radionuclides. Because VOCs are the primary contaminant in the Mitchell Branch area, they are also included. With regulator concurrence, monitoring is conducted in wells UNW-009, UNW-003, and the Mitchell Branch weir (K-1700 Weir). Annual biological monitoring in both ponds K-1007-P1 and K-901-A is intended to evaluate bioaccumulation trends of PCBs.

Sample locations have been included to provide exit pathway monitoring data for the K-901 Pond, the K-1007-P Ponds, the Mitchell Branch area, the K-27/29 area, the K-770 area, the K-1070-F area, the K-1064 area, and the K-31 area. Exit pathway locations reflect: (1) direct discharge, or the potential for direct discharge, to the CR/PC; or (2) DOE surveillance monitoring requirements.

Interior monitoring locations have been selected at the K-1070-A Burial Ground, the K-1070-C/D area, the Mitchell Branch area, the K-25 area, the K-1401 area, the K-1413 area, the K-1035 area, and the K-27/29 area. Interior monitoring at these locations is focused on providing data for evaluating changes in contaminant concentrations near the source units or potentially discharging to surface water within the boundaries of the ETTP, and to support potential watershed management decisions that might result from future ETTP CERCLA decision documents.

Completed D&D actions that have left concrete slabs in-place prescribe interim monitoring performed by the ETTP Environmental Compliance program in accordance with 10 CFR 835, DOE Orders 450.1 (DOE 2003a.) and 5400.5 (DOE 1993b), as well as the National Pollutant Discharge Elimination System (NPDES) storm water permit, until remediation is complete. Storm water runoff from concrete pads in not sampled directly, but instead relies on a radiation contamination control and surveillance program (radiological postings and periodic surveys). The Environmental Compliance Program (ECP) determines the effectiveness of the radiological control program through the ongoing storm drain outfall sampling and instream water sampling, as appropriate. A summary of these monitoring results are provided to the Remediation Effectiveness Report (RER) annually. Changes to the NPDES permit supersede requirements of any Removal Action Report (RmAR) for D&D actions, unless specified otherwise. This monitoring is considered a check on the radiation control program and is, therefore, considered part of the engineering controls for the site.

3. BETHEL VALLEY

3.1 BACKGROUND

The Bethel Valley area is a 1734-acre area defined by the upper drainage area of White Oak Creek (WOC) and its tributaries in Bethel Valley. Bethel Valley is the site of the main plant of the ORNL (Fig. A.1). Weapons research facilities were established at ORNL in 1943 as part of the World War II Manhattan Project. ORNL's original mission was to produce and chemically separate the first gram quantities of plutonium as part of the national effort to produce the atomic bomb. As its role in the development of nuclear weapons decreased over time, the scope of work at ORNL expanded to include production of radioactive isotopes, fundamental research in a variety of sciences, research involving hazardous and radioactive materials, environmental research, and radioactive waste disposal. ORNL's historical missions have produced a diverse legacy of contaminated inactive facilities, waste disposal areas, and secondary contaminated media.

The primary environmental contaminants of concern (COCs) include ^{3}H and ^{90}Sr, which exit Bethel Valley at 7500 Bridge and Raccoon Creek, and several contaminants associated with reactor discharge, including uranium (various isotopes) and ^{137}Cs. Mercury and PCBs are monitored under NPDES permits, but they are present in far lower quantities than radionuclides. Following are the primary issues within Bethel Valley:

- Strontium-90 and uranium releases in the area known as Core Hole 8. The Core Hole 8 Plume releases contaminants to First Creek. First Creek enters WOC, which flows to White Oak Dam (WOD). The source of the Core Hole 8 Plume is Tank W-1A and associated contaminated soil in the North Tank Farm.

- Several small point and non-point releases exist in Bethel Valley, including releases from surface impoundments and from the plant site, that enter the storm drain system. The sources of some of these releases include small, localized groundwater plumes.

Most of the completed actions within Bethel Valley have been single-action decisions that were implemented to address sources of releases, reduce migration of off-site contamination, or remove high-inventory radiological waste sources [e.g. inactive liquid low-level waste (LLLW) tanks and Gunite and Associated Tanks (GAAT) projects]. While the remedies have helped to reduce contaminant loading or minimize the potential for future releases to exit pathways from Bethel Valley, the goals of most of these actions have not included specific, measurable performance criteria. Only the Corehole 8 Removal Action included goals for an interim measure to reduce ^{90}Sr-contaminated groundwater into WOC. Remedial actions prescribed in the ROD for Interim Actions in Bethel Valley (DOE 2002a) have not been implemented and, therefore, do not have action-specific monitoring requirements. Goals to reduce contaminant flux at the Bethel Valley exit pathway (i.e., 7500 Bridge) are addressed as part of Melton Valley monitoring requirements and are not included here.

3.2 MONITORING STRATEGY

The X-10 Water Quality Project (XWQP) sampling locations for FY 2009 in Bethel Valley are shown on Fig. A.3 (Appendix A) and are listed in Tables B.2 and C.2 (Appendices B and C, respectively). There are no major changes to the Bethel Valley water sampling protocol for FY 2009, pending review of the watershed monitoring strategy. This review will be conducted in conjunction with design of the remedial actions specified in the ROD for interim actions in Bethel Valley (DOE 2002a).

Surface Water Monitoring. The Bethel Valley administrative watershed includes the upper WOC drainage basin and three small watersheds that drain directly to the Clinch River: (1) Raccoon Creek (west of the plant site); (2) Bearden Creek (east of the plant site); and (3) an unnamed watershed (southwest of the plant site). XWQP surface water monitoring locations include sites that monitor the primary exit pathways (Raccoon Creek, and Bearden Creek; Note that WC7500 is included in the Melton Valley tables), interior sites associated with the major sources of surface and shallow groundwater releases (e.g., Northwest Tributary and non-rad treatment), and one location that supports evaluation of the Core Hole 8 plume performance assessment (First Creek). Primary analytes for surface water monitoring include radiological parameters and metals. Some locations are also monitored for NPDES parameters by the ORNL Office of Environmental Protection.

Groundwater Monitoring. The groundwater monitoring network for FY 2009 in Bethel Valley consists of a few wells identified as discrete point-source or plume-monitoring locations that track releases to surface water from the main plant area. The Core Hole 8 plume is monitored via groundwater monitoring wells for which ^{90}Sr and uranium are the primary COCs. The Core Hole 33 plume on the eastern side of the main plant area is monitored via two monitoring wells (CH-33 and 4585). Primary COCs for this plume are also ^{90}Sr and uranium. Two wells (0875 and 1102) are used to monitor the quality of groundwater in the vicinity of the surface impoundments and to evaluate the effectiveness of the Surface Impoundments Operable Unit (SIOU) remedial action. Westbay® multi-port well 4579 is routinely monitored in Raccoon Creek as an exit pathway.

4. MELTON VALLEY

4.1 INTRODUCTION

Melton Valley lies within the southeastern portion of the ORR, approximately 16 km (10 miles) southwest of the population center of Oak Ridge (Fig. A.1). Melton Valley is one of two valleys that comprise the ORNL land area and the WOC Watershed. WOC begins in Bethel Valley and drains through Melton Valley before entering the Clinch River drainage system. The two valleys meet at the 7500 Bridge monitoring station, located in the water gap in Haw Ridge.

4.1.1 Regulatory Background

The first CERCLA action on the ORR took place in 1990 to control releases of cesium-contaminated sediments into the Clinch River with the development of the sediment retention structure (SRS) on the White Oak Creek Embayment (WOCE). In 2007, Melton Valley completed the first major watershed-scale CERCLA accelerated closure process with completion of the requirements of the Melton Valley Interim ROD, signed in September 2000 by the Oak Ridge Federal Facility Agreement managers (DOE 2000a). In October 2003, DOE and its contractor, BJC, signed a contract that formally provided the funding and the mechanism for accelerating closure of the Melton Valley ROD actions. Table 4.1 provides a summary of completed and deferred actions.

Monitoring requirements for Melton Valley are provided in a ROD-required monitoring plan (DOE 2006a), the primary source for information presented in this section of the SAP.

4.1.2 Site Characteristics

The WOC Watershed is delineated by four primary subwatersheds separated by major surface water monitoring weir locations: Upper WOC (Bethel Valley) monitored at 7500 Bridge (also known as WC 7500), Middle WOC monitored at WOC Weir, Melton Branch monitored at MB Weir, and Lower WOC delineated by the WOD Weir. All but the 7500 Bridge fall within Melton Valley.

Most of the waste units in Melton Valley lie within the Nolichucky Shale and the Maryville Limestone geologic formations, which are aquitard formations within the Conasauga Group. Shallow groundwater and surface water are tightly coupled, resulting in a large fraction of rainwater (> 95%) moving through

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Table 4.1. Melton Valley Watershed completed remedial actions

Project	Project task	Major remedial actions
Hydrologic Isolation	SWSA 4 Cap	• Removed IHP soil and restored impacted wetlands • Hydraulically isolated SWSA 4 and Pit 1 • Removed portions of LLW line
	Balance of Caps	• Hydraulically isolated SWSA 5 South and neighboring waste units (e.g., OHF area) • Capped the four trenches in the northeast corner of SWSA 5 North • Hydraulically isolated SWSA 6 • Hydraulically isolated Pit 2, Pit 3, Pit 4, Trench 6, and secondary contaminated soil areas • Plugged and abandoned the shallow monitoring (non-hydrofracture) wells • Grouted HRE fuel wells
Soils and Sediments	NA	• Remove contaminated sediment at the four HFIR Ponds • Remove backfill and contaminated soil at the HRE Pond • Removed miscellaneous contaminated soil that exceeded remediation levels • Grouted LLW transfer pipelines • Removed contaminated floodplain soil with an exposure level > 2500 µR/h
TRU Trenches and Tanks Remediation	Trench remediation	Managed the contaminated soil from the lower 22 trenches in SWSA 5 North (removal of the buried TRU waste will be performed separate from the remedy under DOE authority)
Trenches 5 and 7	NA	In situ grouted Trenches 5 and 7
MV Closure HF and Small Facilities D&D	Hydrofracture Well P&A	Plugged and abandoned the HF injection and monitoring wells
	OHF D&D	Demolished OHF site surface facilities
	NHF D&D	Demolished NHF site surface facilities
	Small facilities	Demolished the Alpha Greenhouse Facility, the Pilot Pits structure, and the Decontamination Facility, Grouted and disposed of the five STTs, Demolished HRE ancillary facilities
MSRE D&D	NA	ESD, August 2005 (DOE/OR/01-2249&D1) Deleted MSRE Ancillary Facilities from selected remedy
MV ROD Special Studies[a]	TRU Waste Engineering Study	Completed TRU waste engineering study
	Ecological Survey	Closure on issue deferred to the final ROD for MV
	Watershed Integration Monitoring Plan	Prepared watershed integration surface water and groundwater monitoring plan, updated to include MV post-cap monitoring
	Floodplain Soil Survey	Completed floodplain soil investigation

Note The *project* or *project task* generally corresponds to the anticipated work packages to be put out for competitive bid These subprojects and tasks are based on the life cycle baseline development that is modified and updated at least annually

[a] The subproject MV ROD Special Studies is an exception to the note above in that it is not part of the current life cycle baseline It was invented for this document as a convenient way of grouping four special studies or evaluations required by the ROD and separating them from other construction packages Each of the four studies is in the life cycle baseline but is part of other subprojects

ESD = Explanation of Significant Difference
HF = hydrofracture
HFIR = High Flux Isotope Reactor
HRE = Homogeneous Reactor Experiment
IHP = Intermediate Holding Pond
LLW = low-level waste
MSRE = Molten Salt Reactor Experiment
MV = Melton Valley
NA = not applicable
NHF = New Hydrofracture Facility
OHF = Old Hydrofracture Facility
P&A = plugging and abandonment
STT = shielded transfer tank
SWSA = Solid Waste Storage Area
TRU = transuranic

the shallow groundwater to the surface water system and across WOD. There is a small percentage of water that may intersect groundwater fractures and move along strike through the groundwater system.

Because shallow groundwater release to surface water is the primary component of the Melton Valley contaminant release model, environmental monitoring in the Melton Valley Watershed has focused on surface water, with emphasis on WOD and on the major surface water sites within the watershed.

Melton Valley is the location of several large waste disposal areas that received waste from over 50 years of operation, production, and research activities at ORNL. Melton Valley also served as the U. S. Atomic Energy Commission's Southern Regional Burial Ground for wastes from over 50 other facilities. The major burial grounds are solid waste storage areas (SWSAs) 4, 5, and 6, where wastes were buried primarily in unlined trenches and auger holes. SWSAs 4 and 5 contain over 1 million ft^3 of solid waste. All three of these waste areas were capped as part of the Hydrologic Isolation project under the Melton Valley ROD (DOE 2000a). The SWSA 4 cap was completed in 2004–2005. The SWSA 5 and SWSA 6 caps were completed in 2006. Additional significant contaminated areas include the seepage pits and trenches (Pits and Trenches) in the Waste Area Grouping (WAG) 7 area of the valley, the Homogeneous Reactor Experiment (HRE) Pond, the High Flux Isotope Reactor (HFIR), and the floodplain soils and sediments of the WOC floodplain. The Pits and Trenches were capped under the Melton Valley ROD, with the exception of Trenches 5 and 7, which underwent *in situ* grouting (ISG) then capped. Contaminated media were excavated from the HFIR and HRE Ponds beginning in 2004; regarding and seeding was completed in 2006.

The primary COCs in the valley are tritium, ^{90}Sr, ^{137}Cs, and ^{60}Co. Tritium and ^{90}Sr were placed in most of the shallow burial areas of SWSAs 4, 5, and 6. The worst contaminant releases typically originate within trenches that are perennially inundated. Cesium-137 was present primarily in soils of the WOC floodplain, having been deposited on the creekbed through years of process releases from ORNL. The major hazard associated with ^{137}Cs was the potential for direct gamma radiation exposures and sediment-bound migration to the Clinch River. Much of the ^{137}Cs in the WOC floodplain was removed in FY 2002 and FY 2003. Alpha emitters, primarily uranium and transuranic (TRU) elements, are present in some locations of the valley but do not show up routinely in surface water.

4.2 MONITORING STRATEGY

XWQP sampling locations for FY 2009 in Melton Valley are shown on Fig. A.4 and are listed in Table B.3 (Appendix B). Monitoring details are provided in Table C.3. The monitoring strategy for Melton Valley is based on the revised monitoring plan for the Melton Valley ROD (DOE 2006a). The primary objectives for the FY 2009 Melton Valley monitoring are as follows:

- Measure progress toward achieving the watershed ROD remedial action objectives;
- Perform post-action monitoring for specific watershed ROD actions (e.g., Hydrologic Isolation, Soils and Sediment);
- Perform RCRA groundwater assessment monitoring at SWSA 6; and
- Provide monitoring support to the active waste sites in Melton Valley.

Watershed ROD Monitoring. Several types of surface water monitoring are required as part of the watershed ROD monitoring plan:

- Base-flow grabs will be collected at the major watershed and subwatershed exit points to track progress toward meeting ambient water quality criteria (in the year prior to the FYR) and surface water remediation levels. These locations include the SRS, WOD, Melton Branch Weir, WOC Weir, West Seep Weir, and others. These stations take on an additional role of acting as post-remediation monitoring points for the Melton Valley Hydrologic Isolation project.

- Flow-proportional samples and continuous flow data are collected at the major Melton Valley weirs to determine the impact to the temporal and spatial distribution of contaminant releases that CERCLA ROD actions have had on contaminant sources in the watershed. Locations include WOD, Melton Branch Weir, WOC Weir, 7500 Bridge, and WAG 6 MS3. Flux is estimated at the West Seep Weir, obtaining a grab sample with instantaneous flow measurement.

Sampling occurs at various locations to support specific source remedial actions:

- Post-action surface water sampling is implemented around the SWSA 5, SWSA 6, and Pits and Trenches source actions;
- Groundwater-level monitoring occurs in piezometers throughout the Hydrologic Isolation project area, as well as in the upgradient and downgradient collection trenches surrounding the caps;
- Post-excavation surface water sampling occurs downstream of the HFIR and HRE Ponds excavation actions; and
- Monitoring continues in support of the Trenches 5 and 7 ISG action.

Other Monitoring. Monitoring continues at the sumps and groundwater wells of the Tumulus Technology Demonstration Project in SWSA 6. It is anticipated that tumulus pad drains will eventually become dry as a result of the SWSA 6 cap.

Groundwater monitoring continues semiannually at RCRA groundwater quality wells at SWSA 6, in accordance with interim status requirements (permit pending as of October 1, 2008).

Groundwater samples are collected to support waste management activities, including those at the tumulus and the SWSA 6 Interim Waste Management Facility.

5. BEAR CREEK VALLEY

5.1 BACKGROUND

The Bear Creek administrative watershed encompasses the portion of BCV extending from the west end of Y-12 westward to approximately 0.4 km (0.25 mile) west of Highway 95 (enclosed between Pine Ridge and Chestnut Ridge [Fig. A.1]). The hydraulic catchment area of Bear Creek includes this administrative watershed and an area further downstream located between the Bear Creek water gap in Pine Ridge and LEFPC.

BCV contains three former waste disposal areas that historically accounted for more than 95% of the radiological and inorganic contamination that currently leaves the valley (DOE 1997b). These sites are the Boneyard/Burnyard (BYBY), the S-3 Site, and the Bear Creek Burial Grounds (BCBGs). All of these sites are located in the upper one-third of the valley and released contaminants to surface water and groundwater. In addition to releases from these known waste areas, the Maynardville Limestone also contains commingled plumes of VOC-contaminated groundwater from multiple sources.

The Maynardville Limestone, Bear Creek, and the tributaries represent the downgradient pathways and receptors of contaminants migrating away from waste sites in the Bear Creek watershed. The principal COCs in the exit pathway are uranium, nitrate, and VOCs. Cadmium is an ecological COC in the section of Bear Creek near the S-3 Site, and mercury has been an ecological COC in North Tributary (NT)-3. Contamination in surface streams and contaminant plumes in groundwater derived from individual sources commingle in the exit pathway downstream of the sources.

Contaminant sources and transport pathways to Bear Creek and the Maynardville Limestone include the following:

- Uranium from the S-3 Site enters Bear Creek and groundwater within the Maynardville Limestone via transport in shallow groundwater. These pathways (Pathways 1 and 2) accounted for approximately 30% of uranium migrating in Bear Creek and the Maynardville Limestone at the integration point (IP) during FY 2002 monitoring. In addition, nitrate, ^{99}Tc, metals, and VOCs discharge to NT-1 and NT-2 from the S-3 Site via Pathway 3.

- Before remediation of BYBY, uranium- and mercury-contaminated water discharged from the buried wastes at this site to NT-3. This was the largest source for uranium in Bear Creek and the Maynardville Limestone. BYBY also discharged mercury to NT-3. Following completion of the BYBY remediation, the uranium flux contribution decreased to approximately 3%.

- Uranium waste and dense, nonaqueous-phase liquid (DNAPL) in groundwater at the BCBG are sources of VOCs and uranium in groundwater, which discharges to NT-7 and NT-8. Most VOCs derived from the BCBG volatilize before reaching Bear Creek, and a large proportion of uranium-contaminated leachate is captured by two leachate collection systems.

- Adjacent to BYBY and Sanitary Landfill I, a losing reach of Bear Creek marks a zone of groundwater recharge that is the principal pathway carrying VOCs, uranium, ^{99}Tc, and nitrate in surface water and shallow groundwater to intermediate and deep groundwater in the Maynardville Limestone.

- A past release of trichloroethene (TCE) to groundwater in the vicinity of the Rust Spoil Area has caused a plume of TCE to develop in the Maynardville Limestone.

The ROD for Phase I activities in BCV (DOE 2000b) was approved in June 2000. The selected remedy described in the ROD involves actions at four facilities in BCV: the S-3 Site, the BYBY, the Oil Landfarm Soil Containment Pad (OLFSCP), and the Disposal Area Remedial Action (DARA) facility. Remedial actions at the BYBY were completed in December 2002 and involved the excavation and disposal of 64,000 yd^3 of contaminated soil, excavation and capping of an additional 22,000 yd^3 of soil, and restoration of NT-3 following completion of the action. In addition to the Phase I ROD, four CERCLA actions have been completed in the BCV administrative watershed: (1) Spoil Area 1 and SY-200 Yard [Bear Creek Operable Unit (OU) 2 Remedial Action (DOE 1996a)]; (2) S-3 Site Tributary Interception Removal Action (Pathways 1 and 2) [DOE 1999a]; (3) Burial Ground D-East Revegetation Removal Action (DOE 2003a); and (4) the ROD for the Environmental Management Waste Management Facility (EMWMF) [DOE 1999b]. In addition, the WAG 11 (White Wing Scrapyard) Surface Debris Remedial Action (DOE 1993c) is located in the hydraulic catchment area of Bear Creek downstream of the administrative section of the watershed.

The ROD for Phase I activities in BCV (DOE 2000b) specifies performance monitoring for component actions, as well as monitoring to evaluate attainment of resource use goals for the valley. As of FY 2009, however, only the OLFSCP and the BYBY actions have been completed. The approved

Phased-Construction Completion Report (PCCR) for these actions referenced the draft Remediation Performance Monitoring Plan for BCV that was included as Appendix C of the Remedial Design Work Plan for Phase I activities in BCV (Appendix C, DOE 2001). This Monitoring Plan provided a detailed rationale for selection of environmental monitoring locations based on actions completed and scheduled at the time of Phase I ROD approval. Although the Monitoring Plan was never approved by the regulators, the monitoring actions relevant to the BYBY are considered required under CERCLA, as the plan was referenced in the approved PCCR for BYBY. Required monitoring included uranium flux and mercury measurements, and biological monitoring at NT-3, as well as stream channel stability and vegetation recovery monitoring. However, in March 2007, regulator concurrence was obtained to discontinue flow-paced composite sampling at NT-3 and replace it with monthly grab sampling for isotopic uranium. In addition, both the stream channel stability and riparian vegetation recovery monitoring were completed in FY 2008. Other monitoring included in the BCV Monitoring Plan is conducted at an appropriate frequency for baseline purposes until other Phase I ROD actions are implemented.

DOE conducted data quality objective (DQO) meetings in March 2003 to review and optimize the monitoring requirements for BCV. In these meetings, changes were made to the monitoring program based on the results of monitoring reported in the RER. These changes were detailed in a July 2003 letter to the U. S. Environmental Protection Agency and the Tennessee Department of Environment and Conservation and were incorporated into the SAP. The 2006 CERCLA five year review (FYR) used data collected in accordance with the BCV Monitoring Plan. Based on remedy performance assessment, recommendations were made in the 2006 FYR (DOE 2006b) to optimize monitoring. Along with these changes, approval was obtained to shut down the S-3 Site Tributary Interception Removal Action (Pathways 1 and 2) and reduce the associated monitoring. All monitoring associated with the Pathways 1 and 2 treatment system, with the exception of BCK 12.34, was discontinued when an Addendum to the RmAR (DOE 2007) was approved by the regulators in June 2007. This FY 2009 SAP incorporates these changes.

Bear Creek surface water station Bear Creek kilometer (BCK) 9.47 and spring SS-5 combined flows were originally selected as the contaminant IP for the watershed. The IP is the location for measuring the total flux of contaminants leaving the waste disposal sites in groundwater and surface water. More than 99% of contaminants exiting the former disposal sites pass by the IP, which is located downstream of the BCBG. In 2001, a new monitoring station was constructed at BCK 9.2, downstream of BCK 9.47/SS-5, to provide a more accurate assessment of contaminant flux leaving the valley. Engineering improvements to BCK 9.2 were conducted in FY 2004, and calibration of flow-rating curves was completed in FY 2005. The transition to BCK 9.2 as the watershed IP was completed during FY 2007, and continuous flow-paced monitoring of BCK 9.47/SS-5 for uranium has been discontinued.

Monitoring conducted for the EMWMF is governed by an Environmental Monitoring Plan (EMP) [DOE 2002b] outlining requirements for groundwater, surface water, stormwater, leachate, and ambient air monitoring. EMWMF monitoring is performed by the operating contractor. The ROD for WAG 11 (DOE 1992), the ROD for BCV OU 2 (DOE 1996a), and the Removal Action for Burial Ground D-East (DOE 2003a) do not have monitoring requirements associated with them.

5.2 MONITORING STRATEGY

The principal goal for the YWQP monitoring in FY 2009 is to meet the monitoring requirements specified by the ROD for Phase I activities in BCV (DOE 2000b) and the PCCR for the BYBY (DOE 2003b), as modified by subsequent approved changes. Additional monitoring is conducted to obtain baseline data that will be used to determine performance of future actions.

YWQP will also conduct monitoring required under the RCRA post-closure permit for the Bear Creek Hydrogeologic Regime (TNHW-116). Monitoring for the EMWMF is performed by the operating contractor in accordance with the EMP (DOE 2002b) and is not included in this SAP. Beginning with 2009, a summary of EMWMF monitoring results will no longer be included in the RER.

Monitoring locations in BCV are subdivided into those that monitor contaminant migration in the exit pathway, those that monitor groundwater and surface water close to the source units, and those that are required by RCRA post-closure permits. YWQP sampling locations for FY 2009 in BCV are listed in Tables B.4 and C.4 (and Table C.6 for RCRA post-closure monitoring) and shown on Fig. A.5. Surface water and groundwater monitoring objectives of the Y-12 Environmental Compliance Department (ECD) programs frequently overlap with those of the YWQP. Therefore, to avoid duplication of efforts, the YWQP will, whenever possible, use monitoring data that are collected by the Y-12 ECD from common locations. Those Y-12 ECD monitoring locations from which data are used for the purposes of remediation performance assessment are also shown in Table B.4 and on Fig. A.5. Biological monitoring within Bear Creek and selected tributaries is also included in Table B.4 and shown on Fig. A.5.

6. UPPER EAST FORK POPLAR CREEK WATERSHED (INCLUDING CHESTNUT RIDGE AREA)

6.1 BACKGROUND

The UEFPC Watershed encompasses the UEFPC drainage basin, inclusive of the Y-12 industrial facilities. A portion of Chestnut Ridge that lies immediately south of Y-12 (Fig. A.1) is also administered by the YWQP and is included in this section. In terms of hydrogeology, however, these two areas are separate entities.

UEFPC Watershed

The UEFPC Watershed includes the portion of BCV in the eastern portion of the ORR extending from the west end of Y-12 to the eastern boundary of the ORR along Scarboro Road (Fig. A.1). The watershed also includes that portion of Union Valley between Scarboro Road and Illinois Avenue encompassing the known extent of a VOC plume that has migrated off the ORR to the east of Y-12. The drainage area of the UEFPC Watershed is about 473 ha (1170 acres). The UEFPC Watershed is dominated by the heavily industrialized portions of Y-12, which occupy about 324 ha (800 acres) of the watershed.

The UEFPC Watershed contains multiple contaminant source areas, including waste disposal sites, former and current operations areas (buildings), and the storm drain system, which contains contaminated sediments. Groundwater contaminants from multiple source areas have commingled to form an essentially continuous plume with locally variable composition, depending on the contaminant signatures of contributing source areas. The Maynardville Limestone, storm drain network, and UEFPC represent the principal contaminant migration pathways and receptors of contaminants migrating from sources within the drainage basin.

In the western portion of Y-12, nitrate, ^{99}Tc, metals, and radionuclides from the former S-3 Site migrate along comparatively short, shallow groundwater flow paths and discharge to the former UEFPC tributary network, which is captured in storm drains. Nitrate and ^{99}Tc have also migrated at depth in bedrock along geologic strike to the east and are captured by building sumps located in the western portion of the complex. These sump effluents are treated to remove mercury and discharged to the storm drain network. Direct contaminant migration to the Maynardville Limestone also occurs (e.g., nitrate and metals from the S-2 Site); however, in this migration pathway, contaminants rapidly attenuate downgradient. Multiple VOC sources in the western portion of the complex (i.e., Fire Training Facility; Salvage Yard; Waste Coolant Processing Area; Bldgs. 9204-4, 9201-5, and 9201-4; Rust Garage Facility; and S-2 Site) contribute to shallow groundwater contamination that migrates to storm drains, building sumps, and directly to the Maynardville Limestone. Localized areas of metals and radiological contamination (primarily uranium) exist adjacent to several sources but rapidly attenuate through sorption and dilution in the shallow groundwater system.

In the central portion of the complex, contaminant sources contribute primarily VOCs (in the vicinity of Bldgs. 9212, 9204-2, and 9731) to groundwater. Principal flow paths are within shallow bedrock and fill materials parallel to strike until interception by the storm drain network and subsequent discharge to UEFPC and the Maynardville Limestone.

In the eastern portion of the complex, undefined historical releases resulted in residual DNAPLs that act as secondary sources in the shallow groundwater system near Bldg. 9720-6 and at depth within the Maynardville Limestone (i.e., east-end carbon tetrachloride plume). Contaminants migrate in shallow groundwater within the Maynardville Limestone, and are captured by the underdrain system beneath the UEFPC diversion channel, which discharges to UEFPC. Most VOCs volatilize prior to reaching the watershed surface water exit point (Station 17). In the intermediate and deep groundwater intervals of the Maynardville Limestone [30.5 to 152 m (100 to 500 ft)], contaminants migrate east along geologic strike into Union Valley. Upwelling and discharge to springs in Union Valley and the headwaters of Scarboro Creek represent the discharge points for this pathway. An early action was completed in October 2000 to intercept the VOC plume in the eastern portion of the complex through groundwater extraction and treatment.

The principal surface water contaminants in UEFPC are mercury and uranium. Mercury enters UEFPC primarily through outfalls draining former mercury use areas, as well as from partitioning from historically contaminated stream sediments. The greatest contributions are from outfalls in the western portion of the complex that drain the Western Mercury Use Area (i.e., Bldgs. 9201-4, 9201-5, and 9204-4) and Bldg. 9201-2 in the eastern portion of the complex. The Big Spring Water Treatment System (BSWTS) was constructed to treat discharge from Outfall 51 and water from the Bldg. 9201-2 sumps. In FY 2006, treatment of shallow groundwater discharge through BSWTS resulted in ~50% reduction in Hg flux at Station 17 (IP). Uranium contributions to UEFPC occur from a variety of outfalls sourced from former production areas and contaminated storm sewers, as well as from partitioning from historically contaminated stream sediments. Long-term trending of total uranium concentrations has also shown a declining trend at Station 17.

Chestnut Ridge Hydrogeologic Regime

The Chestnut Ridge Hydrogeologic Regime is composed of the drainage basins (subwatersheds) of five tributaries that feed directly into the Clinch River (Melton Hill Reservoir). These basins encompass an area of about 740 ha (1800 acres). The northern boundary lies along the crest of Chestnut Ridge south of Y-12, and the southern boundary is Bethel Valley Road. The western boundary is a tributary west of Centralized Sanitary Landfill II, informally referred to as Dunaway Branch. The eastern boundary is coincident with that of the ORR at Scarboro Road. In general, groundwater flow occurs within karst solution features and fractures within the Copper Ridge Dolomite. Groundwater flow occurs west to east along the crest of Chestnut Ridge. Strike-normal flow from the crest of the ridge to adjacent valleys to the northwest (Bear Creek) and southeast (Bethel Valley) has been documented with likely discharge points being the tributary systems and multiple springs along the northwestern and southeastern flanks of the ridge.

The only documented source of groundwater contamination within the area is the Chestnut Ridge Security Pits (CRSP). Low levels of VOCs have also been detected in one well at Industrial Landfill IV, although a source has not been confirmed to date. VOC contamination from the CRSP has formed a distinctive plume elongated parallel to strike. Migration from the CRSP to the northwest and southeast has occurred in groundwater, although the migration component in these directions is less than that parallel to strike. Discharge of VOCs from the CRSP has not been documented to date in springs along the flanks of the ridge; VOCs have been observed in a spring along Scarboro Creek approximately 2743 m (9000 ft) east and along strike of the unit, which might reflect a potential pathway and discharge point.

Surface water within the Chestnut Ridge Hydrogeologic Regime is also largely uncontaminated, with the exception of the McCoy Branch subwatershed. The Filled Coal Ash Pond (FCAP) lies in the headwaters of McCoy Branch; historical disposals of coal fly ash in FCAP (and Roger's Quarry located in the lower reaches of McCoy Branch) resulted in contamination of surface water by metals. Remedial actions completed at FCAP in May 1997 included drainage controls, stabilization of the FCAP earthen dam, and construction of a wetland to treat contaminated runoff from FCAP prior to discharge into McCoy Branch.

6.2 UPPER EAST FORK POPLAR CREEK WATERSHED MONITORING STRATEGY

Major remedial actions or CERCLA decisions for the UEFPC Watershed, which provide drivers for a large percentage of the ongoing monitoring, include the following:

- The historical Reduction of Mercury in Plant Effluent Program addressed many principal point source discharges of mercury by both source reduction and mercury treatment units. A ROD (DOE 2002c) for Phase I interim source control actions addressing sources of mercury to UEFPC was signed on May 2, 2002, and includes the recently completed construction of a new mercury treatment system at Bldg. 9201-2 for spring and sump discharges (BSWTS), storm sewer relining/replacement, capping of soil source areas, dredging of contaminated sediment and installation of liner systems in the UEFPC channel, as well as technical studies for addressing mercury-contaminated soil in selected source areas. In FY 2007, DOE implemented a revised monitoring approach for measuring the Hg mass discharged from the West End Mercury Area (WEMA). Those changes have been incorporated into the SAP.

- An Interim Record of Decision (IROD) stipulating administrative controls was approved for off-site VOC contamination in Union Valley in 1995 (DOE 1997c). Although this IROD does not stipulate monitoring, groundwater and surface water is monitored as a best management practice (BMP) and, in part, to support evaluation of the East End VOC Plume removal action discussed below.

- The removal action for the East End VOC Plume, involving an engineering evaluation/cost analysis (DOE 1999c) and AM (DOE 1999d), was approved by the regulatory community for this source of VOCs migrating into Union Valley. A removal action work plan was approved (DOE 1999e); construction and testing of the plume intercept and treatment facility was completed in October 2000. The RmAR was submitted and approved in 2006. Monitoring recommendations made in the 2006 FYR were approved in the RmAR and have been included in this SAP.

A number of additional actions have been completed within the UEFPC Watershed that do not stipulate monitoring. These actions include no-further-action decisions for the Plating Shop Container Areas and Abandoned Nitric Acid Pipeline. Decision documents for the following completed actions do not require post-remediation monitoring: (1) Bldg. 9201-4 exterior process piping removal; (2) Mercury Tanks interim remedial action; (3) Y-12 East End Firing Range lead-contaminated soil removal; and (4) Bldg. 9822 Sediment Basin and Bldg. 81-10 Sump removal action.

Objectives for the remedial actions in the UEFPC Watershed listed above focus on reduction of risk due to contaminated soil hot spots, containment of contaminant plumes in the Maynardville Limestone, and reduction in the mass of contaminants (i.e., mercury) migrating to UEFPC.

The principal goals for YWQP monitoring in the UEFPC Watershed during FY 2009 are to: (1) establish baseline water quality data against which the effects of future remedial actions addressing sources of mercury flux within UEFPC can be measured; (2) perform monitoring in support of the Union Valley IROD (DOE 1997c); (3) continue performance evaluation of the East End VOC Plume early action; and (4) monitor remediation effectiveness for the BSWTS (including facility effluent discharge and any residual discharge at Outfall 51). The YWQP also conducts corrective action monitoring to comply with provisions of the RCRA post-closure permit (TNHW-113) for the groundwater plume (primarily uranium, nitrate, and ^{99}Tc) emanating from the former S-3 Site (eastern S-3 Site plume).

YWQP sampling locations for FY 2009 in the UEFPC Watershed are listed in Tables B.5 and C.5 (and Table C.6 for RCRA post-closure monitoring) and shown on Fig. A.6. Surface water and groundwater monitoring objectives of the Y-12 ECD programs frequently overlap with those of the YWQP. Therefore, to avoid duplication of efforts, the YWQP will use monitoring data, whenever possible, that are collected by the Y-12 ECD from common locations. Those Y-12 ECD monitoring locations from which data are used for the purposes of remediation performance assessment are also shown in Table B.5 and on Fig. A.6.

6.3 CHESTNUT RIDGE AREA MONITORING STRATEGY

YWQP sampling locations for FY 2009 on Chestnut Ridge are listed in Tables B.5 and C.5 (and Table C.6 for RCRA post-closure monitoring) and shown on Fig. A.6.

A watershed strategy under CERCLA is not being pursued for the Chestnut Ridge Hydrogeologic Regime; thus, a comprehensive groundwater/surface water approach has not been developed. Rather, monitoring focuses on individual CERCLA actions or known and suspected exit pathways (i.e., springs and tributaries) for groundwater flow. Individual RODs with post-action performance assessment monitoring have been approved for: (1) the FCAP (DOE 1996b), (2) United Nuclear Corporation (UNC) Disposal Site (DOE 1991), and (3) Kerr Hollow Quarry (KHQ) [DOE 1995a]. The YWQP also is responsible for monitoring to comply with the terms of a RCRA post-closure permit for the Chestnut Ridge Hydrogeologic Regime, which includes KHQ, Chestnut Ridge Sediment Disposal Basin (CRSDB), and the East Chestnut Ridge Waste Pile (ECRWP) [RCRA detection monitoring]. RCRA corrective action monitoring is conducted at the CRSP in accordance with permit requirements.

The principal goals for YWQP monitoring in the Chestnut Ridge area during FY 2009 are to collect data to assess the performance of completed remedial actions and comply with provisions of RCRA post-closure permits. Additional sampling locations are predominantly springs or surface water stations to evaluate groundwater quality at key groundwater discharge points for a number of the subwatersheds within the regime. To achieve monitoring objectives in FY 2009, sampling activities will focus on: (1) performance assessment monitoring or RCRA detection monitoring, and (2) groundwater/surface water exit pathways.

Elevated gross beta activity observed downgradient of the UNC Site suggests a potential contaminant release from the site. The UEFPC Core Team agreed to continue monitoring at the current frequency in the existing well network and to add a downgradient spring. This recommendation has been incorporated into the FY 2009 SAP.

As in the UEFPC Watershed, surface water and groundwater monitoring objectives of the Y-12 ECD programs and BJC Waste Operations (solid waste landfill management) frequently overlap with those of the YWQP. Therefore, to avoid duplication of efforts, the YWQP will use monitoring data collected by other programs from common locations whenever possible. These locations are also listed in Table B.5 and shown on Fig. A.6.

Planned FY 2009 remedial performance assessment monitoring includes the UNC Site (groundwater pathway), FCAP (surface water and biological improvements), and KHQ (groundwater). RCRA post-closure detection monitoring at KHQ, CRSDB, and ECRWP focuses on statistical evaluation of groundwater data to determine if contaminant releases occur. In the case of KHQ, the objectives for remediation performance assessment monitoring are achieved through ongoing RCRA post-closure detection monitoring. RCRA post-closure corrective action monitoring at the CRSP focuses specifically on collection of data to evaluate concentration trends and migration of constituents characteristic of this unit (e.g., VOCs) within groundwater exit pathways (fractures and karst features).

7. OFF-SITE LOCATIONS

7.1 INTRODUCTION

Post-ROD monitoring is conducted throughout the three major surface water systems draining the ORR and at one site located south of the Y-12 Complex:

- LWBR,
- CR/PC,
- LEFPC, and
- ORAU SCF.

These off-site OUs are sampled for one primary reason—performance assessment monitoring. Off-site monitoring is summarized in Table B.6 and detailed in Table C.7 (also see Table C.8 *Biological Monitoring*, and Table C.9 *Future Monitoring*). Locations of sampling activities are shown in Fig. A.7.

7.2 LOWER WATTS BAR AND CLINCH RIVER/POPLAR CREEK MONITORING STRATEGY

The RODs for LWBR and CR/PC were issued in September 1995 and August 1997, respectively (DOE 1995b, DOE 1997d). Both remedies required monitoring of contaminant levels in water, sediment, and fish/turtle tissues. The monitoring program for LWBR has been in place since 1995. A similar program for CR/PC began in 1998.

In 1999, it was determined that monitoring addressing the two OUs as a single hydrologic system, a system connected to the on-site areas of the ORR, would be more technically sound and economically feasible than two separate programs. Therefore, in September 1999, DOE issued the combined monitoring plan for LWBR and CR/PC (DOE 1999f). The plan specified the numbers and locations of monitoring stations in the combined LWBR and CR/PC system to allow annual evaluation of water, fish, and sediment contaminant trends along the hydrologic system.

The combined monitoring plan was issued with the stated expectation that the plan would be periodically updated based on annual sampling results and/or periodic evaluations of monitoring activities. In 2004, DOE issued a revision to the plan (DOE 2004) based on results of sampling conducted from 1999 through 2003 and changes proposed in order to provide a more unified, long-term monitoring program that: (1) meets the requirements of the RODs for both OUs, (2) is technically sound and informative, (3) is integrated with ORR watershed and exit pathway monitoring, and (4) is cost-effective. The monitoring program now consists of two components:

- Annual monitoring of major COCs in fish.
- Monitoring of sediment, surface water, and turtles only in years preceding a CERCLA FYR. The next CERCLA FYR for the ORR is scheduled for 2011; thus, sediment, surface water, and turtle samples will be collected in FY 2010 (see Table C.9 for future monitoring).

The focus of the monitoring program is to detect temporal changes in key COCs at sites and in species that have been previously identified as being a concern during the RI/FS. Sites, species, and analytes that are clearly not a risk, concern, or that do not add to the understanding of contaminant changes in the off-site environment were reduced or discontinued.

7.3 LOWER EAST FORK POPLAR CREEK MONITORING STRATEGY

The LEFPC OU extends from the outfall at Lake Reality (Station 17) in UEFPC downstream approximately 23.3 km (14.5 miles) to the stream's confluence with Poplar Creek. The OU includes the soil, sediment, and groundwater within the 100-year floodplain along the creek and the Sewer Line Beltway. The sites include portions of the ORR, along with commercial, agricultural, residential, and other areas within the city of Oak Ridge.

The creek floodplain downstream of Y-12 became contaminated with mercury and other contaminants during plant operations that occurred since the 1950s. The LEFPC RI/FS was completed in 1994 (DOE 1994), and the ROD (DOE 1995c) was approved in September 1995. No contamination was found to be associated with the Sewer Line Beltway. The remedial action was implemented to reduce the risk from floodplain soils contaminated by mercury. The action was implemented in two phases. Phase I was performed in the spring and summer of 1996. From July 8 to September 14, 1996, 3288 m^3 (4300 yd^3) of mercury-contaminated soils [> 400 parts per million (ppm) mercury] were removed from the floodplain near the National Oceanographic and Atmospheric Administration (NOAA) site. Phase II was performed from February 21 to October 24, 1997. During Phase II, 23,984 m^3 (31,370 yd^3) of mercury-contaminated soils (> 400 ppm mercury) were removed from the NOAA and Bruner site floodplain.

The Remedial Action Report (DOE 1999g) included the following sampling program to monitor the continued effectiveness of the remedial action:

- An annual stream channel/floodplain survey to track significant changes in the sediment depositional patterns in the streambed to support the 2006 FYR (discontinued).
- Continuous monitoring of mercury input into LEFPC at Station 17 to evaluate the magnitude of continued mercury fluxes from UEFPC to LEFPC (since this type of monitoring is currently conducted in conjunction with on-site efforts to reduce mercury flux leaving Y-12, no additional fieldwork is required to obtain mercury data at Station 17).

- An annual survey to verify that land use in the area of the Dean Stallings Ford automobile dealership parking lot has not changed since the issuance of the East Fork Poplar Creek–Sewer Line Beltway RI (DOE 1994) report. If significant land use changes occur that affect exposure pathways, steps will be taken to determine if the land use changes result in unacceptable risk to human health or the environment.

- A periodic survey to detect residential use of shallow groundwater.

The 2006 CERCLA FYR (DOE 2006b) for LEFPC provided recommendations for optimizing sampling based on results of remedial performance conducted to date. These recommendations include discontinuing the annual stream channel/floodplain survey as no significant changes in the sediment depositional patterns have been noted to date. When recommendations are approved by the regulators, they will be incorporated into the SAP.

7.4 OAK RIDGE ASSOCIATED UNIVERSITIES SOUTH CAMPUS FACILITY MONITORING STRATEGY

The ORAU SCF is located southeast of Y-12 at the intersection of Pumphouse Road and Bethel Valley Road (see inset Fig. A.7). Results of the RI conducted at the SCF (DOE 1995d) show groundwater contaminated with TCE, with concentrations ranging from 380 to 1400 μg/L. It was anticipated that the TCE in groundwater would naturally attenuate and, therefore, no remedial action was considered necessary. The No Further Action ROD (DOE 1995e) specified periodic sampling to ensure that evaluations completed in support of the RI are accurate and that natural attenuation in the zone of contamination continues as expected.

Sampling of groundwater (four wells) and surface water (one seep) began in February 1997. Sampling of the seep was discontinued in 2003 due to construction at the SCF. The seep location was covered with fill material during construction activities and, as a result, the surface expression of the seep was eliminated. Seep samples were collected at two alternate locations beginning in FY 2004. Sampling of one groundwater well (GW-844, formerly well MW-43c) was discontinued in FY 2004 because the well was completed in a bedrock zone that does not yield samples suitable for monitoring of VOC contaminants at the site. The approved 2006 FYR recommended continued monitoring of GW-841 and GW-842, and SCF-WS2. The monitoring locations are included in the SAP.

The ROD (DOE 1995e) requires that sampling be performed once every two years; however, beginning in FY 1999, an additional round of samples was collected during the August–September timeframe to allow a comparison of wet-season and dry-season concentrations in order to better document the progress of naturally occurring bioremediation. In general, TCE levels have exhibited a steady decrease in well GW-841. However, in FY 2006, a noted increase of contaminants was noted. This increase is attributed to low rainfall; a similar increase was observed during 2001 during a low-rainfall year.

8. REFERENCES

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BJC 2007b. *Quality Assurance Project Plan for the Water Resources Restoration Program, U.S. Department of Energy, Oak Ridge Reservation, Oak Ridge, Tennessee,* BJC/OR-235/R2, Bechtel Jacobs Company LLC, Oak Ridge, TN.

DOE (U. S. Department of Energy) 1991. *Record of Decision, United Nuclear Corporation Disposal Site, Declaration, Y-12 Plant, Oak Ridge, Tennessee,* U. S. Department of Energy, Environmental Restoration Division, Oak Ridge, TN.

DOE 1992. *Interim Record of Decision for the Oak Ridge National Laboratory, Waste Area Grouping 11, Surface Debris, Oak Ridge, Tennessee,* DOE/OR-1055&D4, U. S. Department of Energy, Environmental Restoration Division, Oak Ridge, TN.

DOE 1993a. *Record of Decision for the K-1407-B/C Ponds at the Oak Ridge K-25 Site, Oak Ridge, Tennessee,* DOE/OR/02-1125&D3, U. S. Department of Energy, Environmental Restoration Division, Oak Ridge, TN.

DOE 1993b. *Radiation Protection of the Public and the Environment,* DOE Order 5400.5, change notice, Washington, D.C.

DOE 1993c. *Interim Remedial Action Work Plan for the Surface Debris at Waste Area Grouping 11 at Oak Ridge National Laboratory, Oak Ridge, Tennessee,* DOE/OR/01-1121&D3, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1994. *East Fork Poplar Creek-Sewer Line Beltway Remedial Investigation Report,* Oak Ridge, Tennessee, DOE/OR/01-1119/V1&D2, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1995a. *Record of Decision for Kerr Hollow Quarry at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee,* DOE/OR/02-1398&D2, U. S. Department of Energy, Office of Environmental Restoration and Waste Management, Oak Ridge, TN.

DOE 1995b. *Record of Decision for the Lower Watts Bar Reservoir,* DOE/OR/02-1373&D3, U. S. Department of Energy, Office of Environmental Restoration and Waste Management, Oak Ridge, TN.

DOE 1995c. *Record of Decision for Lower East Fork Poplar Creek, Oak Ridge, Tennessee,* DOE/OR/02-1370&D2, U. S. Department of Energy, Office of Environmental Restoration and Waste Management, Oak Ridge, TN.

DOE 1995e. *Record of Decision for Chestnut Ridge Operable Unit 2 (Filled Coal Ash Pond and Vicinty), Oak Ridge, Tennessee,* DOE/OR/02-1410&D3, U.S. Department of Energy, Office of Environmental Restoration and Waste Management, Oak Ridge, TN

DOE 1996a. *Record of Decision for Oak Ridge Associated Universities, South Campus Facility, Oak Ridge, Tennessee*, DOE/OR/02-1383&D3, U. S. Department of Energy, Office of Environmental Restoration and Waste Management, Oak Ridge, TN.

DOE 1996b. *Record of Decision for Chestnut Ridge Operable Unit 2 (Filled Coal Ash Pond and Vicinty), Oak Ridge, Tennessee*, DOE/OR/02-1410&D3, U.S. Department of Energy, Office of Environmental Restoration and Waste Management, Oak Ridge, TN

DOE 1997a. *Action Memorandum for the K-901-A Holding Pond and the K-1007-P1 Pond Removal Action, East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/02-1550&D3, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1997b. *Report on the Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee*, DOE/OR/01-1455/V1&D2, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1997c. *Record of Decision for an Interim Action for Union Valley, Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee*, DOE/OR/02-1545&D3, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1997d. *Record of Decision for the Clinch River/Poplar Creek Operable Unit, Oak Ridge, Tennessee*, DOE/OR/02-1547&D3, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1999a. *Removal Action Report for the Bear Creek Valley Interception Trenches for the S-3 Uranium Plume, Pathways 1 and 2 at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee*, DOE/OR/01-1836&D1, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1999b. *Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee*, DOE/OR/01-1791&D3, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1999c. *Engineering Evaluation/Cost Analysis for the Oak Ridge Y-12 Plant East End Volatile Organic Compound Plume, Oak Ridge, Tennessee*, DOE/OR/01-1764&D4, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1999d. *Action Memorandum for the Oak Ridge Y-12 Plant East End Volatile Organic Compound Plume, Oak Ridge, Tennessee*, DOE/OR/01-1819&D2, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1999e. *Removal Action Work Plan for the Oak Ridge Y-12 Plant East End Volatile Organic Compound Plume, Oak Ridge Y-2 Plant, Oak Ridge, Tennessee*, DOE/OR/01-1825&D1, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1999f. *Combined Monitoring Plan for the Lower Watts Bar Reservoir and Clinch River/Poplar Creek Operable Units at the Oak Ridge Reservation, Oak Ridge, Tennessee*, DOE/OR/01-1820&D2, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1999g. *Remedial Action Report on the Lower East Fork Poplar Creek Project, Oak Ridge, Tennessee,* DOE/OR/01-1680&D4, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2000a. *Record of Decision for Interim Actions in the Melton Valley Watershed at the Oak Ridge National Laboratory, Oak Ridge, Tennessee,* DOE/OR/01-1826&D3, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2000b. *Record of Decision for the Phase I Activities in Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee,* DOE/OR/01-1750&D4, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2001. *Remedial Design Work Plan for the Phase I Activities in Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee,* DOE/OR/01-1760&D3, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2002a. *Record of Decision for Interim Actions in Bethel Valley, Oak Ridge, Tennessee,* DOE/OR/01-1862&D4. U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2002b. *Addendum to the Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee,* DOE/OR/01-1873&D2/A1/R1, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2002c. *Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area,* Oak Ridge, Tennessee, DOE/OR/01-1951&D3, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2003a. *Removal Action Report for Burial Ground D-East Revegetation at the Y-12 National Security Complex, Oak Ridge, Tennessee,* DOE/OR/01-2048&D2, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2003b. *Phased Construction Completion Report for the Bear Creek Valley Boneyard/Burnyard Remediation Project at the Y-12 National Security Complex, Oak Ridge, Tennessee,* DOE/OR/01-2077&D2, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2003c. *Environmental Protection Program,* DOE Order 450.1, U.S. Department of Energy, Washington, D.C.

DOE 2004. *Combined Monitoring Plan for the Lower Watts Bar Reservoir and Clinch River/Poplar Creek Operable Units at the Oak Ridge Reservation, Oak Ridge, Tennessee,* DOE/OR/01-1820&D2/R1, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2006a. *Melton Valley Monitoring Plan, Oak Ridge, Tennessee,* DOE/OR/01-1982&D1/R2, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2006b. *2006 Remediation Effectiveness Report/CERCLA Five-Year Review for the U. S. Department of Energy Oak Ridge Reservation, Oak Ridge, Tennessee,* DOE/OR/01-2289&D1, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 2007. *Addendum to the Removal Action Report for the Bear Creek Valley Interception Trenches for the S-3 Uranium Plume, Pathway 1 and 2 at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee,* DOE/OR/01-1836&D1/A1, U. S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

APPENDIX A

FIGURES

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FIGURES

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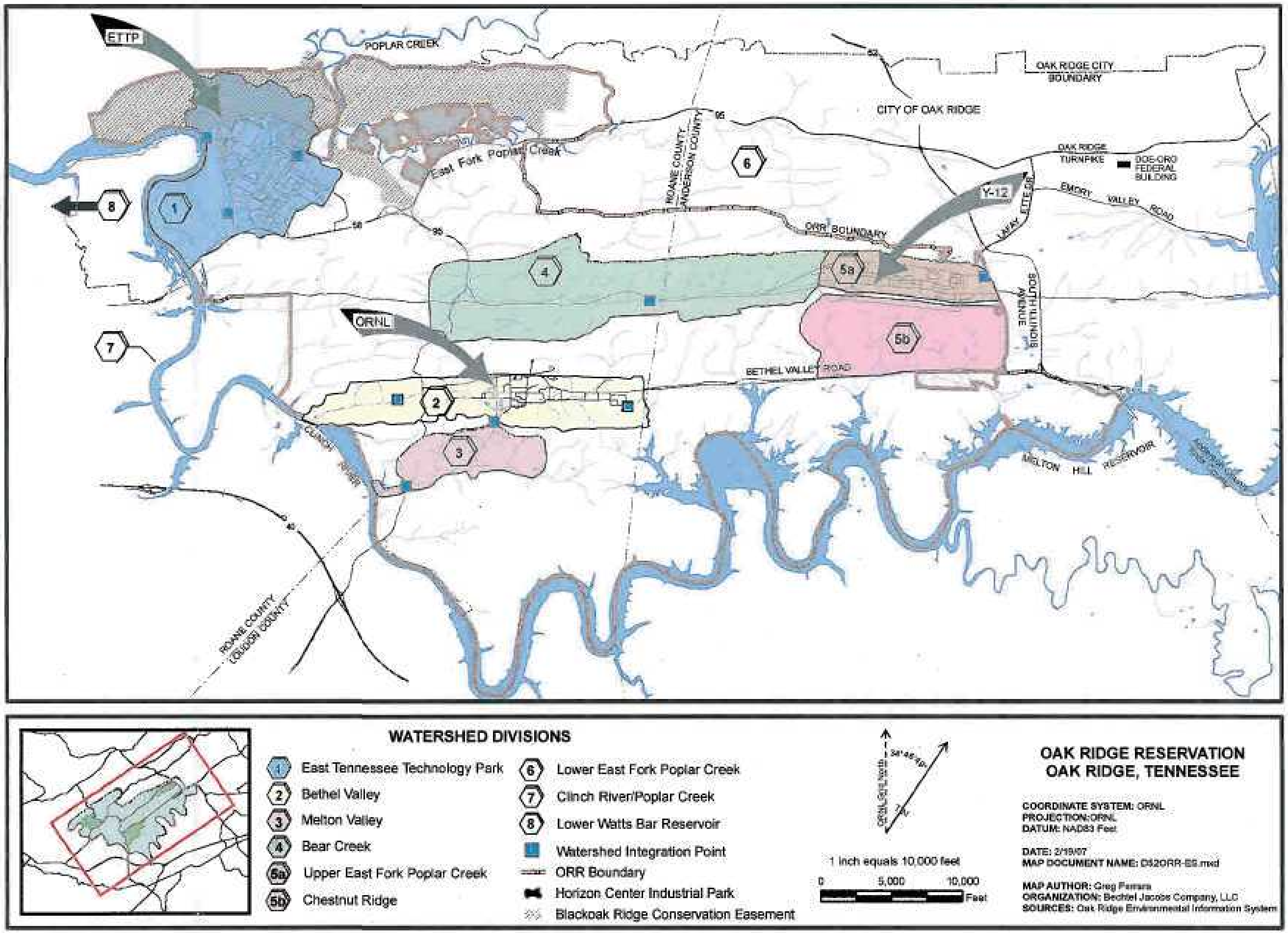

Fig. A.1. Watersheds on the ORR and adjacent watersheds.

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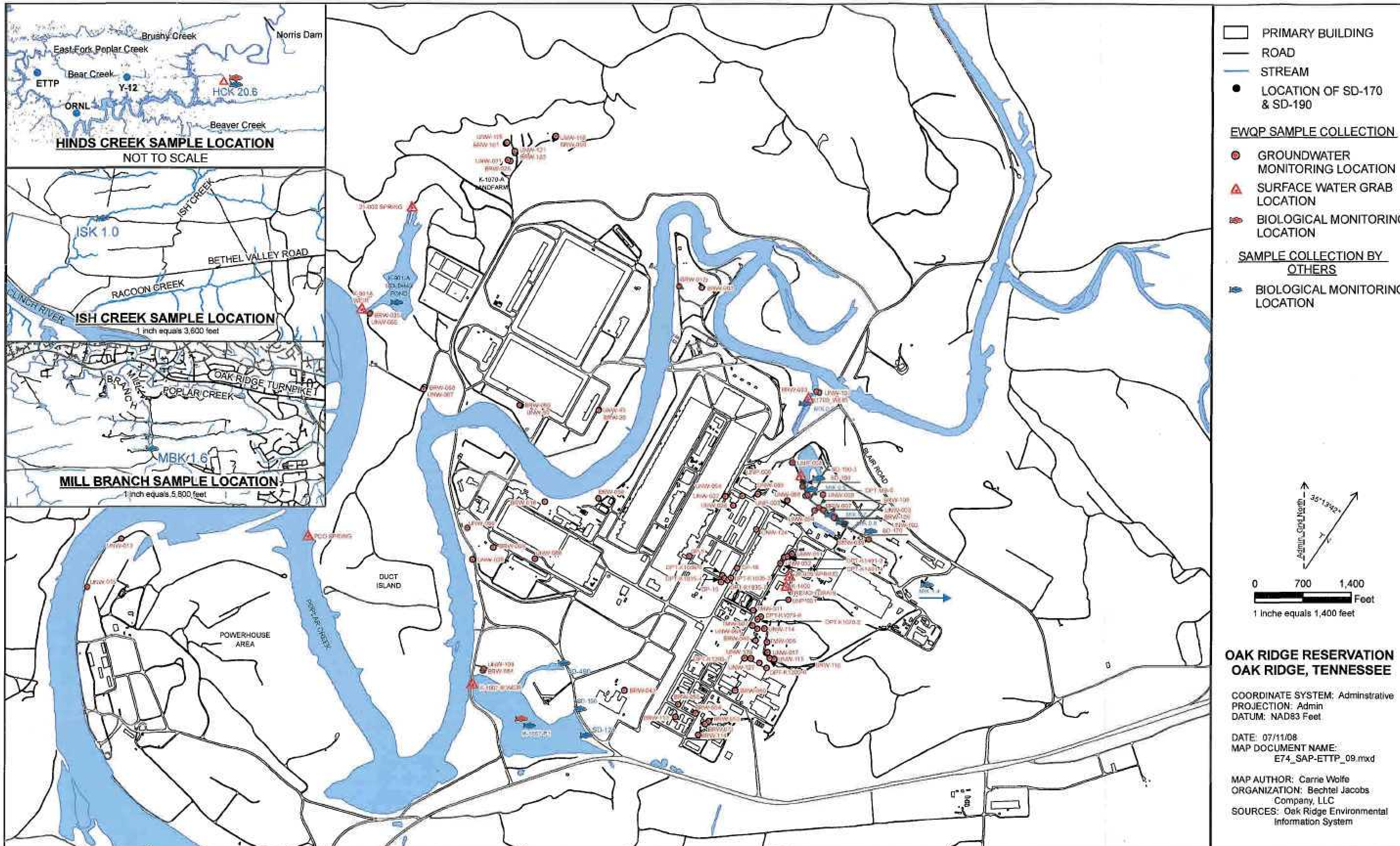

Fig. A.2. FY 2009 sample locations at ETTP.

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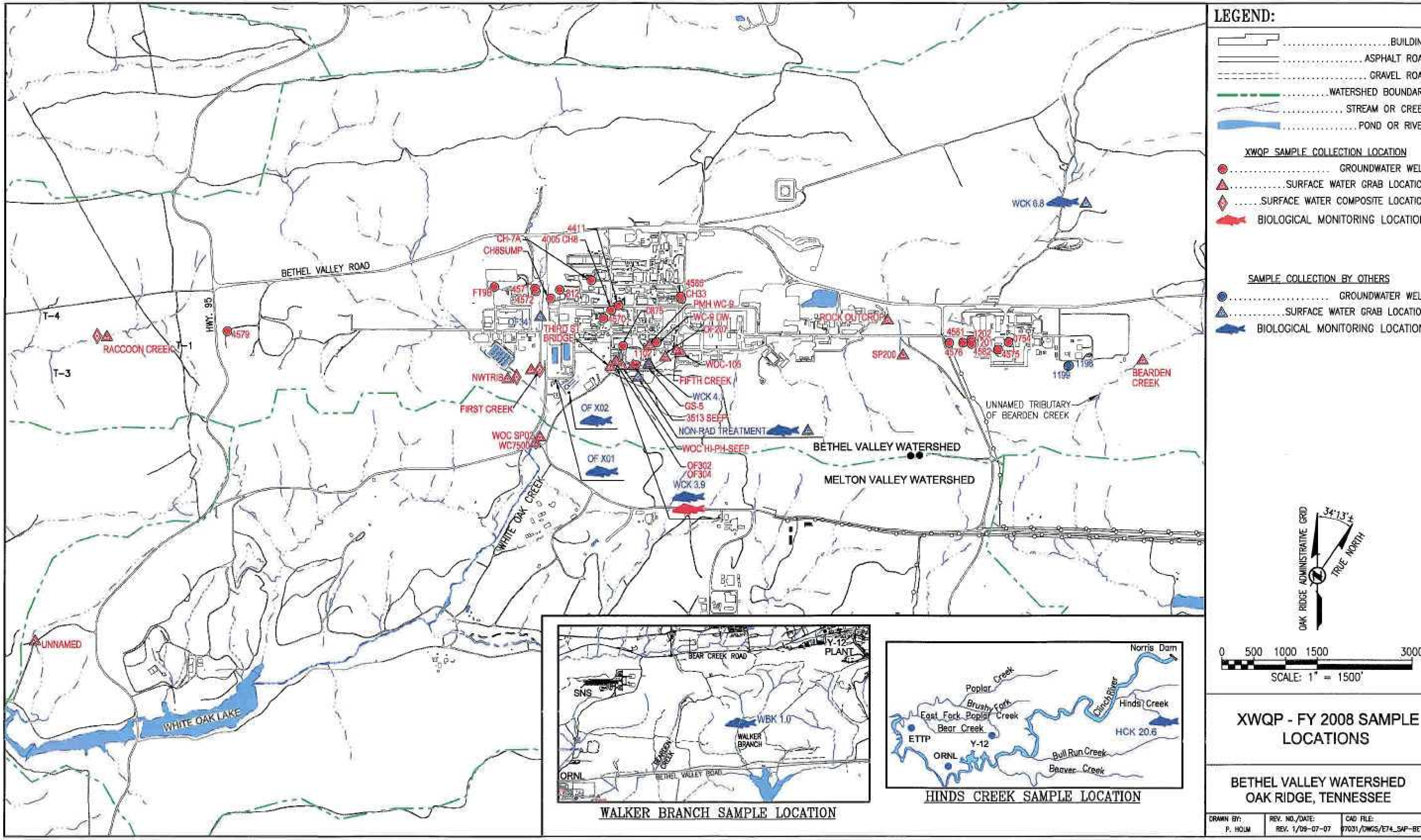

Fig. A.3. FY 2008 sample locations in Bethel Valley.

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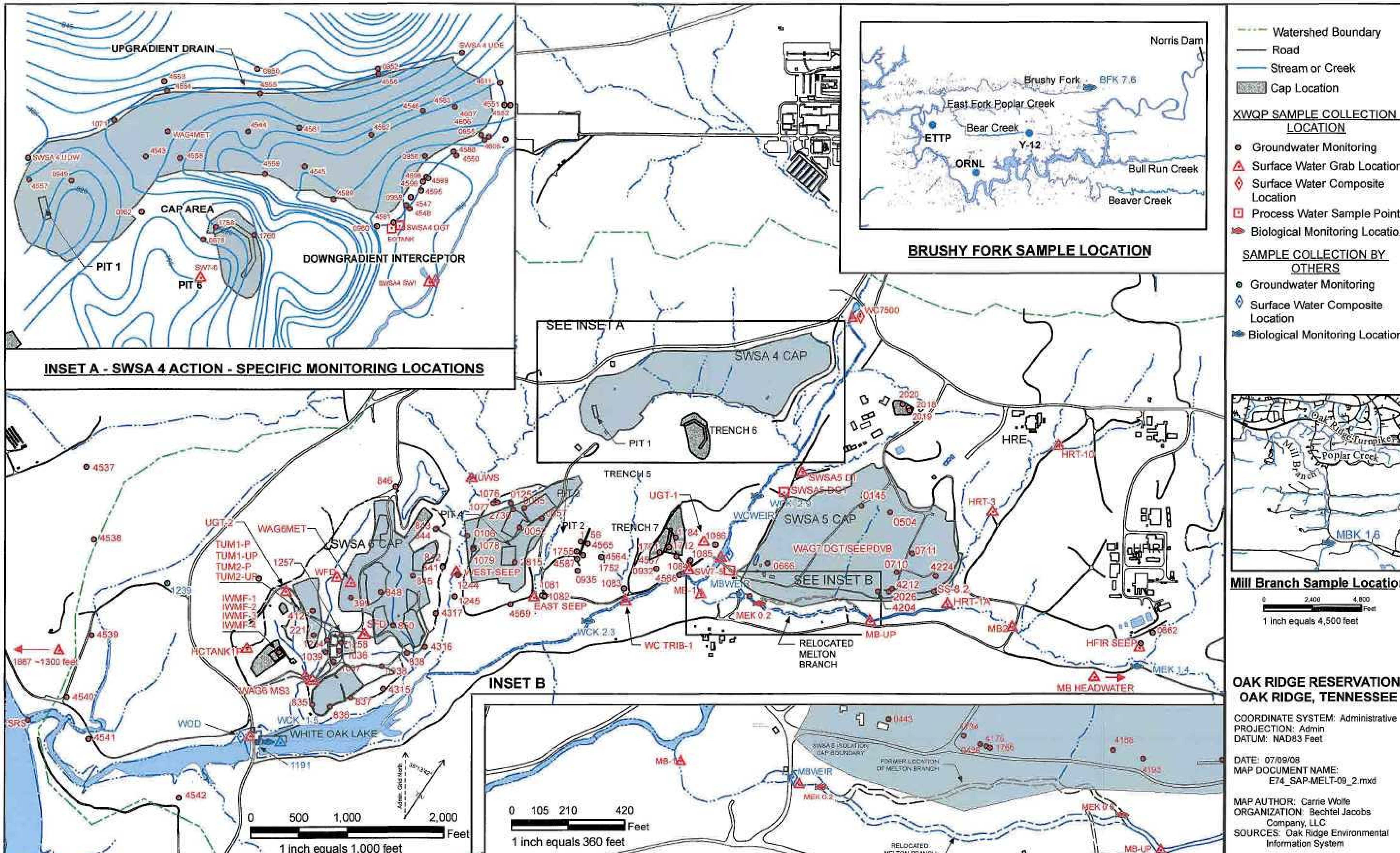

Fig. A.4. FY 2009 sample locations in Melton Valley.

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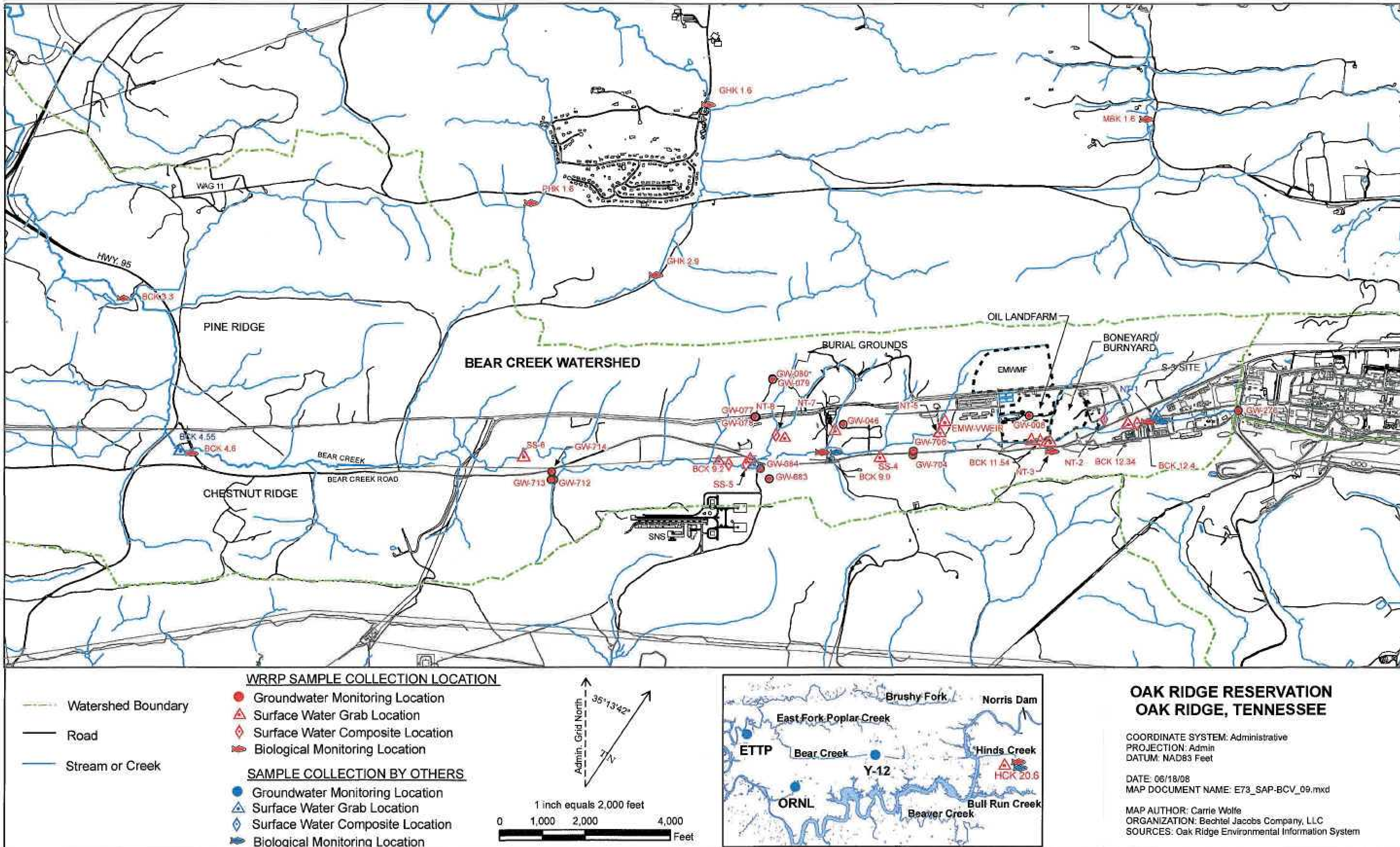

Fig. A.5. FY 2009 sample locations in Bear Creek Watershed.

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Fig. A.6. FY 2009 sample locations in UEFPC drainage basin and Chestnut Ridge area

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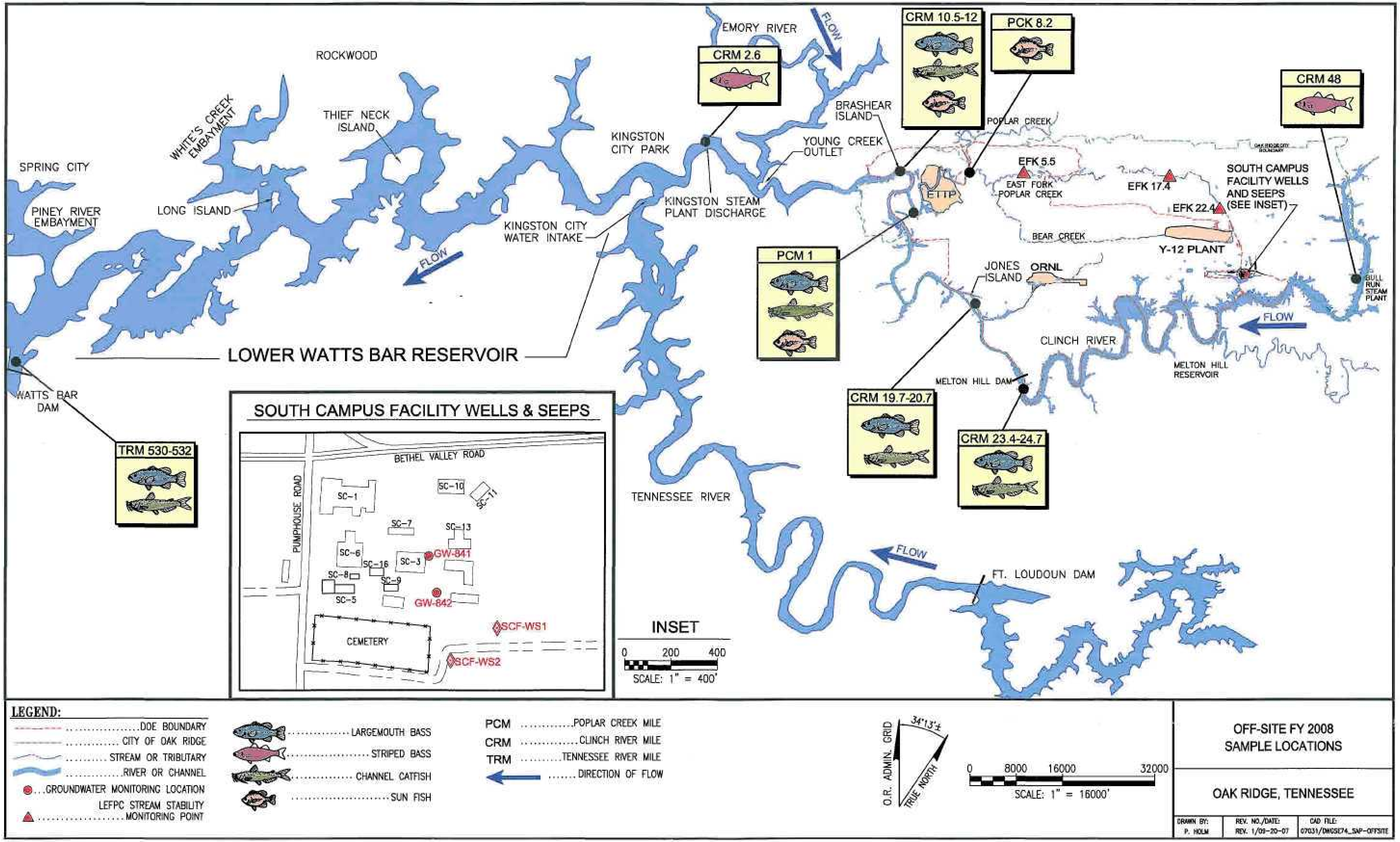

Fig. A.7. FY 2008 sample collection locations in Clinch River/Poplar Creek, Lower Watts Bar Reservoir, South Campus Facility and Lower East Fork Poplar Creek.

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APPENDIX B

PLANNING TABLES

Table B.1. Sample locations and parameters at ETTP

Sample location	Primary station name*	Sample medium[a]	Sample Type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
K-1070-A Burial Ground																
21-002 spring	21-002*	S	G	ETTP-6	2		2	2	2		2		I	EWQP	Q2, Q4	Performance assessment: K-1070-A Burial Ground
BRW-025	BRW-025	G	G	ETTP-1	2		2	2	2		2			EWQP	Q2, Q4	
BRW-101	BRW-101	G	G	ETTP-1	2		2	2	2		2			EWQP	Q2, Q4	
BRW-099	BRW-099	G	G	ETTP-1	2		2	2			2			EWQP	Q2, Q4	
BRW-103	BRW-103	G	G	ETTP-1	2		2	2	2		2			EWQP	Q2, Q4	
UNW-031	UNW-031	G	G	ETTP-1	2		2	2	2		2			EWQP	Q2, Q4	
UNW-116	UNW-116	G	G	ETTP-1	2		2	2			2			EWQP	Q2, Q4	
UNW-118	UNW-118	G	G	ETTP-1	2		2	2	2		2			EWQP	Q2, Q4	
UNW-121	UNW-121	G	G	ETTP-1	2		2	2	2		2			EWQP	Q2, Q4	
K-901 Pond																
BRW-035	BRW-035	G	G	ETTP-1	2				2		2			EWQP	Q2, Q4	Exit pathway: discharge to Clinch River/Poplar Creek
BRW-068	BRW-068*	G	G	ETTP-1	2				2		2			EWQP	Q2, Q4	
UNW-066	UNW-066	G	G	ETTP-1	2				2		2			EWQP	Q2, Q4	
UNW-067	UNW-067	G	G	ETTP-1	2				2		2			EWQP	Q2, Q4	
K-901 Pond	K-901-A POND	B	NA	NA								1		BMAP	Q3	Bioaccumulation of PCBs in fish (largemouth bass) and caged clams
K-901A weir	K-901A*	S	G	ETTP-6	2	2	2		2		2		I	EWQP	Q2, Q4	Exit pathway monitoring
K-1007-P Ponds																
BRW-084	BRW-084	G	G	ETTP-1	2	2	2		2		2			EWQP	Q2, Q4	Exit pathway monitoring
UNW-108	UNW-108	G	G	ETTP-1	2	2	2		2		2			EWQP	Q2, Q4	
K-1007 pond	K-1007-P1	B	NA	NA								1		BMAP	Q3	Bioaccumulation of PCBs in largemouth bass (fillets) and caged clams
K-1007 pond	K-1007-P1	B	NA	ETTP-9								1		EWQP	Q3	Bioaccumulation of PCBs in sunfish (fillets and whole body)
K-1007B weir	K-1007B*	S	G	ETTP-6	2	2	2		2		2		I	EWQP	Q2, Q4	Exit pathway monitoring
SD-100	SD-100	B	NA	NA								1		BMAP	Q3	Bioaccumulation of PCBs in caged clams
SD-120	SD-120	B	NA	NA								1		BMAP	Q3	
SD-490	SD-490	B	NA	NA								1		BMAP	Q3	
BRW-113	BRW-113	G	G	ETTP-4	2						2			EWQP	Q2, Q4	Interior monitoring: Administration Area plume
BRW-114	BRW-114	G	G	ETTP-4	2						2			EWQP	Q2, Q4	

Table B.1. Sample locations and parameters at ETTP (continued)

Sample location	Primary station name*	Sample medium[a]	Sample Type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
Mitchell Branch																
MIK 0.2	MIK 0.2	B	NA	NA								1		BMAP	Q3	Toxicity testing
MIK 0.5	MIK 0.5	B	NA	NA								1		BMAP	Q3	
MIK 0.7	MIK 0.7	B	NA	NA								1		BMAP	Q3	
MIK 0.8	MIK 0.8	B	NA	NA								1		BMAP	Q3	
MIK 0.2	MIK 0.2	B	NA	NA								1		BMAP	Q3	Bioaccumulation of PCBs in fish (redbreast sunfish) and caged clams
MIK 0.5	MIK 0.5	B	NA	NA								1		BMAP	Q3	Fish and benthic macroinvertebrate species diversity and density
MIK 0.7	MIK 0.7	B	NA	NA								1		BMAP	Q3	
MIK 0.8	MIK 0.8	B	NA	NA								1		BMAP	Q3	Benthic macroinvertebrate species diversity and density
MIK 0.5	MIK 0.5	B	NA	NA								1		BMAP	Q4	TDEC Rapid Bioassessment Protocol
MIK 0.7	MIK 0.7	B	NA	NA								1		BMAP	Q4	
MIK 0.8	MIK 0.8	B	NA	NA								1		BMAP	Q4	
Mitchell Branch South Bank																
UNP-004	UNP-004	G	G	ETTP-2	2						2			EWQP	Q2, Q4	Interior monitoring: Mitchell Branch area plume
UNP-005	UNP-005	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
UNW-002	UNW-002	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
UNW-004	UNW-004	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
UNW-068	UNW-068	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
BRW-039	BRW-039	G	G	ETTP-2	2				2		2			EWQP	Q2, Q4	
BRW-007	BRW-007	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
BRW-108	BRW-108	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
BRW-109	BRW-109	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
DPT-MB-6	DPT-MB-6	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
UNW-003	UNW-003*	G	G	ETTP-2	2		2	2	2		2			EWQP	Q2, Q4	Performance assessment: K-1407-B and C Ponds
UNW-009	UNW-009	G	G	ETTP-2	2		2	2	2		2			EWQP	Q2, Q4	
UNW-107	UNW-107	G	G	ETTP-2	2		2		2		2			EWQP	Q2, Q4	Exit pathway: direct discharge to Poplar Creek
BRW-083	BRW-083	G	G	ETTP-2	2		2		2		2			EWQP	Q2, Q4	
K-1700 weir	K1700	S	G	ETTP-7	2	2	2	2	2		2		I	EWQP	Q1,Q2, Q3,Q4	Exit pathway monitoring and K-1407-B/C performance assessment
SD-190-3	SD-190-3	S	G	ETTP-6	2		2				2		I	EWQP	Q2, Q4	
SD-170	SD-170	B	NA	NA								1		BMAP	Q3	Toxicity testing
SD-190	SD-190	B	NA	NA								1		BMAP	Q3	

Table B.1. Sample locations and parameters at ETTP (continued)

Sample location	Primary station name*	Sample medium[a]	Sample Type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
SD-170	SD-170	B	NA	NA								1		BMAP	Q3	Bioaccumulation of PCBs in caged clams
SD-190	SD-190	B	NA	NA								1		BMAP	Q3	
K-1070-C/D Area																
26-005 spring	26-005	S	G	ETTP-6	2						2			EWQP	Q2, Q4	
K-1400 French Drain	K-1400 FR DRAIN	S	G	ETTP-6	2						2			EWQP	Q2, Q4	
UNP-001	UNP-001	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
DP-18	DP18	G	G	ETTP-3	2		2				2			EWQP	Q2, Q4	
DP-19	DP19	G	G	ETTP-3	2		2				2			EWQP	Q2, Q4	Interior monitoring: K-1070-D area plume
TMW-006	TMW-006	G	G	ETTP-3	2						2			EWQP	Q2, Q4	
TMW-007	TMW-007	G	G	ETTP-3	2						2			EWQP	Q2, Q4	
TMW-011	TMW-011	G	G	ETTP-3	2						2			EWQP	Q2, Q4	
BRW-046	BRW-046	G	G	ETTP-3	2						2			EWQP	Q2, Q4	
DPT-K1070-5	DPT-K1070-5	G	G	ETTP-3	2						2			EWQP	Q2, Q4	
DPT-K1070-6	DPT-K1070-6	G	G	ETTP-3	2						2			EWQP	Q2, Q4	
UNW-064	UNW-064	G	G	ETTP-3	2						2			EWQP	Q2, Q4	Performance assessment: K-1070-C/D G-Pit
UNW-114	UNW-114	G	G	ETTP-3	2						2			EWQP	Q2, Q4	
K-1070-C/D Area South																
UNW-017	UNW-017	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
UNW-126	UNW-126	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
UNW-127	UNW-127	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
UNW-115	UNW-115	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
BRW-043	BRW-043	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
BRW-050	BRW-050	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
BRW-054	BRW-054	G	G	ETTP-4	2						2			EWQP	Q2, Q4	Interior monitoring: K-1070-C/Administration Area plume
BRW-055	BRW-055	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
BRW-071	BRW-071	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
DPT-K1200-6	DPT-K1200-6	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
DPT-K1200-7	DPT-K1200-7	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
BRW-110	BRW-110	G	G	ETTP-4	2						2			EWQP	Q2, Q4	
BRW-053	BRW-053	G	G	ETTP-4	2						2			EWQP	Q2, Q4	

Table B.1. Sample locations and parameters at ETTP (continued)

Sample location	Primary station name*	Sample medium[a]	Sample Type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
K-1401 Building																
UNP-003	UNP-003	G	G	ETTP-2	2						2			EWQP	Q2, Q4	Interior monitoring: K-1401 area plume
UNW-051	UNW-051	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
UNW-052	UNW-052	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
UNW-124	UNW-124	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
DPT-K1401-3	DPT-K1401-3	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
DPT-K1401-4	DPT-K1401-4	G	G	ETTP-2	2						2			EWQP	Q2, Q4	
K-1035 Building																
DPT-K1035-3	DPT-K1035-3	G	G	ETTP-3	2		2				2			EWQP	Q2, Q4	Interior monitoring: K-1035 area plume
DPT-K1035-4	DPT-K1035-4	G	G	ETTP-3	2		2				2			EWQP	Q2, Q4	
DPT-K1035-6	DPT-K1035-6	G	G	ETTP-3	2		2				2			EWQP	Q2, Q4	
DPT-K1035-7	DPT-K1035-7	G	G	ETTP-3	2		2				2			EWQP	Q2, Q4	
K-1064																
BRW-003	BRW-003	G	G	ETTP-5	2		2	2			2			EWQP	Q2, Q4	Exit pathway: direct discharge to Poplar Creek
BRW-017	BRW-017	G	G	ETTP-5	2		2	2			2			EWQP	Q2, Q4	
K-27/29 Area																
BRW-016	BRW-016	G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	Exit pathway: direct discharge to Poplar Creek
BRW-069	BRW-069	G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	
UNW-038	UNW-038	G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	
UNW-096	UNW-096	G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	
UNW-088	UNW-088	G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	Interior monitoring: K-27/29 plume
K-1413 Area																
UNW-026	UNW-026	G	G	ETTP-4	2		2	2			2			EWQP	Q2, Q4	Interior monitoring/Natural Attenuation Study Area
UNW-027	UNW-027	G	G	ETTP-4	2		2	2			2			EWQP	Q2, Q4	
UNW-054	UNW-054	G	G	ETTP-4	2		2	2			2			EWQP	Q2, Q4	
UNW-089	UNW-089	G	G	ETTP-4	2		2	2			2			EWQP	Q2, Q4	
DP-9	DP9	G	G	ETTP-5	2						2			EWQP	Q2, Q4	Interior monitoring: K-25 plume
BRW-058	BRW-058	G	G	ETTP-5	2						2			EWQP	Q2, Q4	Exit pathway: direct discharge to Poplar Creek

Table B.1. Sample locations and parameters at ETTP (continued)

Sample location	Primary station name*	Sample medium[a]	Sample Type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
K-770																
UNW-013	UNW-013	G	G	ETTP-5					2		2			EWQP	Q2, Q4	Exit pathway: direct discharge to Clinch River
UNW-015	UNW-015	G	G	ETTP-5					2		2			EWQP	Q2, Q4	
K-1070-F																
PCO Spring	PCO SPRING	S	G	ETTP-8	1				1		1		1	EWQP	Q2	Exit pathway: direct discharge to Poplar Creek
K-31																
UNW-43	UNW-043	G	G	ETTP-5			2				2			EWQP	Q2, Q4	Interior monitoring: K-33/K-31 area
BRW-30	BRW-030	G	G	ETTP-5			2				2			EWQP	Q2, Q4	
UNW-80	UNW-080*	G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	Exit pathway: direct discharge to Poplar Creek
BRW-066	BRW-066	G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	
Exit Pathway Monitoring for AWQC																
K-901A weir	K-901A*	S	G	ETTP-TBD				2	2	2	2		1	EWQP	Q2, Q4 2010	AWQC assessment at exit pathways
21-002 spring	21-002*	S	G	ETTP-TBD	2			2	2	2	2		1	EWQP	Q2, Q4 2010	
K-1007B weir	K-1007B*	S	G	ETTP-TBD				2	2	2	2		1	EWQP	Q2, Q4 2010	
K-1700 weir	K1700*	S	G	ETTP-TBD						2	2		1	EWQP	Q2, Q4 2010	
Biological Reference Sites																
Hinds Creek	HCK 20.6	B	NA	NA								1		BMAP	Q3	Bioaccumulation of PCBs in fish (redbreast sunfish or rockbass)
MBK 1.6	MBK 1.6	B	NA	NA								2		BMAP	Q1, Q3	Fish species diversity and density
ISK 1.0	ISK 1.0	B	NA	NA								2		BMAP	Q1, Q3	
MIK 1.4	MIK 1.4	B	NA	NA								1		BMAP	Q3	Benthic macroinvertebrate species diversity and density
Source Water																
114 Union Valley	SRC-Union Valley	Q	G	ETTP-7	4	4	4		4					EWQP	Q1-Q4	Source water sample

Table B.1. Sample locations and parameters at ETTP (continued)

Notes for ETTP Watershed Table B.1:

a **Sample medium:** G = groundwater, S = surface water, B = biological, and Q = water quality control sample.

b **Sample Type:** G = grab sample; NA = not applicable

c **Sample Group:** Sample locations grouped together for collection within as short a time period as possible per Appendix C tables.

d **AWQC:** Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D.21, MET(1), MET(4), VOC(1), SVOC per methods and PQLs contained therein.
These parameter groups are not itemized individually in Table B.1, but are listed separately in Table C.1. Biological monitoring conducted by the EWQP is provided in Table C.8.

e **Miscellaneous parameters:** For EWQP sampling locations, see Table C.1 for the specific parameter group to be collected.

f **Flow/Precipitation:** I = Instantaneous flow measurement (usually accompanied by a grab sample)

g **Program:** EWQP = ETTP Water Quality Program (implemented by EMEF); BMAP = Biological Monitoring and Abatement Program

h **Sample Frequency:** Q1..Q4 = lists sample schedule by FY quarters
FY2010 = Fiscal year of next scheduled sampling. Sampling conducted once every 5 years at a minimum (year prior to Five Year Review). See Table C.9.

* In "Primary station name" column, denotes high-priority locations for full data validation.

AWQC = ambient water quality criteria
EMEF = Environmental Management and Enrichment Facilities.
ETTP = East Tennessee Technology Park.
EWQP = Water Quality Project at ETTP
FY = fiscal year.
HCK = Hinds Creek kilometer
ISK = Ish Creek kilometer.
MBK = Mill Branch kilometer.
MIK = Mitchell Branch kilometer.
PQL = project quantitation limit
TDEC = Tennessee Department of Environment and Conservation

Table B.2. Sample locations and parameters in Bethel Valley Watershed

Sample location	Primary station name*	Sample medium[a]	Sample Type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
Bethel Valley Watershed Exit Pathways															
1198	1198	G	G	NA	1	1		1		1			EP	Q2	Bethel Valley Exit Pathway
1199	1199	G	G	NA	1	1		1		1			EP	Q2	
Raccoon Creek	RACNWEIR*	S	C	BVW-1				12				C	XWQP	M	
Raccoon Creek	RACNWEIR*	S	G	BVW-2				2		2			XWQP	Q2, Q4	
Raccoon Creek	RACNWEIR*	S	G	BVW-TBD					1	1			XWQP	Q4, 2010	
FT9B-2	2541-02	G	G	BVW-6		2	2	2		2			XWQP	Q2, Q4	
FT9B-5	2541-05	G	G	BVW-6		2	2	2		2			XWQP	Q2, Q4	
CH7A-5	4004-05	G	G	BVW-6	2			2		2			XWQP	Q2, Q4	
Bearden Creek	BRDNCREEK*	S	G	BVW-2		2		2		2		I	XWQP	Q2, Q4	
Unnamed watershed	NONAMEH20	S	G	BVW-3		1		1		1		I	XWQP	Q2	
4579-1	4579-1	G	G	BVW-6		2	2	2		2			XWQP	Q2, Q4	
4579-2	4579-2	G	G	BVW-6		2	2	2		2			XWQP	Q2, Q4	
4579-3	4579-3	G	G	BVW-6		2	2	2		2			XWQP	Q2, Q4	
Solid Waste Storage Area 3															
NWTRIB	NWT	S	C	BVW-1				12				C	XWQP	M	BV surface water contaminant flux and interior monitoring network
NWTRIB	NWT	S	G	BVW-2				2		2			XWQP	Q2, Q4	
NWTRIB	NWT*	S	G	BVW-TBD					1	1			XWQP	Q4, 2010	
Main Plant Area															
Fifth Creek	FIFTH CREEK	S	G	BVW-2		2		2		2		I	XWQP	Q2, Q4	BV surface water contaminant flux interior monitoring network
WOC-105	WOC-105	S	G	BVW-2		2		2		2		I	XWQP	Q2, Q4	
Rock Outcrop	ROC	S	G	BVW-2		2		2		2		I	XWQP	Q2, Q4	
Non-rad treatment	NONRAD	S	C	NA				12				C	EP	M	
WOC HI-PH-SEEP	WOC HI-PH-SEEP	S	G	BVW-4				12		12		I	XWQP	M	
3513 Seep	3513SEEP	S	G	BVW-4				12		12		I	XWQP	M	
GS-5	GS-5	S	G	BVW-2		2				2			XWQP	Q2,Q4	
GS-5	GS-5	S	G	BVW-4				12		12		I	XWQP	M	
WCK 3.9	WCK 3.9	B	NA	NA							1		BMAP	Q3	Bioaccumulation of Hg and PCBs in redbreast sunfish or bluegill and PCBs in stoneroller minnows
WCK 3.9	WCK 3.9	B	NA	NA							1		BMAP	Q3	Benthic macroinvertebrate species diversity and density
WCK 3.9	WCK 3.9	B	NA	NA							2		BMAP	Q1, Q2	Fish species diversity and density

Table B.2. Sample locations and parameters in Bethel Valley Watershed (continued)

Sample location	Primary station name*	Sample medium[a]	Sample Type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
WCK 6.8	WCK 6.8	B	NA	NA							1		BMAP	Q3	Benthic macroinvertebrate species diversity and density
WCK 6.8	WCK 6.8	B	NA	NA							2		BMAP	Q1, Q3	Fish species diversity and density
WCK 3.9	WCK 3.9	B	NA	NA							1		BMAP	Q4	TDEC Rapid Bioassessment Protocol[i]
WCK 6.8	WCK 6.8	B	NA	NA							1		BMAP	Q4	
Sewage Treatment Plant Effluent	Outfall X01	B	NA	NA							2		BMAP	Q1, Q3	Toxicity testing
Non-rad treatment	NonRAD	B	NA	NA							2		BMAP	Q1, Q3	
WBK 1.0	WBK 1.0	B	NA	NA							1		BMAP	Q3	Reference site. Benthic macroinvertebrate species diversity and density.
Outfall 341	OF341	S	G	BVW-4				12		12			XWQP	M	Monitor Corehole 8 discharge
Hinds Creek	HCK 20.6	B	NA	BC-11							2		YWQP	Q1, Q3	Bioaccumulation of Hg and PCBs in fish - redbreast sunfish or rockbass (reference site; see Table B.4)
Performance Assessment															
First Creek	FIRST CREEK	S	C	BVW-1				12				C	XWQP	M	BV surface water contaminant flux and interior monitoring network; Performance Assessment: Corehole 8 remedial effectiveness
First Creek	FIRST CREEK	S	G	BVW-2				2		2			XWQP	Q2, Q4	
First Creek	FIRST CREEK*	S	G	BVW-TBD					1	1			XWQP	Q4, 2010	
CH8 Sump	CH8SUMP	G	C	BVW-1				12				C	XWQP	M	
Third Street Bridge	3RDST_BRID	S	G	BVW-2		2		2		2		I	XWQP	Q2, Q4	BV Performance Assessment: SIOU remedy effectiveness
0812	0812	G	G	BVW-5				4		4			XWQP	Q1-Q4	BV Performance Assessment: Corehole 8 plume remedial effectiveness
4005 - CH8 Zone 2	CH8-2*	G	G	BVW-5				4		4			XWQP	Q1-Q4	
4411	4411	G	G	BVW-5				4					XWQP	Q1-Q4	
4570	4570	G	G	BVW-6				2		2			XWQP	Q2, Q4	
4571	4571	G	G	BVW-6				2		2			XWQP	Q2, Q4	
4572	4572	G	G	BVW-6				2		2			XWQP	Q2, Q4	
CH-33	CH33	G	G	BVW-3				1		1			XWQP	Q2	Corehole 33 plume monitoring
4585	4585	G	G	BVW-2				2		2			XWQP	Q2, Q4	
0875	0875	G	G	BVW-2				2		2			XWQP	Q2, Q4	BV Performance Assessment: SIOU remedy effectiveness
1102	1102	G	G	BVW-2	2			2		2			XWQP	Q2, Q4	
WC-9DW	WC-9 DW	G	WL	BVW-8						C			XWQP	C	Sr-90 Source Identification

Table B.2. Sample locations and paramete... in Bethel Valley Watershed (continued)

Sample location	Primary station name[a]	Sample medium[a]	Sample Type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
Bethel Valley 7000 Area VOC Plume															
4575-1	4575-1	G	G	BVW-6	2					2			XWQP	Q2, Q4	BV 7000 Area VOC groundwater plume monitoring
4575-2	4575-2	G	G	BVW-6	2					2			XWQP	Q2, Q4	
4575-3	4575-3	G	G	BVW-6	2					2			XWQP	Q2, Q4	
1201	1201	G	G	BVW-6	2					2			XWQP	Q2, Q4	
1202	1202	G	G	BVW-6	2					2			XWQP	Q2, Q4	
4576	4576	G	G	BVW-6	2					2			XWQP	Q2, Q4	
4581	4581	G	G	BVW-6	2					2			XWQP	Q2, Q4	
4582	4582	G	G	BVW-6	2					2			XWQP	Q2, Q4	
0754	0754	G	G	BVW-6	2					2			XWQP	Q2, Q4	
SP200	SP200	S	G	BVW-6	2					2			XWQP	Q2, Q4	
Bethel Valley Sr-90 Source Identification															
WC7500	WC7500	S	G	BVW-11				X		X			XWQP	TBD[j]	Follow up sampling for BV Sr-90 source identification
WOC SP02	WOC SP02	S	G	BVW-11				X		X			XWQP	TBD[j]	
3rd St. Bridge	3rd St. Bridge	S	G	BVW-11				X		X			XWQP	TBD[j]	
OF302	OF302	S	G	BVW-11				X		X			XWQP	TBD[j]	
OF304	OF304	S	G	BVW-11				X		X			XWQP	TBD[j]	
WOC HI PH Seep	WOC HI-PH-SEEP	S	G	BVW-11				X		X			XWQP	TBD[j]	
3513 Seep	3513 Seep	S	G	BVW-11				X		X			XWQP	TBD[j]	
GS-5	GS-5	S	G	BVW-11				X		X			XWQP	TBD[j]	
OF207	OF-207	S	G	BVW-11				X		X			XWQP	TBD[j]	
PMHWC-9	PMHWC-9	S	G	BVW-11				X		X			XWQP	TBD[j]	
"Snapshot" of Hg Concentrations in Surface Water															
Raccoon Creek	RACNWEIR	S	G	BVW-10		2							XWQP	Q2, Q4	Semi-annual assessment of Hg in surface waters in the White Oak Creek Watershed[k]
First Creek	FIRST CREEK	S	G	BVW-10		2							XWQP	Q2, Q4	
NWTRIB	NWT	S	G	BVW-10		2							XWQP	Q2, Q4	
WOC-105	WOC-105	S	G	BVW-10		2							XWQP	Q2, Q4	
Fifth Creek	FIFTH CREEK	S	G	BVW-10		2							XWQP	Q2, Q4	
Third Street Bridge	3RDST_BRID	S	G	BVW-10		2							XWQP	Q2, Q4	
7500-Bridge	WC7500	S	G	BVW-10		2							XWQP	Q2, Q4	
SWSA 4 SW1	SWSA4 SW1	S	G	BVW-10		2							XWQP	Q2, Q4	
WC Weir	WCWEIR	S	G	BVW-10		2							XWQP	Q2, Q4	
MB Weir	MBWEIR	S	G	BVW-10		2							XWQP	Q2, Q4	
WOD	WOD	S	G	BVW-10		2							XWQP	Q2, Q4	

Table B.2. Sample locations and paramete.. in Bethel Valley Watershed (continued)

Sample location	Primary station name*	Sample medium[a]	Sample Type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
Sediment Relention Structure (SRS)	SRS	S	G	BVW-10		2							XWQP	Q2, Q4	

Notes for Bethel Valley Watershed Table B.2:

a **Sample medium:** G = groundwater, S = surface water, and B = biological

b **Sample Type:** G = grab sample, C = composite (i e , flow-proportional), WL = water level, NA = not applicable

c **Sample Group:** Sample locations grouped together for collection within as short a time period as possible per Appendix C tables

d **AWQC:** Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D 21, MET(1), MET(4), VOC(1), and SVOC per methods and PQLs contained therein
These parameter groups are not itemized individually in Table B, but are listed separately in Table C
For Bethel Valley, AWQC parameters were analyzed in FY08 and will be analyzed in the year prior to the next CERCLA Five Year Review (2010)

e **Miscellaneous parameters:** For XWQP sampling locations in Bethel Valley, see Table C 2 for the specific parameter group to be collected

f **Flow/Precipitation:** C = continuous flow measurements (usually accompanied by a flow-proportional composite sample)
I = instantaneous flow measurement (usually accompanied by a grab sample)

g **Program:** XWQP = X-10 Water Quality Program (implemented by EMEF), EP = Environmental Protection, BMAP = Biological Monitoring and Abatement Program

h **Sample Frequency:** M = monthly,
Q1 Q4 = lists sample schedule by FY quarters
2010 = Fiscal year of next scheduled sampling Sampling conducted once every 5 years at a minimum (year prior to Five Year Review) See Table C 9
TBD = to be determined

Water Level Frequency: C = continuous water levels collected by transducer (recorded hourly, averaged daily)

i In FY 2008, the State of Tennessee issued a new NPDES permit to ORNL (Permit No TN0002941) All changes included in that permit have been incorporated into this SAP

j Grab samples to be collected per direction of XWQP manager, approximately up to 13 samples per location

k Monitoring locations within Sample Group No 10, the White Oak Creek Watershed, are provided on Figures A 3 (Bethel Valley) and A 4 (Melton Valley)
Samples within Sample Group No 10 shall be collected within as short a timeframe as possible to provide a "snapshot" of conditions with respect to Hg concentrations in surface water within the watershed

* In "Primary station name" column, denotes high-priority locations for full data validation

AWQC = ambient water quality criteria
BV = Bethel Valley
CH = corehole
EMEF = Environmental Management and Enrichment Facilities
FY = fiscal year
NPDES = National Pollutant Discharge Elimination System
NWTRIB = Northwest Tributary
ORNL = Oak Ridge National Laboratory
PQL = project quantitation limit
SAP = Sampling and Analysis Plan
SIOU = Surface Impoundments Operable Unit
TDEC = Tennessee Department of Environment and Conservation
WBK = Walker Branch kilometer
WCK = White Oak Creek kilometer
WOC = White Oak Creek

Table B.3. Sample locations and parameters in Melton Valley Watershed

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/ Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	COMMENTS
MELTON VALLEY ROD-GENERAL															
Sediment Retention Structure (SRS)	SRS*	S	G	MV-1	2	2		2		2			XWQP	Q2, Q4	MV ROD point of compliance for ARARs (AWQC) and risk-based remediation goals; Hydrologic isolation post-remediation compliance monitoring
Sediment Retention Structure (SRS)	SRS*	S	G	MV-TBD				2	2	2			XWQP	Q2, Q4 2010	
WOD	WOD*	S	G	MV-1	2	2		2		2			XWQP	Q2, Q4	
WOD	WOD*	S	G	MV-TBD		2		2	2	2			XWQP	Q2, Q4 2010	
MB Weir	MBWEIR*	S	G	MV-1	2	2		2		2			XWQP	Q2, Q4	
MB Weir	MBWEIR*	S	G	MV-TBD				2	2	2			XWQP	Q2, Q4 2010	
WC Weir	WCWEIR*	S	G	MV-1	2	2		2		2			XWQP	Q2, Q4	
WC Weir	WCWEIR*	S	G	MV-TBD		2		2	2	2			XWQP	Q2, Q4 2010	
MB-Headwaters	MB-HEADWATERS	S	G	MV-4	1	1		1		1			XWQP	Q4	
MB-Headwaters	MB-HEADWATERS	S	G	MV-TBD				1	1	1			XWQP	Q4 2010	
7500-Bridge	WC7500*	S	G	MV-1	2	2		2		2			XWQP	Q2, Q4	AWQC and risk-based remediation goals from BV influx.
7500-Bridge	WC7500*	S	G	MV-TBD		2		2	2	2			XWQP	Q2, Q4 2010	
7500-Bridge	WC7500	S	G	MV-2		12				12			XWQP	M	Hg influx from BV
West Seep Weir	WEST SEEP	S	G	MV-1	2	2		2		2		I	XWQP	Q2, Q4	Seepage Pits & Trenches and SWSA 6 remediation effectiveness
West Seep Weir	WEST SEEP	S	G	MV-TBD				2	2	2		I	XWQP	Q2, Q4 2010	
WOD	WOD	S	C	NA				12				C	EP	M	MV ROD long-term core monitoring of temporal/spatial contaminant distribution
MB Weir	MBWEIR	S	C	NA				12				C	EP	M	
WC Weir	WCWEIR	S	C	NA				12				C	EP	M	
7500-Bridge	WC7500*	S	C	MV-3				12		12		C	XWQP	M	
WAG 6 MS 3	WAG6 MS3	S	C	MV-3				12				C	XWQP	M	
West Seep Weir	WEST SEEP	S	G	MV-2				12		12		I	XWQP	M	
East Seep	EAST SEEP	S	G	MV-2				12		12		I	XWQP	M	
MB5 replacement	MB-UP	S	G	MV-1				2		2		I	XWQP	Q2, Q4	
MB1	MB1	S	G	MV-2				12		12		I	XWQP	M	

Table B.3. Sample locations and parameters in Melton Valley Watershed (continued)

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/ Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	COMMENTS
MB2	MB2	S	G	MV-2				12		12		I	XWQP	M	
ESA-MISC.	1867	S	G	MV-1	2	2	2	2		2			XWQP	Q2, Q4	Determine offsite migration of contamination
Melton Valley Low-Frequency Multi-port Well Zones (Group 2)	4537	G	P	MV-9b						1			XWQP	Q2	MV ROD exit pathway deep picket wells to monitor potential long-term, off-site groundwater releases
	4537-03*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4538	G	P	MV-9b						1			XWQP	Q2	
	4538-05*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4539	G	P	MV-9b						1			XWQP	Q2	
	4539-05*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4539-08*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4541	G	P	MV-9b						1			XWQP	Q2	
	4541-02*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4542	G	P	MV-9b						1			XWQP	Q2	
	4542-01*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4542-05	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4542-08*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
Melton Valley High-Frequency Multi-port Well Zones (Group 5)	4537-02*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4538-03*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4539-01*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4539-02*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
	4539-04*	G	G	MV-9b	1	1	1	1		1			XWQP	Q2	
Melton Valley Low-Frequency Multi-port Well Zones (Group 3)	4537	G	P	MV-9a						1			XWQP	Q4	MV ROD exit pathway deep picket wells to monitor potential long-term, off-site groundwater releases
	4537-04*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4538	G	P	MV-9a						1			XWQP	Q4	
	4538-02*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4538-06*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4539	G	P	MV-9a						1			XWQP	Q4	
	4539-06*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4540	G	P	MV-9a						1			XWQP	Q4	
	4540-03*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4541	G	P	MV-9a						1			XWQP	Q4	
	4541-03*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4542	G	P	MV-9a						1			XWQP	Q4	
	4542-02*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4542-06*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/ Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	COMMENTS
Melton Valley High-Frequency Multi-port Well Zones (Group 6)	4540-01*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4540-02*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4541-04*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4541-05*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4541-06*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
	4542-04*	G	G	MV-9a	1	1	1	1		1			XWQP	Q4	
1191	1191	G	G	NA	1	1	1	1		1			EP	Q2	Existing MV groundwater exit pathway wells
1239	1239	G	G	NA	1	1	1	1		1			EP	Q2	
WCK 2.3	WCK 2.3	B	SV	NA							1		BMAP	Q3	Benthic macroinvertebrate species diversity and density
WCK 2.3	WCK 2.3	B	NA	NA							1		BMAP	Q3	Bioaccumulation of Hg and PCBs in fish.
WCK 2.3	WCK 2.3	B	NA	NA							2		BMAP	Q1, Q3	Fish species community diversity and density
WCK 2.3	WCK 2.3	B	NA	NA							1		BMAP	Q4	TDEC Rapid Bioassessment Protocol[k]
MEK 0.2	MEK 0.2	B	NA	MV-12							1		XWQP	Q3	Bioaccumulation of COCs in redbreast sunfish
MEK 0.6	MEK 0.6	B	NA	MV-14							1		XWQP	Q4	TDEC Rapid Bioassessment Protocol[k]
MEK 0.6	MEK 0.6	B	SV	MV-12							1		XWQP	Q3	Benthic macroinvertebrate species diversity and density
MEK 0.6	MEK 0.6	B	SV	MV-13							2		XWQP	Q1, Q3	Fish community species diversity and density
MEK 1.4	MEK 1.4	B	SV	NA							2		BMAP	Q1, Q3	Fish community species diversity and density
MBK 1.6	MBK 1.6	B	SV	NA							2		BMAP	Q1, Q3	
BFK 7.6	BFK 7.6	B	SV	NA							2		BMAP	Q1, Q3	
WCK 1.5	WCK 1.5	B	NA	MV-12							1		XWQP	Q3	Bioaccumulation of Hg and PCBs in fish (bluegill and largemouth bass)
WCK 2.9	WCK 2.9	B	NA	NA							1		BMAP	Q3	Bioaccumulation of Hg and PCBs in fish (redbreast sunfish)

Table B.3. Sample locations and parameters in Melton Valley Watershed (continued)

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/ Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	COMMENTS
MELTON VALLEY HYDROLOGIC ISOLATION PROJECT															
HI Project-wide Monitoring Locations															
SW-HI-2 (effluent)	EQ TANK	G	G	MV-11	12	12	12	12		12			XWQP	M	Equalization Holding Tank groundwater collection monitoring, Treatment Plant compliance
Solid Waste Storage Area 4															
SWSA 4 SW1	SWSA4 SW1	S	C	MV-3				12				C	XWQP	M	Measure strontium and Cs-137 flux post-remediation
SWSA 4 SW1	SWSA4 SW1	S	G	MV-2		12				12		I	XWQP	M	Measure post-remediation mercury flux
SWSA 4 SW1	SWSA4 SW1*	S	G	MV-1	2	2		2		2		I	XWQP	Q2, Q4	Post-remediation point-of-compliance for SWSA 4 AWQC and risk-based remediation goals
SWSA 4 SW1	SWSA4 SW1*	S	G	MV-TBD				2	2	2		I	XWQP	Q2, Q4 2010	
4543 (PZ-1)	4543	G	WL	MV-10						C			XWQP	C	Evaluate effectiveness of cap at controlling water table fluctuations and groundwater flow through SWSA 4
4544 (PZ-2)	4544	G	WL	MV-10						C			XWQP	C	
4545 (PZ-3)	4545	G	WL	MV-10						C			XWQP	C	
4546 (PZ-4)	4546	G	WL	MV-10						C			XWQP	C	
4547 (PZ-5A)	4547	G	WL	MV-10						C			XWQP	C	
4548 (PZ-5B)	4548	G	WL	MV-10						C			XWQP	C	
4588 (PZ-6AR)	4588	G	WL	MV-10						C			XWQP	C	
4550 (PZ-6B)	4550	G	WL	MV-10						C			XWQP	C	
4551 (PZ-7A)	4551	G	WL	MV-10						C			XWQP	C	
4552 (PZ-7B)	4552	G	WL	MV-10						C			XWQP	C	
4553 (PZ-8A)	4553	G	WL	MV-10						12			XWQP	Mthly	
4554 (PZ-8B)	4554	G	WL	MV-10						12			XWQP	Mthly	
4555 (PZ-9)	4555	G	WL	MV-10						C			XWQP	C	
4556 (PZ-10)	4556	G	WL	MV-10						C			XWQP	C	
4557 (PZ-11)	4557	G	WL	MV-10						12			XWQP	Mthly	
4558 (PZ-12)	4558	G	WL	MV-10						12			XWQP	Mthly	
4559 (PZ-13)	4559	G	WL	MV-10						12			XWQP	Mthly	
4589 (PZ-14R)	4589	G	WL	MV-10						C			XWQP	C	
4561 (PZ-15)	4561	G	WL	MV-10						12			XWQP	Mthly	
4562 (PZ-16)	4562	G	WL	MV-10						12			XWQP	Mthly	
4563 (PZ-17)	4563	G	WL	MV-10						12			XWQP	Mthly	

Table B.3. Sample locations and parameters in Melton Valley Watershed (continued)

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/ Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	COMMENTS
4591 (PZ-20)	4591	G	WL	MV-10						C			XWQP	C	
4595 (PZ-24)	4595	G	WL	MV-10						C			XWQP	C	
4596 (PZ-25)	4596	G	WL	MV-10						C			XWQP	C	
4598 (PZ-27)	4598	G	WL	MV-10						C			XWQP	C	
4599 (PZ-28	4599	G	WL	MV-10						C			XWQP	C	
4605 (PZ-34)	4605	G	WL	MV-10						C			XWQP	C	
4606 (PZ-35)	4606	G	WL	MV-10						C			XWQP	C	
4607 (PZ-36)	4607	G	WL	MV-10						C			XWQP	C	
4611(PZ-40)	4611	G	WL	MV-10						C			XWQP	C	
0949	0949	G	WL	MV-10						C			XWQP	C	
0950	0950	G	WL	MV-10						C			XWQP	C	
0952	0952	G	WL	MV-10						12			XWQP	Mthly	
0955	0955	G	WL	MV-10						12			XWQP	Mthly	
0956	0956	G	WL	MV-10						4			XWQP	Qtly	
0958	0958	G	WL	MV-10						4			XWQP	Qtly	
0960	0960	G	WL	MV-10						4			XWQP	Qtly	
0962	0962	G	WL	MV-10						4			XWQP	Qtly	
1071	1071	G	WL	MV-10						4			XWQP	Qtly	
MV Valve Pit 3/SWSA4	SWSA4 DGT	G	G	MV-11				4		4			XWQP	Q1 - Q4	Groundwater collection monitoring
Upgradient Drain East	SWSA4 UDE	G	G	MV-11				4		4		I	XWQP	Q1 - Q4	Upgradient diverted water quality.
Upgradient Drain West	SWSA4 UDW	G	G	MV-11				4		4		I	XWQP	Q1 - Q4	
WAG 4 Meteorological Station	WAG4MET	-	-	MV-7								X	XWQP	D	SWSA 4 rainfall
Solid Waste Storage Area 5															
MB-2 (alias MB-15)	MB2	S	G	MV-4	1	1		*(I)*		1		I	XWQP	Q4	Post-remediation point of compliance for SWSA 5 AWQC and risk-based remediation goals
MB-2 (alias MB-15)	MB2	S	G	MV-TBD				*(I)*	1	1		I	XWQP	Q4 2010	
HRT-3	HRT-3	S	G	MV-4	1	1		*(I)*		1		I	XWQP	Q4	

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/ Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	COMMENTS
SW-HI-5	SWSA5D1	S	G	MV-1	2	2		2		2		I	XWQP	Q2, Q4	SWSA 5 remediation effectiveness
SW-HI-5	SWSA5D1	S	G	MV-TBD				2	2	2		I	XWQP	Q2,Q4 2010	
SW-HI-5	SWSA5D1	S	G	MV-2				12		12		I	XWQP	M	
SW-HI-6	HRT-1A	S	G	MV-1	2	2		2		2		I	XWQP	Q2, Q4	
SW-HI-6	HRT-1A	S	G	MV-TBD				2	2	2			XWQP	Q2, Q4 2010	
HRT-10	HRT-10	S	G	MV-1	2	2		2		2			XWQP	Q2, Q4	
0666	0666	G	WL	MV-10						12			XWQP	Mthly	Evaluate effectiveness of cap at controlling water table fluctuations and groundwater flow through SWSA 5 South
1734	1734	G	WL	MV-10						C			XWQP	C	
0436	0436	G	WL	MV-10						12			XWQP	Mthly	
1766	1766	G	WL	MV-10						12			XWQP	Mthly	
2026	2026	G	WL	MV-10						C			XWQP	C	
0710	0710	G	WL	MV-10						12			XWQP	Mthly	
0711	0711	G	WL	MV-10						12			XWQP	Mthly	
0443	0443	G	WL	MV-10						12			XWQP	Mthly	
SS-8.2	SS-8.2	G	WL	MV-10						C			XWQP	C	
0145	0145	G	WL	MV-10						C			XWQP	C	
0504	0504	G	WL	MV-10						12			XWQP	Mthly	
4175	4175	G	WL	MV-10						12			XWQP	Mthly	
4212	4212	G	WL	MV-10						12			XWQP	Mthly	
4224	4224	G	WL	MV-10						12			XWQP	Mthly	
4188	4188	G	WL	MV-10						12			XWQP	Mthly	
4193	4193	G	WL	MV-10						12			XWQP	Mthly	
4204	4204	G	WL	MV-10						12			XWQP	Mthly	
2018	2018	G	WL	MV-10						12			XWQP	Mthly	Evaluate effectiveness of cap at controlling water table fluctuations and groundwater flow through SWSA 5 North Trench 4 Area
2019	2019	G	WL	MV-10						12			XWQP	Mthly	
2020	2020	G	WL	MV-10						12			XWQP	Mthly	
MV Valve Pit 2/SWSA 5	SWSA5 DGT	G	G	MV-11				4		4			XWQP	Q1 - Q4	Groundwater collection monitoring
Solid Waste Storage Area 6															
WAG 6 MS 3	WAG6 MS3	S	G	MV-1	2	2		2		2			XWQP	Q2, Q4	SWSA 6 Post-remediation compliance
WAG 6 MS 3	WAG6 MS3	S	G	MV-TBD				2	2	2			XWQP	Q2, Q4 2010	

Table B.3. Sample locations and parameters in Melton Valley Watershed (continued)

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/ Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	COMMENTS
IWMF Outfall	IWMF-1	S	G	MV-1		2		2		2		I	XWQP	Q2, Q4	IWMF hydrologic isolation performance
IWMF UnderPAD	IWMF-2	S	G	MV-1		2		2		2		I	XWQP	Q2, Q4	
IWMF PAD	IWMF-3	S	G	MV-1		2		2		2		I	XWQP	Q2, Q4	
OF287	IWMF-4	S	G	MV-1		2		2		2		I	XWQP	Q2, Q4	
49FD-1	SFD	S	G	MV-1	2	2		2		2		I	XWQP	Q2, Q4	SWSA 6 cap performance
49FD-2	WFD	S	G	MV-1	2	2		2		2		I	XWQP	Q2, Q4	
Tumulus 1 Pad	TUM1P	G	G	MV-7				12					XWQP	M	Tumulus performance
Tumulus 1 Underpad	TUM1UP	G	G	MV-7				12					XWQP	M	
Tumulus 2 Pad	TUM2P	G	G	MV-7				12					XWQP	M	
Tumulus 2 Underpad	TUM2UP	G	G	MV-7				12					XWQP	M	
Hillcut Test Facility Pad	HCTANK1P	S	G	MV-5		2				2			XWQP	Q1, Q3	Tumulus area groundwater quality monitoring.
1036	1036	G	G	MV-6				2		2			XWQP	Q2, Q4	
1037	1037	G	G	MV-6				2		2			XWQP	Q2, Q4	
1039	1039	G	G	MV-6				2		2			XWQP	Q2, Q4	
1254	1254	G	G	MV-6				2		2			XWQP	Q2, Q4	
1257	1257	G	G	MV-6				2		2			XWQP	Q2, Q4	
1258	1258	G	G	MV-6				2		2			XWQP	Q2, Q4	
SWSA 6 UGT-2	UGT-2	S	G	MV-11		1		1		1		I	XWQP	Q2 storm	Groundwater collection monitoring; SWSA 6 Cap C UGT stormwater quality
0835	0835	G	G	MV-5	2			2		2			XWQP	Q1, Q3	SWSA 6 RCRA (RCRA PCP monitoring)
0837	0837	G	G	MV-5	2	2		2		2			XWQP	Q1, Q3	
0838 (replaces former SWSA 6 MS1)	0838	G	G	MV-5	2			2		2			XWQP	Q1, Q3	
0841	0841	G	G	MV-5	2			2		2			XWQP	Q1, Q3	
0842	0842	G	G	MV-5	2			2		2			XWQP	Q1, Q3	
0843	0843	G	G	MV-5	2			2		2			XWQP	Q1, Q3	
0844	0844	G	G	MV-5	2			2		2			XWQP	Q1, Q3	
0846	0846	G	G	MV-5	2			2		2			XWQP	Q1, Q3	
4315	4315	G	G	MV-5	2	2		2		2			XWQP	Q1, Q3	
4316	4316	G	G	MV-5	2			2		2			XWQP	Q1, Q3	
4317	4317	G	G	MV-5	2			2		2			XWQP	Q1,Q3	
0850	0850	G	WL	MV-10						C			XWQP	C	Evaluate effectiveness of cap at controlling water table fluctuations and groundwater flow through SWSA 6
2217	2217	G	WL	MV-10						C			XWQP	C	

Table B.3. Sample locations and parameters in Melton Valley Watershed (continued)

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/ Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	COMMENTS
0399	0399	G	WL	MV-10						12			XWQP	Mthly	Area
0836	0836	G	WL	MV-10						12			XWQP	Mthly	
0845	0845	G	WL	MV-10						12			XWQP	Mthly	
0848	0848	G	WL	MV-10						12			XWQP	Mthly	
0938	0938	G	WL	MV-10						12			XWQP	Mthly	
4127	4127	G	WL	MV-10						12			XWQP	Mthly	
1036	1036	G	WL	MV-10						C			XWQP	C	Evaluate effectiveness of cap at controlling water table fluctuations and groundwater flow through Tumulus Area
1037	1037	G	WL	MV-10						12			XWQP	Mthly	
1039	1039	G	WL	MV-10						12			XWQP	Mthly	
1257	1257	G	WL	MV-10						12			XWQP	Mthly	
WAG 7 Pits and Trenches															
SW 7-5 (T7-Trib)	SW7-5	S	G	MV-4		1		1		1		I	XWQP	Q4	Trench 7 remediation effectiveness
SW 7-6	SW7-6	S	G	MV-1		2	2	2		2		I	XWQP	Q2, Q4	Trench 6 remediation effectiveness
SW-HI-7 (WC TRIB-1)	WC TRIB-1	S	G	MV-4		1		1		1		I	XWQP	Q4	Trench 5 & 7 remediation effectiveness
SW-HI-8 (EAST SEEP)	EAST SEEP	S	G	MV-1		2	2	*(I)*		2		I	XWQP	Q2, Q4	Seepage Pits & Trenches/Trench 5 remediation effectiveness
SW-HI-10 (UWS)	UWS	S	G	MV-4	1	1		1		1		I	XWQP	Q4	SWSA 4 west upstream of Pits 2,3,4
MV Valve Pit 1/P&T	WAG7 DGT	G	G	MV-11				4		4			XWQP	Q1 - Q4	Groundwater collection monitoring; post-remediation monitoring; UGT-1-upgradient trench outfall, Trench 7 leak site
Trench 7 UGT-1	UGT-1	S	G	MV-11		1		1		1		I	XWQP	Q2 storm	
0055	0055	G	WL	MV-10						C			XWQP	C	Evaluate effectiveness of cap at controlling water table fluctuations and groundwater flow through Pits 2,3, and 4 Area
0052	0052	G	WL	MV-10						12			XWQP	Mthly	
0057	0057	G	WL	MV-10						12			XWQP	Mthly	
0125	0125	G	WL	MV-10						12			XWQP	Mthly	
2730	2730	G	WL	MV-10						12			XWQP	Mthly	
2815	2815	G	WL	MV-10						12			XWQP	Mthly	
0678	0678	G	WL	MV-10						12			XWQP	Mthly	Evaluate effectiveness of cap at controlling water table fluctuations and groundwater flow through Trench 6 Area
1758	1758	G	WL	MV-10						12			XWQP	Mthly	
1760	1760	G	WL	MV-10						12			XWQP	Mthly	
MELTON VALLEY SOILS AND SEDIMENT															
HFIR Cobalt Seep	HFIR SEEP	S	G	MV-1				2		2			XWQP	Q2, Q4	HFIR, HRE Ponds post action monitoring
HRT-3	HRT-3*	S	G	MV-2				12		12		I	XWQP	M	

Table B.3. Sample locations and parameters in Melton Valley Watershed (continued)

Sample location	Primary station name[a]	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/ Precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	COMMENTS
HRT-10	HRT-10*	S	G	MV-2				12		12		I	XWQP	M	
0662	0662	G	G	MV-6				2		2			XWQP	Q2, Q4	HFIR Pond remediation monitoring
1152	1152	G	G	MV-6				2		2			XWQP	Q2, Q4	
WAG 7 IN-SITU GROUTING															
0106	0106	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	Pits and Trenches baseline and interior groundwater quality monitoring wells
1076	1076	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1077	1077	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1078	1078	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1079	1079	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
4569	4569	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1081	1081	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1082	1082	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1083	1083	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1084	1084	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1085	1085	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1086	1086	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1244	1244	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1245	1245	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
0935	0935	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1752	1752	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1755	1755	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1756	1756	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
4587	4587	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
4564	4564	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
4565	4565	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
0932	0932	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1712	1712	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1784	1784	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
1791	1791	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
4566	4566	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
4567	4567	G	G	MV-8		2	2	2		2			XWQP	Q2, Q4	
SEEP D REMOVAL ACTION															
MV Valve Pit 1/SPD	SEEPD VB	G	G	MV-11				4		4			XWQP	Q1 - Q4	Seep D groundwater collection monitoring

<u>Notes for Melton Valley Watershed Table B.3:</u>

a **Sample medium:** G = groundwater, S = surface water, and B = biological

b **Sample Type:** G = grab sample, C = composite (e g , flow-proportional), WL = water level, SV = survey, P = pressure profile, NA = not applicable

c **Sample Group:** Sample locations grouped together for collection within as short a time period as possible per Appendix C tables

d **AWQC** Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D 21, in addition to MET(1), MET(4), VOC(1), and SVOC, per methods and PQLs contained therein These parameter groups are not itemized individually in Table B, but are listed separately in Table C

e **Miscellaneous parameters:** For XWQP sample locations in Melton Valley, see Table C 3 for the specific parameter group to be collected Biological monitoring conducted by] the XWQP is provided in Table C 8 Miscellaneous may include general water quality parameters (e g , total dissolved solids, total suspended solids, total organic carbon, temperature, dissolved oxygen, turbidity, pH, conductivity, oxidation-reduction potential) and water levels (in wells)

f **Flow/Precipitation:** C = continuous flow measurements I = instantaneous flow measurement X = precipitation

g **Program:** XWQP = X-10 Water Quality Program (implemented by EMEF), EP = Environmental Protection (UT-Battelle), BMAP = Biological Monitoring and Abatement Program

h **Sample Frequency:**
D = Daily
M = Monthly
2010 = Fiscal year of next scheduled sampling Sampling conducted once every 5 years at a minimum (year prior to Five Year Review) See Table C 9
Q1 Q4 = lists sample schedule for FY quarters

Water Level Frequency:
Qtly = water levels collected manually once per quarter
Mthly = water levels collected manually once per month
C = continuous water level data collected by data recorder with transducer, recorded hourly and averaged daily, data loggers are calibrated weekly and downloaded monthly

k In FY 2008, the State of Tennessee issued a new NPDES permit to ORNL (Permit No TN0002941) All changes included in that permit have been incorporated into this SAP

l Required monitoring for radiological constituents are reflected elsewhere in Table B 3 for this location

* In "Primary station name" column, denotes high priority locations for full data validation

ARAR = applicable or relevant and appropriate requirement
AWQC = ambient water quality criteria
BV = Bethel Valley
COC = contaminant of concern
EMEF = Environmental Management and Enrichment Facilities
HFIR = High-Flux Isotope Reactor
HI = hydraulic isolation
HRE = Homogeneous Reactor Experiment
HRT = Homogeneous Reactor Test
IWMF = Interim Waste Management Facility
MB Weir = Melton Branch Weir
MEK = Melton Branch kilometer
MV = Melton Valley
NPDES = National Pollutant Discharge Elimination System
ORNL = Oak Ridge National Laboratory
PCP = Post Closure Permit
PQL = project quantitation limit
RCRA = Resource Conservation and Recovery Act of 1976
ROD = Record of Decision
SFD = South French Drain
SRS = sediment retention structure
SWSA = Solid Waste Storage Area
TDEC = Tennessee Department of Environment and Conservation
WAG = Waste Area Grouping
WC Weir = White Oak Creek Weir
WCK = White Oak Creek kilometer
WOD = White Oak Dam

Table B.4. Sample locations and parameters in Bear Creek Valley Watershed

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/Precipitation[f]	Sampling program[g]	FY 2008 Sampling Frequency[h]	Comments
BCK 3.3	BCK 3.3	B	NA	BC-10								2		YWQP	Q1, Q3	Fish and benthic macroinvertebrate species diversity and density
BCK 3.3	BCK 3.3	B	NA	BC-11								2		YWQP	Q1, Q3	Bioaccumulation of Hg, metals (including uranium), and PCBs in fish [2 species: stoneroller minnows (whole body) and rock bass (fillets - Hg and PCBs only)]
BCK 3.3	BCK 3.3	B	NA	BC-4a								1		YWQP	Q4	TDEC Rapid Bioassessment Protocol
BCK 3.3	BCK 3.3	S	G	BC-TBD			4	4	4	4	4		I	YWQP	FY 2010 (Q1-Q4)	Test compliance with AWQC
BCK 4.6	BCK 4.6	B	NA	BC-4b								1		YWQP	Q4	Riparian monitoring
BCK 4.6	BCK 4.6	B	NA	BC-10								2		YWQP	Q1, Q3	Fish and benthic macroinvertebrate species diversity and density
BCK 4.6	BCK 4.6	B	NA	BC-4a								1		YWQP	Q4	TDEC Rapid Bioassessment Protocol
BCK4.55 (Outfall 304)	BCK4.55	S	G	NA	1		1	1	1		1			ECD–WCS	Q2	
BCK4.55 (Outfall 304)	BCK4.55	S	G	BC-TBD	3		3	3	3		3		I	YWQP	FY 2010 (Q1, Q2, Q4)	Watershed performance assessment and exit pathway
Red Tail Hawk Spring	SS-6.6	S	G	BC-TBD	4		4	4	4		4		I	YWQP	FY 2010 (Q1-Q4)	
SS-7	SS-7	S	G	BC-TBD	4		4	4	4		4		I	YWQP	FY 2010 (Q1-Q4)	Springs in Zone 1 that mark the outfall of intermediate and along-strike flow paths in the Maynardville Limestone
SS-8	SS-8	S	G	BC-TBD	4		4	4	4		4		I	YWQP	FY 2010 (Q1-Q4)	
Zone 1 – Zone 2 Boundary																
BCK 7.87	BCK-07.87*	S	G	BC-TBD			4	4	4	4	4		I	YWQP	FY 2010 (Q1-Q4)	Test for compliance with AWQC, analyze for metals (including Hg and U) and nitrate at the boundary between Zone 1 and Zone 2
GW-712	GW-712	G	G	BC-1	2		2	2	2		2			YWQP	Q2, Q4	Groundwater monitoring at the boundary between Zone 1 and Zone 2; SS-6 sampling location represents combined flow from SS-6 East and SS-6 West (also see RCRA Post-closure Permit monitoring group below).
GW-713	GW-713*	G	G	BC-1	2		2	2	2		2			YWQP	Q2, Q4	
GW-714	GW-714	G	G	BC-1	2		2	2	2		2			YWQP	Q2, Q4	
SS-6 (combined flow)	SS-6*	S	G	BC-1	2		2	2	2		2			YWQP	Q2, Q4	

Table B.4. Sample locations and parameters in Bear Creek Valley Watershed (continued)

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/Precipitation[f]	Sampling program[g]	FY 2008 Sampling Frequency[h]	Comments
Zone 2 – Zone 3 Boundary (Integration Plane)																
BCK 9.9	BCK 9.9	B	NA	BC-10								2		YWQP	Q1, Q3	Fish and benthic macroinvertebrate species diversity and density
BCK 9.9	BCK 9.9	B	NA	BC-11								2		YWQP	Q1, Q3	Bioaccumulation of Hg, metals (including uranium), and PCBs in fish [1 species: stoneroller minnows (whole body)]
BCK 9.9	BCK 9.9	B	NA	NA								2		BMAP	Q1, Q3	Toxicity testing
BCK 9.9	BCK 9.9	B	NA	BC-4a								1		YWQP	Q4	TDEC Rapid Bioassessment Protocoli
SS-5	SS-5	S	G	NA	1		1	1	1		1			ECD–WCS	Q4	
SS-5	SS-5	S	G	BC-TBD	3		3	3	3		3		I	YWQP	FY 2010 (Q1-Q4)	Measurement of human health risk in the exit pathway; validate establishment of new IP at BCK 9.2.
BCK 9.2	BCK9.2	S	G	BC-TBD			4	4	4	4	4		I	YWQP	FY 2010 (Q1-Q4)	In year before the FYR, test for compliance with AWQC and analyze for COCs (metals, including Hg and U, and nitrate) at IP.
BCK 9.2	BCK9.2*	S	C	BC-5					52				C	YWQP	W	Measurement of uranium flux reduction at the IP
SS-5	SS-5	S	C	BC-5					52				C	YWQP	W	Determine ungaged uranium flux at the IP
GW-683	GW-683	G	G	BC-7	2		2	2	2		2			YWQP	Q2, Q4	Measurement of human health risk at the Phase I ROD IP. Analyze for COCs in wells: metals (including Hg and Cd) , nitrate, U.
GW-684	GW-684	G	G	BC-7	2		2	2	2		2			YWQP	Q2, Q4	
GW-077	GW-077	G	G	BC-7	2		2				2			YWQP	Q2, Q4	Monitoring groundwater in the Nolichucky Shale exit pathway along strike from the Burial Grounds
GW-078	GW-078	G	G	BC-7	2		2				2			YWQP	Q2, Q4	
GW-079	GW-079	G	G	BC-7	2		2				2			YWQP	Q2, Q4	
GW-080	GW-080	G	G	BC-7	2		2				2			YWQP	Q2, Q4	
Zone 3																
Combined S-3 Site, Boneyard/Burnyard, and EMWMF Remedial Actions																
GW-704	GW-704	G	G	BC-7	2		2	2	2		2			YWQP	Q2, Q4	Picket B wells provide the first location to monitor change in the groundwater exit pathway downgradient from the S-3 Site and BYBY.
GW-706	GW-706	G	G	BC-7	2		2	2	2		2			YWQP	Q2, Q4	
EMW-VWEIR	EMW-VWEIR	S	G	BC-12			6		6		6			YWQP	Bi-M (storm flow)	EMWMF sedimentation basin discharge point. Collect during flow immediately downstream of EMW-VWEIR and above confluence of discharge with NT-5.
NT-5 H Flume	NT-05	S	G	BC-5					52				I	YWQP	W	Collect additional information to increase accuracy of BCK uranium flux calculations

Table B.4. Sample locations and parameters in Bear Creek Valley Watershed (continued)

Sample location	Primary station name[a]	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/Precipitation[f]	Sampling program[g]	FY 2008 Sampling Frequency[h]	Comments
S-3 Site Remedial Actions																
BCK 12.4	BCK 12.4	B	NA	BC-10								2		YWQP	Q1, Q3	Fish and benthic macroinvertebrate species diversity and density
BCK 12.4	BCK 12.4	B	NA	BC-11								2		YWQP	Q1, Q3	Bioaccumulation of Hg and metals (including uranium) in fish [1 species: stoneroller minnows (whole body)]
BCK 12.4	BCK 12.4	B	NA	BC-4a								1		YWQP	Q4	TDEC Rapid Bioassessment Protocoli
BCK 12.4	BCK 12.4	B	NA	NA								2		BMAP	Q1, Q3	Toxicity testing
BCK 12.34	BCK 12.34	S	C	BC-5				52	52				C	YWQP	W	Measure uranium (isotopic) and nitrate flux, and Cd (monthly grab) from the S-3 Site.
BCK 12.34	BCK 12.34	S	G	BC-6			12				12			YWQP	M	
BCK 12.34	BCK 12.34*	S	G	BC-TBD			4	4	4	4	4		I	YWQP	FY 2010 (Q1-Q4)	In upper reaches of Bear Creek, monitor for compliance with AWQCs and COCs (nitrates and metals, including Cd, Hg, and total U with MDL ≤0.004 mg/L)
BCK 12.47	BCK 12.47	S	G	BC-TBD			4				4		I	YWQP	FY 2010 (Q1-Q4)	
NT-1	NT-01	S	G	NA	1		1	1	1		1			ECD–WCS	Q2	Subsequent to completion of remedial action for Pathway 1, monitor compliance with AWQC and COCs (nitrates and metals, including Cd and U). Collect baseline data in year prior to Five Year Review before completion of action.
NT-1	NT-01	S	G	BC-TBD				4	4	4	4		I	YWQP	FY 2010 (Q1-Q4)	
NT-2	NT-02	S	C	BC-5				52					C	YWQP	W	Monitor for nitrate flux in the S-3 Site Pathway 3.
NT-2	NT-02	S	G	BC-TBD			4	4	4	4	4		I	YWQP	FY 2010 (Q1-Q4)	Test for compliance with AWQC, metals, and nitrate in NT-02; Monitor for breakthrough of uranium in the S-3 Site Pathway 3.
Boneyard/Burnyard Remedial Action																
NT-3	NT-03	S	G	BC-6					12		12		I	YWQP	M	Measure uranium flux from BYBY.
NT-3	NT-03	S	G	BC-TBD				4	4	4	4			YWQP	FY 2010 (Q1-Q4)	Test for compliance with AWQC, analyze for metals (Hg)
NT-3	NT-03	B	NA	BC-10								2		YWQP	Q1, Q3	Fish and benthic macroinvertebrate species diversity and density
NT-3	NT-03	B	NA	BC-4a								1		YWQP	Q4	TDEC Rapid Bioassessment Protocoli
BCK 11.54	BCK 11.54	S	C	BC-5					52				C	YWQP	W	Measure flux of uranium below NT-3; Use BCK 11.54 as upgradient IP for Bear Creek Burial Grounds.
BCK 11.54	BCK 11.54	S	G	BC-TBD				4	4	4	4		I	YWQP	FY 2010 (Q1-Q4)	Test for compliance with AWQC and analyze for COCs (metals, including Hg, Cd, and U; nitrate)
NT-3	NT-03	NA	NA	NA							1			YWQP	Q4	Stream channel stability survey performed by DOE (S.Brown)

Table B.4. Sample locations and parameters ... Bear Creek Valley Watershed (continued)

Sample location	Primary station name[a]	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/Precipitation[f]	Sampling program[g]	FY 2008 Sampling Frequency[h]	Comments
Bear Creek Burial Grounds																
NT-7	NT-07	S	G	BC-7	2		2	2	2		2			YWQP	Q2, Q4	Baseline monitoring in NT-7 and NT-8 for proposed actions in BCBG. Establish baseline for East and West forks of NT-8 as baseline for individual seep actions (BCBG C-E vs. C-W).
NT-8	NT-08	S	G	BC-7	2		2	2			2			YWQP	Q2, Q4	
NT-7	NT-07	S	G	BC-6					10		10		I	YWQP	M	Determine the relative contribution of the Bear Creek Burial Grounds to uranium flux at BCK 9.2 (monthly, except in months of semiannual grab sample)
NT-8	NT-08	S	C	BC-5					52				C	YWQP	W	Determine relative contribution of the BCBGs to uranium flux at BCK 9.2.
Biological Reference Sites																
GHK 1.6	GHK 1.6	B	NA	BC-10								2		YWQP	Q1, Q3	Benthic macroinvertebrate species diversity and density
GHK 2.9	GHK 2.9	B	NA	BC-10								2		YWQP	Q1, Q3	
MBK 1.6	MBK 1.6	B	NA	BC-10								2		YWQP	Q1, Q3	Fish and benthic macroinvertebrate species diversity and density
PHK 1.6	PHK 1.6	B	NA	BC-10								2		YWQP	Q1, Q3	Fish species diversity and density
Hinds Creek	HCK 20.6	B	NA	BC-11								2		YWQP	Q1, Q3	Bioaccumulation of Hg, metals (including uranium), and PCBs in fish [2 species: stoneroller minnows (whole body) and rock bass (fillets - Hg and PCBs only)]
RCRA Post-Closure Corrective Action Monitoring																
GW-712	GW-712	G	G	BC-1	2		2	2	2		2			YWQP	Q2, Q4	RCRA PCP for BCV: Plume delineation monitoring locations (also see Zone 1/Zone 2 boundary groundwater monitoring requirement for CERCLA)
GW-713	GW-713*	G	G	BC-1	2		2	2	2		2			YWQP	Q2, Q4	
GW-714	GW-714	G	G	BC-1	2		2	2	2		2			YWQP	Q2, Q4	
SS-6 (combined flow)	SS-6*	S	G	BC-1	2		2	2	2		2			YWQP	Q2, Q4	
GW-008	GW-008	G	G	BC-1	2		2		2		2			YWQP	Q2, Q4	RCRA PCP Point of Compliancef well: Oil Landfarm
GW-046	GW-046	G	G	BC-1	2		2		2		2			YWQP	Q2, Q4	RCRA PCP Point of Compliance well: BCBG
GW-276	GW-276	G	G	BC-1	2		2	2	2		2			YWQP	Q2, Q4	RCRA PCP Point of Compliance well: S-3 Site
"Snapshot" of Hg Concentrations in Surface Water																
BCK 9.2	BCK-9.2	S	G	BC-13			2							YWQP	Q2, Q4	
NT-8	NT-08	S	G	BC-13			2							YWQP	Q2, Q4	

Table B.4. Sample locations and parameters ... Bear Creek Valley Watershed (continued)

Sample location	Primary station name[a]	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/Precipitation[f]	Sampling program[g]	FY 2008 Sampling Frequency[h]	Comments
SS-5	SS-5	S	G	BC-13			2							YWQP	Q2, Q4	Semiannual assessment of Hg in surface water in Bear Creek watershed
SS-4	SS-4	S	G	BC-13			2							YWQP	Q2, Q4	
BCK 11.54	BCK 11.54	S	G	BC-13			2							YWQP	Q2, Q4	
BCK 12.34	BCK 12.34	S	G	BC-13			2							YWQP	Q2, Q4	

Notes for Bear Creek Valley Watershed Table B.4:

a **Sample Medium:** G = groundwater, S = surface water, B = biological, and NA = not applicable

b **Sample type:** G = grab sample, C = composite sample (e g , flow proportional), and NA = not applicable

c **Sample Group:** Sample locations grouped together for collection within as short a time period as possible per Appendix C tables

d **AWQC:** Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D 21, in addition to MET(1), MET(4), VOC(1), and SVOC, per methods and PQLs contained therein

e **Miscellaneous parameters:** For YWQP sample locations in Bear Creek Valley, see Table C 4 and Table C 6 for the specific group to be collected Biological monitoring conducted by] the YWQP is provided in Table C 8 Miscellaneous parameters may include general water quality parameters such as total dissolved solids, total suspended solids, total organic carbon, temperature, dissolved oxygen, turbidity, pH, conductivity, oxidation-reduction potential, and water level (in wells)

f **Flow/precipitation:** C = continuous flow measurements
I = instantaneous flow measurements

g **Sampling program:**
YWQP = Y-12 Plant Water Quality Program by EMEF
ECD-WCS = Y-12 Plant Environmental Compliance Department-Water Compliance Section
BMAP = Biological Monitoring and Abatement Program

h **Sample Frequency:** W = Weekly; Bi-M = Bi-monthly
M = Monthly; Q1 Q4 = lists sample schedule for FY quarters
2010 = Fiscal year of next scheduled sampling Sampling conducted once every 5 years at a minimum (year prior to Five Year Review) See Table C 9

* In "Primary station name" column, denotes high-priority locations for full data validation

AWQC = ambient water quality criteria
BCBG = Bear Creek Burial Grounds
BCK = Bear Creek kilometer
BCV = Bear Creek Valley
BYBY = Boneyard/Burnyard
COC = contaminant of concern
DOE = Department of Energy
EMEF = Environmental Management and Enrichment Facilities
EMWMF = Environmental Management Waste Management Facility
FYR = Five Year Review
GHK = Gum Hollow Branch kilometer
HCK = Hinds Creek kilometer
IP = Integration Point
MBK = Mill Branch kilometer
NT = North Tributary
PCP = Post Closure Permit
PHK = Pinhook Branch kilometer
PQL = project quantitation level
RCRA = Resource Conservation and Recovery Act of 1976
ROD = Record of Decision
TDEC = Tennessee Department of Environment and Conservation

Table B.5. Sample locations and parameters in UEFPC Watershed, including Chestnut Ridge

Sample location	Primary station name[a]	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/Precip[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
Phase I ROD for Mercury Source Areas and UEFPC Watershed Surface Water Exit Pathway																
Station 17	STATION 17	S	C	NA			52[k]		52[l]		52[k]		C	ECD-WCS	W	Watershed exit pathway: UEFPC Integration Point and mercury remedial action monitoring
Station 17	STATION 17	S	G	NA				52[k]			52[k]			ECD-WCS	W	
Station 17	STATION 17	S	G	RMPE-8			52							YWQP	W*	
Station 17	STATION 17*	S	G	RMPE-8			208				208			YWQP	D (M-TH)	
Station 8	STATION 8	S	G	EFW-2a EFW-2b			4		4		4		I	YWQP	Q2, Q4	Watershed exit pathway (Storm flow sample and baseflow sample each quarter).
Station 8	STATION 8	S	G	RMPE-8			52				52		C	YWQP	W	Per Non-Significant Change to Phase I Interim Source Control ROD, continue flow monitoring and weekly grab sample for Hg.
PCK 8.2	PCK 8.2	B	NA	EFW-9								1		YWQP	Q3	Bioaccumulation of Hg in fish (redbreast sunfish)
EFK 6.3	EFK 6.3	B	NA	NA								2		BMAP	Q1, Q3	Bioaccumulation of Hg (Q1,Q3) and PCBs (Q3) in fish (redbreast sunfish or rockbass)
EFK 13.8	EFK 13.8	B	NA	NA								2		BMAP	Q1, Q3	Bioaccumulation of Hg (Q1,Q3) and PCBs (Q3) in fish (redbreast sunfish or rockbass). Fish and benthic macroinvertebrate species diversity and density.
EFK 13.8	EFK 13.8	B	NA	NA								1		BMAP	Q4	TDEC Rapid Bioassessment Protocol
EFK 18.2	EFK 18.2	B	NA	NA								2		BMAP	Q1, Q3	Bioaccumulation of Hg (Q1,Q3) and PCBs (Q3) in fish (redbreast sunfish or rockbass); largemouth bass annual sample in large reach, including this site.
EFK 23.4	EFK 23.4	B	NA	NA								2		BMAP	Q1, Q3	Fish and benthic macroinvertebrate species diversity and density. Bioaccumulation of mercury (Q1,Q3) and PCBs (Q3) in fish (redbreast or rockbass).
EFK 23.4	EFK 23.4	B	NA	NA								1		BMAP	Q4	TDEC Rapid Bioassessment Protocol.
EFK 24.4	EFK 24.4	B	NA	NA								2		BMAP	Q1, Q3	Fish (Q1) and benthic macroinvertebrate (Q1,Q3) community species diversity and density. Bioaccumulation of mercury (Q1, Q3) and PCBs (Q3) in redbreast sunfish.
EFK 24.4	EFK 24.4	B	NA	NA								1		BMAP	Q4	TDEC Rapid Bioassessment Protocol
Hinds Creek	HCK FISH REF	B	NA	NA								2		BMAP	Q1, Q3	Bioaccumulation of mercury (Q1,Q3) and PCBs (Q3) in fish (redbreast sunfish or rockbass); benthic macroinvertebrate species density and diversity (Q1, Q3).
Outfall 55	OF 055	S	G	NA			52						E	ECD-WCS	W	Watershed exit pathway and RMPE mercury remedial action monitoring
Outfall 551	551	S	C	NA			52						C	ECD-WCS	W	CMTS performance monitoring per Phase I Interim ROD for UEFPC
N/S Pipe	OF 200	S	C	NA		4[m]		4[m]			4[m]		E	ECD-WCS	Q1-Q4	Watershed exit pathway and RMPE mercury remedial action monitoring
N/S Pipe	OF 200	S	C	NA			12[n]		12[n]				E	ECD-WCS	M	
N/S Pipe	OF 200	S	C	NA			52[n]						E	ECD-WCS	W	
N/S Pipe (Outfall 200)	OF 200	B	NA	NA								2		BMAP	Q1, Q3	Toxicity testing

Table B.5. Sample locations and parameters in UEF… Watershed, including Chestnut Ridge (continued)

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/Precip[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
N/S Pipe (Outfall 200A6)	200A6*	S	G	EFW-2a EFW-2b			4				4			YWQP	Q2, Q4	Watershed exit pathway. Stormflow and baseflow samples during both Q2 and Q4.
N/S Pipe (Outfall 200A6)	200A6	S	C	RMPE-8			52				52		C	YWQP	W	Baseline data to evaluate ungauged Hg flux into UEFPC from mercury use areas.
Outfall 51	OF 051	S	G	EFW-7b			12				12		I	YWQP	M	Watershed exit pathway and RMPE mercury remedial action monitoring
UEFPC at Outfall 125	UEFPC at OF125	S	G	RMPE-8			52				52		C	YWQP	W	Baseline data in conjunction with interim ROD for mercury source areas
BSWTS	BSWTS-EFFLUENT	G	G	EFW-7c	2		2	2	2		2			YWQP	Q2, Q4	BSWTS performance monitoring under interim ROD for mercury source areas
BSWTS	BSWTS-EFFLUENT*	G	C	EFW-7d			52						C	YWQP	W	
BSWTS	BSWTS-INFLUENT	G	C	EFW-7b			12							YWQP	M	Treatment system performance
East Fork Poplar Creek Longitudinal Survey																
EFK 6.3	EFK 6.3	S	G	RMPE-7			2				2		I	YWQP	Q1, Q3[o]	Total and dissolved mercury, total and dissolved methyl mercury (grab samples) to support BMAP program
EFK 13.8	EFK 13.8	S	G	RMPE-7			2				2		I	YWQP	Q1, Q3[o]	
EFK 18.2	EFK 18.2	S	G	RMPE-7			2				2		I	YWQP	Q1, Q3[o]	
Station 17	STATION 17	S	G	RMPE-7			2				2		I	YWQP	Q1, Q3[o]	
EFK 24.8	EFK 24.8	S	G	RMPE-7			2				2		I	YWQP	Q1, Q3[o]	
Clinch River (Raw H2O)	RAW WATER	S	G	RMPE-7			2				2		I	YWQP	Q1, Q3[o]	
Hinds Creek	HCK 20.6	S	G	RMPE-7			2				2		I	YWQP	Q1, Q3[o]	
UEFPC RCRA PCP Monitoring																
GW-108	GW-108	G	G	EFW-1	2		2	2	2		2			YWQP	Q2, Q4	UEFPC RCRA post-closure permits: S 3 Ponds eastern plume
GW-193	GW-193	G	G	EFW-1					2		2			YWQP	Q2, Q4	
GW-605	GW-605	G	G	EFW-1	2		2	2	2		2			YWQP	Q2, Q4	
GW-606	GW-606	G	G	EFW-1	2		2	2	2		2			YWQP	Q2, Q4	
GW-733	GW-733*	G	G	EFW-1	2				2		2			YWQP	Q2, Q4	
UEFPC Groundwater Exit Pathway																
GW-253	GW-253	G	G	EFW-5	1		1	1	1		1			YWQP	Q2	Exit pathway: Maynardville Limestone at S-2 Site
GW-618	GW-618	G	G	EFW-5	1		1	1	1		1			YWQP	Q2	Exit pathway: Maynardville Limestone at Picket E
GW-744	GW-744	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	Exit pathway: Nolichucky Shale at ORR boundary
GW-747	GW-747	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	
GW-816	GW-816	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	Exit pathway: Pine Ridge water gap

Table B.5. Sample locations and parameters in UEFPC Watershed, including Chestnut Ridge (continued)

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/Precip[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
									East End VOC Plume Removal Action							
EEVOC Influent[p]	9422-22 TF INF	G	G	EFW-7a	-		4	4	4		4			YWQP	Q1-Q4	
EEVOC Influent[p]	9422-22 TF INF	G	G	EFW-7b	12									XWQP	M	
EEVOC Effluent[p]	9422-22 TF EFF*	G	G	EFW-7a	-		4	4	4		4			YWQP	Q1-Q4	
EEVOC Effluent[p]	9422-22 TF EFF*	G	G	EFW-7b	12									YWQP	M	
GW-151	GW-151	G	G	EFW-3a	2		2	2	2		2			YWQP	Q2, Q4	Exit pathway: EEVOC Plume Removal Action Performance Assessment
GW-153	GW-153	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	
GW-154	GW-154	G	G	EFW-3a	2		2		2		2			YWQP	Q2, Q4	
GW-220	GW-220	G	G	NA	2		2	2	2		2			ECD-WCS	Q2, Q4	
GW-223	GW-223	G	G	EFW-3a	2		2	2	2		2			YWQP	Q2, Q4	
GW-380	GW-380	G	G	EFW-3a	2		2	2	2		2			YWQP	Q2, Q4	
GW-381	GW-381	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	
GW-382	GW-382	G	G	EFW-3a	2		2	2	2		2			YWQP	Q2, Q4	
GW-383	GW-383	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	
GW-722 - 14	GW-722 - 14	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	
GW-722 - 17	GW-722 - 17	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	
GW-722 - 20	GW-722 - 20	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	
GW-722 - 22	GW-722 - 22	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	
GW-722 - 33	GW-722 - 33	G	G	NA	1		1	1	1		1			ECD-WCS	Q4	
GW-722 - 14	GW-722 - 14	G	G	EFW-6b	1						1			YWQP	Q2	Exit pathway: Semiannual EEVOC Plume Removal Action performance assessment
GW-722 - 17	GW-722 - 17*	G	G	EFW-6b	1						1			YWQP	Q2	
GW-722 - 20	GW-722 - 20*	G	G	EFW-6b	1						1			YWQP	Q2	
GW-722 - 22	GW-722 - 22*	G	G	EFW-6b	1						1			YWQP	Q2	
GW-722 - 33	GW-722 - 33	G	G	EFW-6b	1						1			YWQP	Q2	
GW-722-All Zones	GW-722-All Zones	G	P	EFW-6b							1			YWQP	Q2	
GW-762	GW-762	G	G	EFW-3a	2		2	2	2		2			YWQP	Q2, Q4	Exit pathway: East End VOC Plume Removal Action Performance Assessment
GW-832	GW-832	G	G	EFW-3a	2		2	2	2		2			YWQP	Q2, Q4	
GW-149	GW-149	G	WL	EFW-6a							1			YWQP	Q2	
GW-151	GW-151	G	WL	EFW-6a							1			YWQP	Q2	
GW-152	GW-152	G	WL	EFW-6a							1			YWQP	Q2	
GW-153	GW-153	G	WL	EFW-6a							1			YWQP	Q2	
GW-168	GW-168	G	WL	EFW-6a							1			YWQP	Q2	
GW-223	GW-223	G	WL	EFW-6a							1			YWQP	Q2	
GW-381	GW-381	G	WL	EFW-6a							1			YWQP	Q2	
GW-384	GW-384	G	WL	EFW-6a							1			YWQP	Q2	Water levels in Q2 East End VOC Plume Removal Action Performance Assessment
GW-605	GW-605	G	WL	EFW-6a							1			YWQP	Q2	

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/Precip[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
GW-733	GW-733	G	WL	EFW-6a							1			YWQP	Q2	
GW-734	GW-734	G	WL	EFW-6a							1			YWQP	Q2	
GW-735	GW-735	G	WL	EFW-6a							1			YWQP	Q2	
GW-750	GW-750	G	WL	EFW-6a							1			YWQP	Q2	
GW-763	GW-763	G	WL	EFW-6a							1			YWQP	Q2	
GW-832	GW-832	G	WL	EFW-6a							1			YWQP	Q2	
East End Fuel Station																
GW-281	GW-281	G	G	EFW-8	1						1			YWQP	Q3	East End Fuel Station BTEX and TCE plume monitoring
GW-658	GW-658	G	G	EFW-8	1						1			YWQP	Q3	
GW-802	GW-802	G	G	EFW-8	1						1			YWQP	Q3	
UEFPC Union Valley IROD and East End VOC Plume Removal Action																
SCR 7.1SP	SCR7.1SP	S	G	EFW-5	1						1			YWQP	Q2	East End VOC Plume Removal Action performance assessment. Semiannual monitoring required for wells GW-169 and GW-170 for VOCs only.
SCR 7.8SP	SCR7.8SP	S	G	EFW-5	1						1			YWQP	Q2	
GW-169	GW-169	G	G	EFW-3a	2		2	2	2		2			YWQP	Q1, Q4	
GW-170	GW-170*	G	G	EFW-3a	2		2	2	2		2			YWQP	Q1, Q4	
GW-171	GW-171	G	G	EFW-5	1						1			YWQP	Q2	
GW-172	GW-172	G	G	EFW-5	1						1			YWQP	Q2	
GW-230	GW-230	G	G	EFW-5	1						1			YWQP	Q2	
Chestnut Ridge Sediment Disposal Basin (CRSDB) RCRA PCP Monitoring																
GW-156	GW-156	G	G	CRS-2			1				1			YWQP	Q2	Chestnut Ridge Hydrogeologic Regime RCRA post-closure permit: CRSDB detection monitoring [alternate monitoring annually between wet (Q2) and dry (Q4) seasons]
GW-159	GW-159	G	G	CRS-2			1				1			YWQP	Q2	
GW-731	GW-731	G	G	CRS-2			1				1			YWQP	Q2	
GW-732	GW-732	G	G	CRS-2			1				1			YWQP	Q2	
Chestnut Ridge Security Pits (CRSP) RCRA PCP Monitoring																
GW-177	GW-177	G	G	CRS-3	2		2		2		2			YWQP	Q2, Q4	Chestnut Ridge Hydrogeologic Regime RCRA post-closure permit: CRSP corrective action monitoring and SWDF detection monitoring (as indicated)
GW-301	GW-301	G	G	CRS-3	2						2			YWQP	Q2, Q4	
GW-521	GW-521	G	G	NA	2		2	2	2		2			BJCWO	Q2, Q4	
GW-557	GW-557	G	G	NA	2		2	2	2		2			BJCWO	Q2, Q4	
GW-562	GW-562	G	G	NA	2		2	2	2		2			BJCWO	Q2, Q4	
GW-799	GW-799	G	G	NA	2		2	2	2		2			BJCWO	Q2, Q4	
GW-801	GW-801	G	G	NA	2		2	2	2		2			BJCWO	Q2, Q4	
GW-831	GW-831	G	G	CRS-3	2						2			YWQP	Q2, Q4	
SCR 4.3SP	SCR4.3SP	S	G	NA	2		2	2	2		2			BJCWO	Q2, Q4	
Chestnut Ridge Kerr Hollow Quarry (KHQ) RCRA PCP and Performance Assessment Monitoring																
GW-143	GW-143*	G	G	CRS-1	1		1		1		1			YWQP	Q2	Chestnut Ridge Hydrogeologic Regime RCRA post-closure permit: KHQ detection monitoring [alternate monitoring annually between wet (Q2) and dry (Q4) seasons]
GW-144	GW-144	G	G	CRS-1	1		1		1		1			YWQP	Q2	
GW-145	GW-145	G	G	CRS-1	1		1		1		1			YWQP	Q2	
GW-231	GW-231	G	G	CRS-1	1		1		1		1			YWQP	Q2	

Table B.5. Sample locations and parameters in UEF[illegible] Watershed, including Chestnut Ridge (continued)

Sample location	Primary station name[a]	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/Precip[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
Chestnut Ridge United Nuclear Corporation Site (UNC) Performance Assessment/Landfill IV																
1090	1090	G	G	CRS-6			2	2	2		2			YWQP	Q2, Q4	
GW-203	GW-203	G	G	CRS-6			2	2	2		2			YWQP	Q2, Q4	
GW-205	GW-205*	G	G	CRS-6			2	2	2		2			YWQP	Q2, Q4	
GW-221	GW-221	G	G	CRS-6			2	2	2		2			YWQP	Q2, Q4	Remedial Action performance assessment
GW-305	GW-305	G	G	NA	2		2	2	2		2			BJCWO	Q2, Q4	
UNC SW-1	UNC SW-1	S	G	CRS-6			2	2	2		2		I	YWQP	Q2, Q4	
Chestnut Ridge Filled Coal-Ash Pond (FCAP) Performance Assessment																
MCK 2.05	MCK 2.05	S	G	CRS-5			2	2	2		2			YWQP	Q2, Q4	
MCK 2.00	MCK 2.0*	S	G	CRS-5			2	2	2		2			YWQP	Q2, Q4	Remedial Action Performance Assessment (includes additional FY09 snapshot for Hg concentrations @ MCK 2.00 and MCK 1.4)
MCK 1.4	MCK 1.4	S	G	CRS-5			2				2			YWQP	Q2, Q4	
MCK 1.9	MCK 1.9	B	NA	CRS-8								2		YWQP	Q1, Q3	Benthic macroinvertebrate species diversity and density
MCK 1.9	MCK 1.9	B	NA	CRS-9								1		YWQP	Q4	TDEC Rapid Bioassessment Protocol
MCK 1.6	MCK 1.6	B	NA	CRS-8								2		YWQP	Q1, Q3	Fish species diversity and density
MCK 1.4	MCK 1.4	B	NA	CRS-8								2		YWQP	Q1, Q3	Benthic macroinvertebrate diversity and density
MCK 1.4	MCK 1.4	B	NA	CRS-9								1		YWQP	Q4	TDEC Rapid Bioassessment Protocol
S19	ROGERS QUARRY	S	C	NA			1		1^{g}		1		C	ECD-WCS	Annually	Exit pathway (NPDES stormwater sample also collected at this station once every 3rd year)
Rogers Quarry	ROGERS QUARRY	B	NA	CRS-9								1		YWQP	Q4	Bioaccumulation of mercury and metals in fish (largemouth bass)
East Chestnut Ridge Waste Pile (ECRWP) RCRA PCP Monitoring																
GW-161	GW-161	G	G	CRS-11	2		2	2	2		2			YWQP	Q2, Q4	
GW-294	GW-294	G	G	CRS-11	2		2	2	2		2			YWQP	Q2, Q4	Chestnut Ridge Hydrogeologic Regime RCRA post-closure permit: ECRWP detection monitoring.
GW-296	GW-296*	G	G	CRS-11	2		2	2	2		2			YWQP	Q2, Q4	
GW-298	GW-298	G	G	CRS-11	2		2	2	2		2			YWQP	Q2, Q4	
ECRWP Leachate Sump	T043M	L	G	CRS-12	1	1	1	1	1		1			YWQP	Q2	Chestnut Ridge Hydrogeologic Regime RCRA post-closure permit: ECRWP leachate monitoring [alternate monitoring annually between wet (Q2) and dry (Q4) seasons]
Chestnut Ridge Subwatershed 5 Exit Pathway																
S17	S17	S	C	NA					1^{g}		1		C	ECD-WCS	Annually	Exit pathway (NPDES stormwater sample collected and analyzed every 3rd year)
S17	S17	S	G	NA	1		1	1	1		1			ECD-WCS	Q3	Exit pathway
Chestnut Ridge Subwatershed 4 Exit Pathway																
GW-797	GW-797	G	G	NA	2		2	2	2		2			BJCWO	Q2, Q4	Landfill V Permit monitoring
GW-798	GW-798	G	G	NA	2		2		2		2			BJCWO	Q2, Q4	Industrial Landfill VII

Table B.5. Sample locations and parameters in UEFPC Watershed, including Chestnut Ridge (continued)

Sample location	Primary station name[a]	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological Monitoring	Flow/Precip[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
Chestnut Ridge Subwatershed 3 Exit Pathway																
SCR 3.5SP	SCR3.5SP	S	G	CRS-4	2		2	2	2		2			YWQP	Q2, Q4	Exit pathway
SCR 3.5SW	SCR3.5SW	S	G	NA	1		1	1	1		1			ECD-WCS	Q3	
Chestnut Ridge Subwatershed 2 Exit Pathway																
SCR 2.2SP	SCR2.2SP	S	G	NA	1		1	1	1		1			ECD-WCS	Q3	Exit pathway
SCR2.1SP	SCR2.1SP	S	G	NA	1		1	1	1		1			ECD-WCS	Q3	
Chestnut Ridge Subwatershed 1 Exit Pathway																
SCR 1.25SP	SCR1.25SP	S	G	CRS-4	2		2	2	2		2			YWQP	Q2, Q4	Exit pathway
SCR 1.5SW	SCR1.5SW	S	G	NA	1		1	1	1		1			ECD-WCS	Q3	

Notes for UEFPC and Chestnut Ridge Table B.5:

a **Sample medium:** G = groundwater, S = surface water, B = biological, and L = leachate

b **Sample Type:** G = grab sample, C = composite (e g , flow proportional), WL = water level, P = pressure profile, and NA = not applicable

c **Sample Group:** Sample locations grouped together for collection within as short a time period as possible per Appendix C tables

d **AWQC** Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D 21, in addition to MET(1), MET(4), VOC(1), and SVOC per methods and PQLs contained therein

e **Miscellaneous parameters:** For YWQP sample locations in UEFPC watershed and Chestnut Ridge, see Table C 5 and Table C 6 for the specific parameter group to be collected Biological monitoring conducted by the YWQP is provided in Table C 8 Miscellaneous may include general water quality parameters (e g , total dissolved solids, total suspended solids, total organic carbon, temperature, dissolved oxygen, turbidity, pH, conductivity, oxidation-reduction potential) and water levels (in wells)

f **Flow/precipitation:**
C = continuous flow measurements
I = instantaneous flow measurements
E = estimated or derived from nearby flow measurement station

g **Program:**
YWQP = Y-12 Plant Water Quality Program by EMEF
BJCWO = Bechtel Jacobs Company Waste Organization
BMAP = Biological Monitoring and Abatement Program
ECD-WCS = Y-12 Plant Environmental Compliance Department-Water Compliance Section

h **Sample Frequency:**
D = Daily
W = Weekly
W* = Weekly on Mondays
Q1 Q4 = lists sample schedule for FY quarters
M = Monthly

k Station 17 One 7-day composite sample collected weekly and analyzed for metals, including Hg (at 50 ppt minimum detection limit), TSS, and phosphates One weekly grab sample collected and analyzed for nitrate/nitrite, dissolved oxygen, and temperature

l Station 17 One 7-day composite sample collected each week per Y-12 Radiological Monitoring Plan

m N/S Pipe Flow measurement is derived from downstream station Quarterly 24-hour composite sample collected and analyzed for nitrate/nitrite, TDS, and PCBs Monthly 24-hour composite sample collected and analyzed for metals (Cd, Pb, total U) Weekly 24-hour composite sample collected and analyzed for total Hg

n N/S Pipe 24-hour composite samples collected monthly and analyzed for radiological parameters (U, $^{89/90}$Sr, ^{3}H, ^{99}Tc, ^{137}Cs, $^{228\ 230\ 232}$Th, $^{226\ 228}$Ra, ^{241}Am, ^{237}Np, ^{238}Pu, ^{239}Pu, gross alpha, and gross beta) per the Y-12 Radiological Monitoring Plan

o East Fork Poplar Creek Longitudinal sampling performed in December and June in conjunction with BMAP sampling for the Y-12 NPDES Program Samples collected for miscellaneous parameters (TSS and in-field measurements), total and dissolved mercury, and total and dissolved methyl mercury

p Samples of EEVOC Treatment System Influent will be taken at valve 600-C Samples of effluent will be taken at valves 620-L or 620-M

q At outfalls S17 and S19 (Rogers Quarry), 24-hour composite samples are collected annually and analyzed for radiological parameters per Y-12 Radiological Monitoring Plan

* In "Primary station name" column, denotes high-priority locations for full data validation

AWQC = ambient water quality criteria
BSWTS = Big Spring Water Treatment System
CMTS = Central Mercury Treatment System
CRSDB = Chestnut Ridge Sediment Disposal Basin
CRSP = Chestnut Ridge Security Pit

ECRWP = East Chestnut Ridge Waste Pile
EEVOC = East End Volatile Organic Compound.
EFK = East Fork Kilometer
FCAP = Filled Coal Ash Pond
HCK = Hinds Creek kilometer
KHQ = Kerr Hollow Quarry.
MCK = McCoy Branch kilometer
N/S = North/South.
NPDES = National Pollutant Discharge Elimination System.
ORR = Oak Ridge Reservation
PQL = project quantitation limit
RCRA = Resource Conservation and Recovery Act of 1976.
RMPE = Reduction of Mercury in Plant Effluents.
ROD = Record of Decision.
SCR = South Chestnut Ridge
SWDF = solid waste disposal facility.
TDEC = Tennessee Department of Environment and Conservation.
UEFPC = Upper East Fork Poplar Creek.
UNC = United Nuclear Corporation

Table B.6. Off-site sample locations and parameters

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
South Campus Facility Performance Assessment																
GW-841	GW-841*	G	G	OFF-3	1						1			YWQP	Q2	SCF Remedial Action Performance Assessment Monitoring
GW-842	GW-842	G	G	OFF-3	1						1			YWQP	Q2	
SCF-WS2	SCF-WS2	G	G	OFF-3	1						1			YWQP	Q2	
SCF-WS1	SCF-WS1	G	G	OFF-3	1						1			YWQP	Q2	
Lower East Fork Poplar Creek Performance Assessment																
Station 17	STATION 17	S	C	NA			52						C	ECD-WCS	W	Hg flux entering LEFPC
EFPC (Dean Stallings locality)	EFPC	NA	SV	NA							1			YWQP	Annual	Visual survey to verify existing land use (S. Brown)
Lower Watts Bar Reservoir Performance Assessment																
Kingston City Water Intake	TRM 568.4	S	G	OFF-TBD			1		1		1			YWQP	FY 2010	LWB Reservoir Performance Assessment Monitoring. Sampling of surface water and sediment is conducted once every 5 years. Next sampling will occur in 2010, the year prior to the Five Year Review.
Watts Bar Forebay	TRM 530-532	S	G	OFF-TBD			1		1		1			YWQP	FY 2010	
Thief Neck Island	TRM 551-556	SE	SC	OFF-TBD			1		1					YWQP	FY 2010	
Watts Bar Forebay	TRM 530-532	SE	SC	OFF-TBD			1		1					YWQP	FY 2010	
Watts Bar Forebay	TRM 530-532	B	NA	OFF-1								1		YWQP	Q4	Bioaccumulation of Hg, PCBs, and lipids in fish (catfish); Hg only in largemouth bass
Clinch River (CR)/Poplar Creek (PC) Performance Assessment																
Melton Hill Forebay	CRM23.4-24.7	S	G	OFF-TBD			1		1		1			YWQP	FY 2010	CR/PC Performance Assessment Monitoring. Sampling of surface water and sediment is conducted once every 5 years (year prior to Five Year Review). Next sampling will occur in 2010.
White Oak Creek Embayment	WOCE*	S	G	OFF-TBD			1		1		1			YWQP	FY 2010	
Bull Run Steam Plant	CRM 48	S	G	OFF-TBD			1		1		1			YWQP	FY 2010	
K-1007-P1 Pond	K-1007-P1 POND	S	G	OFF-TBD			1		1		1			YWQP	FY 2010	
K-901-A Pond	K-901 POND	S	G	OFF-TBD			1		1		1			YWQP	FY 2010	
Brashear Island	CRM10.5-12	S	G	OFF-TBD			1		1		1			YWQP	FY 2010	
Kingston City Park	CRM0.5-1.5	S	G	OFF-TBD			1		1		1			YWQP	FY 2010	
Bull Run Steam Plant	CRM 48	SE	SC	OFF-TBD			1		1					YWQP	FY 2010	
Melton Hill Forebay	CRM23.4-24.7	SE	SC	OFF-TBD			1		1					YWQP	FY 2010	
ETTP Water Intake	CRM14-15	SE	SC	OFF-TBD			1		1					YWQP	FY 2010	

Table B.6. Off-site sample locations and parameters (continued)

Sample location	Primary station name*	Sample medium[a]	Sample type[b]	Appendix C Sample Group[c]	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC[d]	Miscellaneous[e]	Biological monitoring	Flow/precipitation[f]	Sampling program[g]	FY 2008 sampling frequency[h]	Comments
PCM 1	PCM 1.0	SE	SC	OFF-TBD		1	1		1					YWQP	FY 2010	
PCM 3	PCM 3	SE	SC	OFF-TBD		1	1		1					YWQP	FY 2010	
PCM 5.5	PCM 5.5	SE	SC	OFF-TBD		1	1		1					YWQP	FY 2010	
Brashear Island	CRM10.5-12	SE	SC	OFF-TBD			1		1					YWQP	FY 2010	
Young Creek area	CRM6-7	SE	SC	OFF-TBD			1		1					YWQP	FY 2010	
Kingston City Park	CRM0.5-1.5	SE	SC	OFF-TBD			1		1					YWQP	FY 2010	
Jones Island	CRM19.7-20.7	B	NA	OFF-1								1		YWQP	Q4	Bioaccumulation of Hg, PCBs, ^{137}Cs, and lipids in fish (catfish); Hg and ^{137}Cs only in largemouth bass
Melton Hill Forebay	CRM23.4-24.7	B	NA	OFF-1								1		YWQP	Q4	Bioaccumulation of Hg, PCBs, and lipids in fish (catfish), Hg only in largemouth bass.
PCM 1	PCM 1.0	B	NA	OFF-1								1		YWQP	Q4	
Brashear Island	CRM10.5-12	B	NA	OFF-1								1		YWQP	Q4	
PCM 1	PCM 1.0	B	NA	NA								1		BMAP	Q3	Bioaccumulation of Hg in bluegill
Brashear Island	CRM10.5-12	B	NA	NA								1		BMAP	Q3	
Bull Run Steam Plant effluent	CRM 48	B	NA	OFF-2								1		YWQP	Q2	Bioaccumulation of PCBs and lipids in fish (striped bass)
Kingston Steam Plant effluent	CRM 2.6	B	NA	OFF-2								1		YWQP	Q2	
Melton Hill Forebay	CRM23.4-24.7	B	NA	OFF-TBD								1		YWQP	FY 2010	Bioaccumulation of Hg, ^{137}Cs, PCBs, and lipids in turtles (three individual specimens of the common snapping turtle at each location) conducted once every 5 years. Samples will next be collected in FY 2010.
Jones Island	CRM19.7-20.7	B	NA	OFF-TBD								1		YWQP	FY 2010	
Brashear Island	CRM10.5-12	B	NA	OFF-TBD								1		YWQP	FY 2010	

Notes for Off-site locations Table B.6:

- a **Sample Medium:** G = groundwater; S = surface water; B = biological; SE = sediment; NA = not applicable
- b **Sample Type:** G = grab sample; C = composite (e.g., flow proportional); SC = sediment core; SV = survey; NA = not applicable
- c **Sample Group:** Sample locations grouped together for collection within as short a time period as possible per Appendix C tables.
- d **AWQC:** Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D.21, in addition to MET(1), MET(4), VOC(1), and SVOC per methods and PQLs contained therein.
- e **Miscellaneous parameters:** For off-site sample locations, see Table C.7 for the specific parameter group to be collected. Biological monitoring conducted by the WRRP is provided in Table C.8. Miscellaneous may include general water quality parameters (e.g., total dissolved solids, total suspended solids, total organic carbon, temperature, dissolved oxygen, turbidity, pH, conductivity, oxidation-reduction potential) and water levels (in wells), as well as a physical survey.
- f **Flow/precipitation:** C = continuous flow measurements
- g **Program:**
  YWQP = Y-12 Plant Water Quality Program implemented by EMEF
  ECD-WCS = Y-12 National Security Complex Environmental Compliance Department-Water Compliance Section
  BMAP = Biological Monitoring and Abatement Program
- h **Sample Frequency:**
  W = Weekly
  Q_ = lists sample schedule for FY quarters
  FY2010 = Fiscal year of next scheduled sampling. Sampling conducted once every 5 years at a minimum (year prior to Five Year Review). See Table C.9.
- * In "Primary station name" column, denotes high-priority locations for full data validation.

AWQC = Ambient Water Quality Criteria
CR = Clinch River
CRM = Clinch River mile
EFPC = East Fork Poplar Creek
EMEF = Environmental Management and Enrichment Facilities
ETTP = East Tennessee Technology Park
LEFPC = Lower East Fork Poplar Creek
LWB = Lower Watts Bar
PC = Poplar Creek
PCM = Poplar Creek mile
PQL = project quantitation limit
SCF = South Campus Facility
TRM = Tennessee River mile
WOCE = White Oak Creek Embayment

APPENDIX C

ADMINISTRATIVE SAMPLE GROUP TABLES

Table C.1. Sample groups for the EWQP in the ETTP Watershed during FY 2009

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
ETTP-1	K901	UNW-067	Q2, Q4	WG	G			FLD(1), VOC(1), ALPHA, BETA
	K901	BRW-068*		WG	G			FLD(1), VOC(1), ALPHA, BETA
	K901	UNW-066		WG	G		X	FLD(1), VOC(1), ALPHA, BETA
	K901	BRW-035		WG	G			FLD(1), VOC(1), ALPHA, BETA
	K1070A	BRW-025		WG	G			FLD(1,2), ION(1,2), MET(1), VOC(1,2), TOC, TC, U
	K1070A	BRW-099		WG	G			FLD(1,2), ION(1,2), MET(1), VOC(1,2), TOC
	K1070A	BRW-101		WG	G			FLD(1,2), ION(1,2), MET(1), VOC(1,2), TOC, U
	K1070A	BRW-103		WG	G		X	FLD(1,2), ION(1,2), MET(1), VOC(1,2), TOC, U
	K1070A	UNW-031		WG	G			FLD(1,2), ION(1,2), MET(1), VOC(1,2), TOC, TC, U
	K1070A	UNW-116		WG	G			FLD(1,2), ION(1,2), MET(1), VOC(1,2), TOC
	K1070A	UNW-118		WG	G			FLD(1,2), ION(1,2), MET(1), VOC(1,2), TOC, U
	K1070A	UNW-121		WG	G			FLD(1,2), ION(1,2), MET(1), VOC(1,2), TOC, U
	K1007P	BRW-084		WG	G			FLD(1), MET (1,3), VOC(1), PCB, ALPHA, BETA, TC
	K1007P	UNW-108		WG	G			FLD(1), MET (1,3), VOC(1), PCB, ALPHA, BETA, TC
ETTP-2	MBA	UNP-004	Q2, Q4	WG	G			FLD(1), TOC, VOC(1)
	MBA	UNP-005		WG	G			FLD(1), VOC(1)
	MBA	UNW-002		WG	G			FLD(1), VOC(1)
	MBA	UNW-003*		WG	G			FLD(1), TOC, MET(1), ION(2), VOC(1), ALPHA, BETA, GAMMA, SR, TC, TH, U
	MBA	UNW-004		WG	G			FLD(1), TOC, VOC(1)
	MBA	UNW-009		WG	G			FLD(1), MET(1), ION(2), VOC(1), ALPHA, BETA, GAMMA, SR, TC, TH, U
	MBA	UNW-068		WG	G			FLD(1), VOC(1)
	MBA	BRW-007		WG	G			FLD(1), TOC, VOC(1)
	MBA	BRW-039		WG	G			FLD(1), TOC, VOC(1), ALPHA, BETA, TC
	MBA	UNW-107		WG	G		X	FLD(1), MET (1), VOC(1), ALPHA, BETA
	MBA	BRW-083		WG	G			FLD(1), TOC, MET (1), VOC(1), ALPHA, BETA
	MBA	BRW-108		WG	G			FLD(1), TOC, VOC(1)
	MBA	BRW-109		WG	G			FLD(1), VOC(1)
	MBA	DPT-MB-6		WG	G			FLD(1), TOC, VOC(1)
	K-1401	UNP-003		WG	G			FLD(1), VOC(1)
	K-1401	UNW-051		WG	G			FLD(1), VOC(1)
	K-1401	UNW-052		WG	G			FLD(1), TOC, VOC(1)
	K-1401	UNW-124		WG	G			FLD(1), VOC(1)
	K-1401	DPT-K1401-3		WG	G			FLD(1), VOC(1)
	K-1401	DPT-K1401-4		WG	G			FLD(1), TOC, VOC(1)

Table C.1. Sample groups for the EWQP in the ETTP Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
ETTP-3	K1070CD	DP18	Q2, Q4	WG	G			FLD(1), TOC, VOC(1), MET(1)
	K1070CD	DP19		WG	G			FLD(1), VOC(1), MET(1)
	TMW-006	TMW-006		WG	G			FLD(1), VOC(1)
	K1070CDN	TMW-007		WG	G			FLD(1), VOC(1)
	K1070CDN	TMW-011		WG	G			FLD(1), TOC, VOC(1)
	K1070CDN	BRW-046		WG	G		X	FLD(1), VOC(1)
	K1070CDN	UNW-064		WG	G			FLD(1), VOC(1)
	K1070CDN	UNW-114		WG	G			FLD(1), TOC, VOC(1)
	K1070CDN	DPT-K1070-5		WG	G			FLD(1), VOC(1)
	K1070CDN	DPT-K1070-6		WG	G			FLD(1), TOC, VOC(1)
	K1035	DPT-K1035-3		WG	G			FLD(1), VOC(1), MET(1)
	K1035	DPT-K1035-4		WG	G			FLD(1), VOC(1), MET(1)
	K1035	DPT-K1035-6		WG	G			FLD(1), TOC, VOC(1), MET(1)
	K1035	DPT-K1035-7		WG	G			FLD(1), VOC(1), MET(1)
ETTP-4	K1070CDS	UNW-017	Q2, Q4	WG	G			FLD(1), VOC(1)
	K1070CDS	UNW-126		WG	G			FLD(1), TOC, VOC(1)
	K1070CDS	UNW-127		WG	G			FLD(1), VOC(1)
	K1070CDS	BRW-055		WG	G			FLD(1), VOC(1)
	K1070CDS	UNW-115		WG	G			FLD(1), TOC, VOC(1)
	K1070CDS	BRW-054		WG	G			FLD(1), VOC(1)
	K1070CDS	DPT-K1200-6		WG	G			FLD(1), VOC(1)
	K1070CDS	DPT-K1200-7		WG	G			FLD(1), VOC(1)
	K1070CDS	BRW-110		WG	G		X	FLD(1), TOC, VOC(1)
	K-1413	UNW-026		WG	G			FLD(1,2), TOC, MET(1), ION (1,2), VOC(1,2)
	K-1413	UNW-027		WG	G			FLD(1,2), TOC, MET(1), ION (1,2), VOC(1,2)
	K-1413	UNW-054		WG	G			FLD(1,2), TOC, MET(1), ION (1,2), VOC(1,2)
	K-1413	UNW-089		WG	G			FLD(1,2), TOC, MET(1), ION (1,2), VOC(1,2)
	K1070CDS	BRW-043		WG	G			FLD(1), TOC, VOC(1)
	K1070CDS	BRW-050		WG	G		X	FLD(1), VOC(1)
	K1070CDS	BRW-053		WG	G			FLD(1), VOC(1)
	K1070CDS	BRW-071		WG	G			FLD(1), VOC(1)
	K1007P	BRW-113		WG	G			FLD(1), VOC(1)
	K1007P	BRW-114		WG	G			FLD(1), VOC(1)
	K1070CD	UNP-001		WG	G			FLD(1), TOC, VOC(1)

Table C.1. Sample groups for the EWQP in the E[illegible]P Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
ETTP-5	K-31	BRW-030	Q2, Q4	WG	G			FLD(1), MET(1)
	K-31	UNW-043		WG	G		X	FLD(1), MET(1)
	K-31	BRW-066		WG	G			FLD(1), MET(1),VOC(1)
	K-31	UNW-080*		WG	G			FLD(1), MET(1),VOC(1)
	K-770	UNW-013		WG	G			FLD(1), ALPHA, BETA
	K-770	UNW-015		WG	G			FLD(1), ALPHA, BETA
	K-1064	BRW-003		WG	G			FLD(1,2), ION(1,2), MET(1), VOC(1)
	K-1064	BRW-017		WG	G			FLD(1,2), TOC, ION(1,2), MET(1), VOC(1)
	K-27/29	UNW-038		WG	G			FLD(1), TOC, VOC(1), MET(1)
	K-27/29	UNW-096		WG	G			FLD(1), TOC, VOC(1), MET(1)
	K-27/29	UNW-088		WG	G			FLD(1), TOC, VOC(1), MET(1)
	K-27/29	BRW-016		WG	G			FLD(1), TOC, VOC(1), MET(1)
	K-27/29	BRW-069		WG	G			FLD(1), VOC(1), MET(1)
	K-25	DP9		WG	G			FLD(1), TOC, VOC(1)
	K-25	BRW-058		WG	G			FLD(1), VOC(1)
ETTP-6	K-901	K-901-A Weir*	Q2, Q4	WS	G	I		FLD(1), MET(1), VOC(1), ALPHA, BETA, TC, PCB
	K1070A	21-002 Spring*		WS	G	I		FLD(1,2), ION(1,2), MET(1), VOC(1,2), TOC, ALPHA, BETA, TC, U
	K1007P	K-1007-B Weir*		WS	G	I		FLD(1), MET(1), VOC(1), ALPHA, BETA, TC, PCB
	MBA	SD-190-3		WS	G	I		FLD(1), MET(1), VOC(1)
	K1070CD	26-005		WS	G			FLD(1), VOC(1)
	K1070CD	K-1400FD		WS	G			FLD(1), VOC(1)
ETTP-7	MBA	K-1700 Weir	Q1,Q2,Q3,Q4	WS	G	I		FLD(1), VOC(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, TC, TH, SR, U, PCB
	SRC	SRC-Union Valley		WQ	G			MET(1), VOC(1), PCB, ALPHA, BETA, SR, TC, TH, U
ETTP-8	K-1070-F	PCO SPRING	Q2	WS	G	I		FLD(1), VOC(1), ALPHA, BETA

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Table C.1. Sample groups for the EWQP in the E. [illegible] Watershed during FY 2009 (continued)

Notes for ETTP Watershed Table C.1:

a **Sample Group:**

ETTP = East Tennessee Technology Park Watershed sample group number.

Samples will be collected in the sequence shown during as short a time as possible following the schedule listed under Monitoring Frequency.

b **Location and Sampling Point**

BRW = Bedrock interval monitoring well.
DP = Direct-push well.
K1007P = K-1007-P Ponds.
K1070A = K-1070-A Burial Ground.
MBA = Mitchell Branch South Bank Area.
K901 = K-901 Pond.
K1070CD = K-1070-C/D Area.
K1070CDN = K-1070-C/D Area North.
K1070CDS = K-1070-C/D Area South.
SD = Storm drain
SRC = Source water sample.
TMW = Temporary monitoring well.
UNP = Unconsolidated interval piezometer.
UNW = Unconsolidated interval monitoring well.

c **Monitoring Frequency**

Q_ = Quarter of the fiscal year (e.g., Q1, Q2, Q3, Q4)

d **Matrix**

WG = Groundwater.
WS = Surface water.
WQ = Water quality control sample.

e **Sample Type**

G = grab grab sample

f **Flow/Precipitation**

I = Instantaneous flow measurement (often accompanied by a grab sample)

g **Duplicate**

X = field duplicate sample collected

h **Analyte/Parameter group:**

See Table D.1 for a list of parameter groups and analytes.
NOTE: Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D.21, in addition to MET(1), MET(4), VOC(1), and SVOC, per methods and PQLs contained therein.

Water levels will be measured at all wells prior to commencement of the sampling event in order to obtain a snapshot of water level conditions.

* Notation in "Sampling Point" column designates high-priority location for full data validation

AWQP = ambient water quality criteria
ETTP = East Tennessee Technology Park.
EWQP = ETTP Water Quality Program.
FY = fiscal year.
PQL = project quantitation limit

Table C.2. Sample groups for the XWQP in the Bethel Valley Watershed during FY 2009

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
BVW-1	EXP	Raccoon Creek*	M	WS	C	C		SR, T
	MPA	First Creek		WS	C	C		ALPHA, GAMMA, SR
	MPA	CH8Sump		WG	C	C		ALPHA, SR
	SWSA3	NWTrib		WS	C	C		GAMMA, SR, T
BVW-2	EXP	Raccoon Creek*	Q2, Q4	WS	G			FLD(1), ALPHA, BETA, GAMMA
	SWSA3	NWTrib		WS	G		X	FLD(1), ALPHA, BETA, GAMMA
	EXP	Bearden Creek*		WS	G	I		FLD(1), MET(1), T
	SWSA1/MPA	Rock Outcrop		WS	G	I		FLD(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	SWSA1/MPA	Third Street Bridge		WS	G	I		FLD(1), MET(1,4,6), ALPHA, BETA, GAMMA, SR, T
	SWSA1/MPA	Fifth Creek		WS	G	I		FLD(1), MET(1,4,6), ALPHA, BETA, GAMMA, SR, T
	MPA	First Creek		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR, T
	MPA	WOC-105[i]		WS	G	I		FLD(1), MET(1,4,6), ALPHA, BETA, GAMMA
	SIOU	0875		WG	G		X	FLD(1), ALPHA, BETA, SR, T
	SIOU	1102		WG	G			FLD(1), VOC(1), ALPHA, BETA, SR, T
	MPA	GS-5		WS	G			FLD(1), MET(4,6)
	MPA	4585		WG	G			FLD(1), ALPHA, BETA, SR, U
BVW-3	EXP	NONAME H2O	Q2	WS	G	I		FLD(1), MET(1), ALPHA, BETA, T
	MPA	CH-33		WG	G		X	FLD(1), ALPHA, BETA, SR, T, U
BVW-4	MPA	WOC HI-PH-SEEP	M	WS	G	I		FLD(1), ALPHA, GAMMA, SR
	MPA	3513SEEP		WS	G	I		FLD(1), ALPHA, GAMMA, SR
	MPA	GS-5		WS	G	I		FLD(1), ALPHA, GAMMA, SR
	MPA	OF341		WS	G			FLD(1), ALPHA, SR
BVW-5	MPA	0812	Q1,Q2, Q3, Q4	WG	G			FLD(1), ALPHA, BETA, SR, T, U
	MPA	4411		WG	G			ALPHA, BETA, GAMMA, AM, CM, PU, SR, T, U
	MPA	4005–Zone 2*		WG	G			FLD(1), ALPHA, BETA, SR, T, U
BVW-6	BV	2541-02	Q2, Q4	WG	G			FLD(1), ION(1), MET(1), ALPHA, BETA, SR
	BV	2541-05		WG	G			FLD(1), ION(1), MET(1), ALPHA, BETA, SR
	BV	4579-1		WG	G			FLD(1), ION(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	BV	4579-2		WG	G		X	FLD(1), ION(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	BV	4579-3		WG	G			FLD(1), ION(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	MPA	4004-05		WG	G			FLD(1), VOC(1), ALPHA, BETA, SR
	MPA	4570		WG	G			FLD(1), ALPHA, BETA, SR, U
	MPA	4571		WG	G			FLD(1), ALPHA, BETA, SR
	MPA	4572		WG	G			FLD(1), ALPHA, BETA, SR

Table C.2. Sample groups for the XWQP in the Bet Valley Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
	BV 7000	4575-1		WG	G			FLD(1), VOC(1)
	BV 7000	4575-2		WG	G			FLD(1), VOC(1)
	BV 7000	4575-3		WG	G			FLD(1), VOC(1)
	BV 7000	1201		WG	G			FLD(1), VOC(1)
	BV 7000	1202		WG	G			FLD(1), VOC(1)
	BV 7000	4576		WG	G			FLD(1), VOC(1)
	BV 7000	4581		WG	G			FLD(1), VOC(1)
	BV 7000	4582		WG	G			FLD(1), VOC(1)
	BV 7000	0754		WG	G			FLD(1), VOC(1)
	SP200	SP200		WS	G			FLD(1), VOC(1)
BVW-8	MPA	WC-9 DW	C	WG	WL			CONTINUOUS WATER LEVEL
BVW-10	MPA	WOC-105[i]	Q2, Q4	WS	G			MET(4,6)
	SWSA1/MPA	Fifth Creek		WS	G			MET(4,6)
	SWSA1/MPA	Third Street Bridge		WS	G			MET(4,6)
	EXP	Raccoon Creek*		WS	G			MET(1,4,6)
	MPA	First Creek*		WS	G			MET(1,4,6)
	SWSA3	NWTrib*		WS	G			MET(1,4,6)
	MV	SRS		WS	G			MET(4,6)
	MV	WOD		WS	G			MET(4,6)
	MV	MBWEIR		WS	G			MET(4,6)
	MV	WCWEIR		WS	G			MET(4,6)
	MV	WC7500		WS	G			MET(4,6)
	SWSA4	SWSA4 SW1		WS	G			MET(4,6)
BVW-11	MPA	WC 7500	TBD (up to13 samples per location)	WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)
	MPA	WOC SP02		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)
	MPA	Third Street Bridge		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)
	MPA	OF-302		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)
	MPA	OF-304		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)
	MPA	WOC HI-PH-SEEP		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)

Table C.2. Sample groups for the XWQP in the Beta Valley Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
	MPA	3513 Seep		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)
	MPA	GS-5		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)
	MPA	OF-207		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)
	MPA	PMHWC-9		WS	G			FLD(1), ALPHA, BETA, GAMMA, SR (On up to 25% of samples based on Beta results)

Notes for Bethel Valley Watershed Table C.2:

a **Sample Group**
BVW = Bethel Valley Watershed sample group number.
Samples will be collected in the sequence shown during as short a time period as possible following the schedule under Monitoring Frequency.

b **Location and Sampling Point**
BV = Bethel Valley
BV 7000 = Bethel Valley 7000 Area VOC Plume
EXP = Exit Pathway
MPA = Main Plant Area (Oak Ridge National Laboratory)
MV = Melton Valley]
NWTrib = Northwest Tributary
SIOU = Surface Impoundments Operable Unit
SP = Spring
SRS = Sediment Retention Structure
SWSA = Solid Waste Storage Area
WOC = White Oak Creek
WOD = White Oak Dam

c **Monitoring Frequency**
Q_ = Quarter of the fiscal year (e.g., Q1, Q2, Q3, Q4)
M = Monthly — Samples are typically collected on the last Wednesday of each month. Coordinate collection of these samples with Environmental Protection.
TBD = to be determined

Water Level Frequency
C = Daily average water levels using continuously recording data logger and transducer

d **Matrix**
WG = Groundwater.
WS = Surface water.

e **Sample Type**
G = grab sample
C = composite
WL = water level

f **Flow/Precipitation**
C = continuous flow measurement (often accompanied by a flow-proportional composite sample)
I = instantaneous flow measurement (often accompanied by a grab sample)

g **Duplicate**
X = field duplicate sample collected

h **Analyte/Parameter group:**
See Table D.1 for a list of parameter groups and analytes.
NOTE: Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D.21, in addition to MET(1), MET(4), VOC(1), and SVOC, per methods and PQLs contained therein.

i Collect sample above the mixing zone at the confluence of White Oak Creek and Fifth Creek.

* Notation in "Sampling Point" column designates high-priority location for full data validation

AWQC = ambient water quality criteria
FY = fiscal year
PQL = project quantitation limit
XWQP = X-10 Water Quality Project

Table C.3. Sample groups for the XWQP in the Melton Valley Watershed during FY 2009

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
MV-1	MV	SRS*	Q2, Q4	WS	G			FLD(1), VOC(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	MV	WOD*		WS	G			FLD(1), VOC(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	MV	MBWEIR*		WS	G			FLD(1), VOC(1), MET(1), ALPHA, BETA, GAMMA, SR, T, U
	MV	WCWEIR*		WS	G			FLD(1), VOC(1), MET(1), ALPHA, BETA, GAMMA, SR, T, U, C
	MV	WC7500*		WS	G			FLD(1), VOC(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	MV	WEST SEEP		WS	G	I		FLD(1), VOC(1), MET(1,4), ALPHA, BETA, GAMMA, SR, C, T
	SWSA 5	SWSA5D1		WS	G	I		FLD(1), VOC(1), MET(1,4), ALPHA, BETA, GAMMA, SR, T, U
	SWSA4	SWSA4 SW1*		WS	G	I		FLD(1), VOC(1), MET(1), ALPHA, BETA, GAMMA, SR, T, U
	SWSA 5	HRT-1A		WS	G	I		FLD(1), VOC(1), MET(1,4), ALPHA, BETA, GAMMA, SR, T, U
	SWSA 5	HRT-10		WS	G			FLD(1), VOC(1), MET(1,4), U
	HFIR	HFIR SEEP		WS	G			FLD(1), BETA, GAMMA, SR, T
	SWSA 6	WAG 6 MS3		WS	G			FLD(1), VOC(1), MET(1,4), ALPHA, BETA, GAMMA, SR, T
	SWSA 6	IWMF-1		WS	G	I		FLD(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	SWSA 6	IWMF-2		WS	G	I		FLD(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	SWSA 6	IWMF- 3		WS	G	I		FLD(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	SWSA 6	IWMF-4		WS	G	I		FLD(1), MET(1), ALPHA, BETA, GAMMA, SR, T
	SWSA 6	SFD		WS	G	I		FLD(1), MET(1,4), VOC(1), ALPHA, BETA, GAMMA, SR, T
	SWSA 6	WFD		WS	G	I		FLD(1), MET(1,4), VOC(1), ALPHA, BETA, GAMMA, SR, T
	WAG 7	SW7-6		WS	G	I		FLD(1), ION(I,2), MET(1,4), ALPHA, BETA, GAMMA, SR, T, TC, C
	WAG 7	EAST SEEP		WS	G	I		FLD(1), ION(I,2), MET(1,4)
	MV	MB-UP		WS	G	I	X	FLD(1), ALPHA, BETA, GAMMA, SR, T
	ESA-MISC	1867		WG	G			FLD(1), ION(1,2), MET(1), VOC(1), ALPHA, BETA, GAMMA, SR, T, U
MV-2	MV	MB1	M	WS	G	I		FLD(1), ALPHA, BETA, GAMMA, SR, T
	MV	HRT-3		WS	G	I		FLD(1), ALPHA, BETA, GAMMA, SR, T
	MV	HRT-10		WS	G	I		FLD(1), ALPHA, BETA, GAMMA, SR, T
	MV	EAST SEEP		WS	G	I		FLD(1), ALPHA, BETA, GAMMA, C, SR, T, U
	MV	WEST SEEP		WS	G	I		FLD(1), ALPHA, BETA, GAMMA, SR, T, U
	MV	SWSA5D1		WS	G	I		FLD(1), ALPHA, BETA, GAMMA, SR, T, U
	MV	MB2		WS	G	I		FLD(1), BETA, GAMMA, SR, T
	SWSA4	SWSA4 SW1		WS	G	I		FLD(1), MET(4)
	EXP	WC7500		WS	G			FLD(1), MET(4)
MV-3	SWSA6	WAG6 MS3	M	WS	C	C		ALPHA, BETA, GAMMA, SR, T
	SWSA4	SWSA4 SW1		WS	C	C		ALPHA, BETA, GAMMA, SR, T
	EXP	WC7500*		WS	C	C	X	GAMMA, SR, T, SLD (TSS only)
MV-4	MV	MB-HEADWATERS	Q4	WS	G			FLD(1), VOC(1), MET(1,4), ALPHA, BETA, GAMMA, SR, T

Table C.3. Sample groups for the XWQP in the Mel[illegible] Valley Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
	SWSA 5	MB2		WS	G	I		FLD(1), VOC(1), MET(1,4)
	SWSA 5	HRT-3		WS	G	I		FLD(1), VOC(1), MET(1,4)
	WAG 7	SW7-5 (T7-Trib)		WS	G	I		FLD(1), MET(1,4), ALPHA, BETA, GAMMA, SR, C, T
	WAG 7	WC TRIB-1		WS	G	I		FLD(1), MET(1,4), ALPHA, BETA, GAMMA, SR, C, T
	WAG 7	UWS		WS	G	I		FLD(1), MET(1,4), VOC(1), ALPHA, BETA, GAMMA, SR, T
MV-5	SWSA6	0837	Q1, Q3	WG	G			FLD(1), MET(5), VOC(1), ALPHA, BETA, GAMMA, T, SR
	SWSA6	0835		WG	G			FLD(1),VOC(1), ALPHA, BETA, GAMMA, T, SR
	SWSA6	0841		WG	G		X	FLD(1),VOC(1,2), ALPHA, BETA, GAMMA, T, SR
	SWSA6	0842		WG	G			FLD(1),VOC(1,2), ALPHA, BETA, GAMMA, T, SR
	SWSA6	0843		WG	G			FLD(1),VOC(1,2), ALPHA, BETA, GAMMA, T, SR
	SWSA6	0844		WG	G			FLD(1),VOC(1,2), ALPHA, BETA, GAMMA, T, SR
	SWSA 6	0846		WG	G			FLD(1),VOC(1,2), AALPHA, BETA, GAMMA, T, SR
	SWSA 6	0838		WG	G			FLD(1), VOC(1), ALPHA, BETA, GAMMA, T, SR
	SWSA 6	4315		WG	G			FLD(1), MET(5), VOC(1), ALPHA, BETA, GAMMA, T, SR
	SWSA 6	4316		WG	G			FLD(1), VOC(1), ALPHA, BETA, GAMMA, T, SR
	SWSA 6	4317		WG	G			FLD(1),VOC(1,2), ALPHA, BETA, GAMMA, SR, T
	SWSA 6	HCTANK1P		WS	G			FLD(1), MET(1)
MV-6	SWSA6	1036[i]	Q2, Q4	WG	G			FLD(1), SR, T
	SWSA6	1037[i]		WG	G			FLD(1), SR, T
	SWSA6	1039[i]		WG	G			FLD(1), SR, T
	SWSA6	1254[i]		WG	G			FLD(1), SR, T
	SWSA6	1257[i]		WG	G			FLD(1), SR, T
	SWSA6	1258[i]		WG	G			FLD(1), SR, T
	HFIR	0662		WG	G			FLD(1), GAMMA, T
	HFIR	1152		WG	G			FLD(1), GAMMA, T
MV-7	SWSA6	TUM1P	M	WG	G			T
	SWSA6	TUM1UP		WG	G			T
	SWSA6	TUM2P		WG	G			T
	SWSA6	TUM2UP		WG	G			T
	SWSA4	WAG4MET		NA	-	X		NA
MV-8	WAG7	0106	Q2, Q4	WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1076		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1077		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1078		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1079		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC

Table C.3. Sample groups for the XWQP in the Melt... Valley Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
	WAG7	4569		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1081		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1082		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1083		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1084		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1085		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1086		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1244		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1245		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	0935		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1752		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1755		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1756		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	4587		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	4564		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	4565		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	0932		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1712		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1784		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	1791		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	4566		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
	WAG7	4567		WG	G			FLD(1), MET(1), ION(1,2), ALPHA, BETA, GAMMA, T, SR, C, U, TC
MV-9a	MV	4537 - All Zones	Q2	NA	P			FLD(4)
	MV	4537-04*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T
	MV	4538 - All Zones		NA	P			FLD(4)
	MV	4538-02*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U
	MV	4538-06*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T
	MV	4539 - All Zones		NA	P			FLD(4)
	MV	4539-06*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T
	MV	4540 - All Zones		NA	P			FLD(4)
	MV	4540-01*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U, AM
	MV	4540-02*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U, AM
	MV	4540-03*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U, AM
	MV	4541 - All Zones		NA	P			FLD(4)
	MV	4541-03*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T

Table C.3. Sample groups for the XWQP in the Melton Valley Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
	MV	4541-04*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U
	MV	4541-05*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U
	MV	4541-06*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR
	MV	4542 - All Zones		NA	P			FLD(4)
	MV	4542-02*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, SR
	MV	4542-04*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR
	MV	4542-06*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T
MV-9b	MV	4537 - All Zones	Q2	NA	P			FLD(4)
	MV	4537-02*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR
	MV	4537-03*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR
	MV	4538 - All Zones		NA	P			FLD(4)
		4538-03*						FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR
	MV	4538-05*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T
	MV	4539 - All Zones		NA	P			FLD(4)
	MV	4539-01*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR
	MV	4539-02*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U
	MV	4539-04*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U
	MV	4539-05*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, U
	MV	4539-06*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR
	MV	4541 - All Zones		NA	P			FLD(4)
	MV	4541-02*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U
	MV	4542 - All Zones		NA	P			FLD(4)
	MV	4542-01*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR, U
	MV	4542-05*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T, SR
	MV	4542-08*		WG	G			FLD(1), SLD, ION(1,3), VOC(1), MET(1), ALPHA, BETA, GAMMA, T
MV-10	SWSA4	0949	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	0950	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4543 (PZ-1)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4544 (PZ-2)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4545 (PZ-3)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4546 (PZ-4)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4547/48 (PZ-5A,B)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4551/52 (PZ-7A,B)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4555 (PZ-9)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4556 (PZ-10)	C	WG	WL			CONTINUOUS WATER LEVEL

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
	SWSA4	4588/50 (PZ-6AR,B)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4589 (PZ-14R)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4591 (PZ-20)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4595 (PZ-24)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4596 (PZ-25)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4598 (PZ-27)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4599 (PZ-28)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4605 (PZ-34)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4606 (PZ-35)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4607 (PZ-36)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	4611 (PZ-40)	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA5	0145	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA5	1734	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA5	2026	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA5	SS-8.2	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA6	0850	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA6	1036	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA6	2217	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA7	0055	C	WG	WL			CONTINUOUS WATER LEVEL
	SWSA4	0952	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA4	0955	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA4	4553/54 (PZ-8A,B)	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA4	4557 (PZ-11)	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA4	4558 (PZ-12)	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA4	4559 (PZ-13)	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA4	4561 (PZ-15)	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA4	4562 (PZ-16)	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA4	4563 (PZ-17)	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	0436	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	0443	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	0504	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	0666	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	0710	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	0711	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	1766	Mthly	WG	WL			MONTHLY WATER LEVEL

Table C.3. Sample groups for the XWQP in the Melton Valley Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
	SWSA5	2018	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	2019	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	2020	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	4175	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	4188	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	4193	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	4204	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	4212	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA5	4224	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA6	0399	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA6	0836	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA6	0845	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA6	0848	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA6	0938	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA6	1037	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA6	1039	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA6	1257	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA6	4127	Mthly	WG	WL			MONTHLY WATER LEVEL
	WAG7	0052	Mthly	WG	WL			MONTHLY WATER LEVEL
	WAG7	0057	Mthly	WG	WL			MONTHLY WATER LEVEL
	WAG7	0125	Mthly	WG	WL			MONTHLY WATER LEVEL
	WAG7	0678	Mthly	WG	WL			MONTHLY WATER LEVEL
	WAG7	1758	Mthly	WG	WL			MONTHLY WATER LEVEL
	WAG7	1760	Mthly	WG	WL			MONTHLY WATER LEVEL
	WAG7	2730	Mthly	WG	WL			MONTHLY WATER LEVEL
	WAG7	2815	Mthly	WG	WL			MONTHLY WATER LEVEL
	SWSA 4	0958	Qtly	WG	WL			QUARTERLY WATER LEVEL
	SWSA 4	0960	Qtly	WG	WL			QUARTERLY WATER LEVEL
	SWSA 4	0962	Qtly	WG	WL			QUARTERLY WATER LEVEL
	SWSA 4	1071	Qtly	WG	WL			QUARTERLY WATER LEVEL
	SWSA4	0956	Qtly	WG	WL			QUARTERLY WATER LEVEL
MV-11	SWSA 4	EQ TANK	M	WG	G			FLD(1), SLD, ION(1,2), MET(1,4), VOC(1), ALPHA, BETA, GAMMA, T, C, TC, SR, U
	SWSA 4	SWSA4 DGT	Q1 - Q4	WG	G			FLD(1), ALPHA, BETA, GAMMA, SR, T, U
	SWSA 4	SWSA4 UDE	Q1 - Q4	WG	G	I		FLD(1), ALPHA, BETA, GAMMA, SR, T, U
	SWSA 4	SWSA 4 UDW	Q1 - Q4	WG	G	I		FLD(1), ALPHA, BETA, GAMMA, SR, T, U

Table C.3. Sample groups for the XWQP in the Mel... Valley Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
	SWSA 5	SEEPD VB	Q1 - Q4	WG	G			FLD(1), ALPHA, BETA, GAMMA, SR, T
	SWSA 5	SWSA5 DGT	Q1 - Q4	WG	G			FLD(1), ALPHA, BETA, GAMMA, SR, T, C, U
	WAG 7	WAG7 DGT	Q1 - Q4	WG	G			FLD(1), ALPHA, BETA, GAMMA, SR, T, TC, C, U
	SWSA 6	UGT-2	Q2 (storm only)	WS	G	I		FLD(1), MET(1), ALPHA, GAMMA, SR, T
	WAG 7	UGT-1	Q2 (storm only)	WS	G	I		FLD(1), MET(1), ALPHA, GAMMA, SR, T

Notes for Melton Valley Watershed Table C.3:

a **Sample Group**

MV = Melton Valley watershed sample group number

Samples will be collected in the sequence shown during as short a time period as possible, at the frequency shown.

b **Location and Sampling Point**

HFIR = High Flux Isotope Reactor
HRT = Homogeneous Reactor Test
IWMF = Interim Waste Management Facility
MBWEIR = Melton Branch Weir
MV = Melton Valley
SRS = Sediment Retention Structure
SWSA = Solid Waste Storage Area
WAG = Waste Area Grouping
WCWEIR = White Oak Creek Weir
WOD = White Oak Dam

c **Monitoring Frequency**

Q_ = Quarter of the fiscal year (e.g., Q1, Q2, Q3, Q4)
M = Monthly
Monthly grab samples are typically collected during baseflow (i.e., low flow) conditions.
Coordinate collection of monthly composite samples with Environmental Protection (UT-Battelle).

Water Level Frequency

Qtly = Quarterly
Mthly = Monthly
C = Daily average water levels using continuously recording data logger and transducer

d **Matrix**

WS = Surface water
WG = Groundwater
NA = not applicable

e **Sample Type**

C = composite
G = grab sample
P = pressure profile
WL = water level

f **Flow/Precipitation**

C = continuous flow measurement (often accompanied by a flow-proportional composite sample)
I = instantaneous flow measurement (often accompanied by a grab sample)
X = precipitation data collected at scheduled frequency

g **Duplicate** X = field duplicate sample collected

h **Analyte/parameter group:** See Table D.1

NOTE: Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D.21, in addition to MET(1), MET(4), VOC(1), and SVOC, per methods and PQLs contained therein.

NA = Not applicable (i.e., no analytical/parameter group)

i Sampling of these wells will be done coincident with the RCRA post-closure sampling in SWSA 6

* Notation in "Sampling Point" column designates high-priority location for full data validation

AWQC = ambient water quality criteria
FY = fiscal year
PQL = project quantitation limit
XWQP = X-10 Water Quality Program

Table C.4. Sample groups for the YWQP in the [illegible] Creek Valley Watershed during FY 2009

Sample group[a]	Location[b]	Sampling point[b]	Monitoring frequency[c]	Matrix[d]	Sample type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
BC-5	S-3	NT-02	W	WS	C	C		ION(2)
	S-3	BCK-12.34		WS	C	C		ION(2), U
	S-3/BYBY	BCK-11.54		WS	C	C		U
	S-3/BYBY/EMWMF	NT-05		WS	G	I		U, ALPHA, BETA
	BCBG	NT-08		WS	C	C		U
	EXP	BCK9.2*		WS	C	C		U
	EXP	SS-5		WS	C	C		U
BC-6	S-3	BCK-12.34	M	WS	G			FLD(1), MET(1)
	BYBY	NT-03		WS	G	I	X	FLD(1), U
	BCBG	NT-07		WS	G	I		FLD(1), U (monthly except in months of semiannual grab samples)
BC-7	BCBG	GW-077	Q2, Q4	WG	G			FLD(1), MET(2), VOC(1), SLD
	BCBG	GW-078		WG	G			FLD(1), MET(2), VOC(1), SLD
	BCBG	GW-079		WG	G			FLD(1), MET(2), VOC(1), SLD
	BCBG	GW-080		WG	G		X	FLD(1), MET(2), VOC(1), SLD
	EXP	GW-683		WG	G			FLD(1), ION(1,2), MET(1,4), VOC(1), SLD, ALPHA, BETA, TC, U
	EXP	GW-684		WG	G			FLD(1), ION(1,2), MET(1,4), VOC(1), SLD, ALPHA, BETA, TC, U
	S-3/BYBY	GW-704		WG	G			FLD(1), ION(1,2), MET(1,2), VOC(1), SLD, ALPHA, BETA, TC, U
	S-3/BYBY	GW-706		WG	G			FLD(1), ION(1,2), MET(1,2), VOC(1), SLD, ALPHA, BETA, TC, U
	BCBG	NT-07		WS	G			FLD(1), ION(1,2), MET(1,2), VOC(1), SLD, U
	BCBG	NT-08		WS	G			FLD(1), ION(1,2), MET(1,2), VOC(1), SLD
BC-12	EMWMF	EMW-VWEIR	Bi-M	WS	G			FLD(1), MET(1,2), SLD, ALPHA, BETA, TC, U, GAMMA, SR
BC-13	EXP	BCK9.2*	Q2, Q4	WS	G			MET(4,6)
	BCBG	NT-08		WS	G			MET(4,6)
	EXP	SS-5		WS	G			MET(4,6)
	EXP	SS-4		WS	G			MET(4,6)
	S-3/BYBY	BCK-11.54		WS	G			MET(4,6)
	S-3	BCK-12.34		WS	G			MET(4,6)

Notes for Bear Creek Valley Watershed Table C.4:

a **Sample Group**
BC = Bear Creek Valley Watershed sample group number

Samples in each group will be collected during as short a time period as possible, following the schedule provided.

b **Location and Sampling Point**

BCBG = Bear Creek Burial Grounds
BCK = Bear Creek kilometer
BYBY = Boneyard/Burnyard
EMWMF = Environmental Management Waste Management Facility
EXP = Exit pathway
GW = Groundwater well
NT = Northern tributary
SS = South side of Bear Creek

c **Monitoring Frequency**
W = Weekly
Bi-M = Bi-monthly
M = Monthly
Q1...Q4 = lists sample schedule for FY quarters

d **Matrix**
WG = groundwater
WS = surface water

e **Sample Type**
G = grab sample
C = composite sample

f **Flow/Precipitation**
C = continuous flow measurement (often accompanied by a flow-proportional composite sample)
I = Instantaneous flow measurement (often accompanied by a grab sample)

g **Duplicate**
X = field duplicate sample will be collected

h **Analyte/parameter group**
See Table D.1 for a list of parameter groups and analytes.
NOTE: Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D.21, in addition to MET(1), MET(4), VOC(1), and SVOC, per methods and PQLs contained therein.

* **In "Sampling Point" column, denotes high-priority locations for full data validation.**

AWQC = ambient water quality criteria
FY = fiscal year
PQL = project quantitation limit
YWQP = Y-12 Water Quality Program

Table C.5. Sample groups for the YWQP in [illegible] UEFPC Watershed during FY 2009

Sample group[a]	Location[b]	Sampling point[b]	Monitoring frequency[c]	Matrix[d]	Sample type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
EFW-2a	EXP	Station 8	Q2, Q4 (baseflow)	WS	G	I		FLD(1), MET(1,2), SLD, ALPHA, BETA, U
	EXP	Outfall 200A6*		WS	G			FLD(1), MET(1,2), SLD
EFW-2b	EXP	Station 8	Q2, Q4 (storm flow)	WS	G	I		FLD(1), MET(1,2), SLD, ALPHA, BETA, U
	EXP	Outfall 200A6*		WS	G			FLD(1), MET(1,2), SLD
EFW-3a[i]	NHP	GW-154	Q2, Q4	WG	G			FLD(1), MET(1,2), VOC(1,2), SLD, ALPHA, BETA, U
	NHP	GW-832		WG	G			FLD(1), ION(1,2), MET(1,2), VOC(1,2), SLD, ALPHA, BETA, U
	NHP	GW-151		WG	G			FLD(1), ION(1,2), MET (1,2), VOC(1,2), SLD, ALPHA, BETA, U
	NHP	GW-223		WG	G			FLD(1), ION(1,2), MET(1,2), VOC(1,2), SLD, ALPHA, BETA, U
	NHP	GW-762		WG	G		X	FLD(1), ION(1,2), MET(1,2), VOC(1,2), SLD, ALPHA, BETA
	NHP	GW-382		WG	G			FLD(1), ION(1,2), MET(1,2), VOC(1,2), SLD, ALPHA, BETA
	NHP	GW-380		WG	G			FLD(1), ION(1,2), MET(1,2), VOC(1,2), SLD, ALPHA, BETA
	UV	GW-169		WG	G			FLD(1), ION(1,2), MET(1), VOC(1), SLD, ALPHA, BETA
	UV	GW-170*		WG	G		X	FLD(1), ION(1,2), MET(1), VOC(1), SLD, ALPHA, BETA
EFW-5	UV	GW-171	Q2	WG	G			FLD(1,2), VOC(1), SLD
	UV	GW-172		WG	G			FLD(1,2), VOC(1), SLD
	UV	GW-230		WG	G			FLD(1,2), VOC(1), SLD
	UV	SCR7.1SP		WS	G			FLD(1,2), VOC(1), SLD
	UV	SCR7.8SP		WS	G			FLD(1,2), VOC(1), SLD
	S-2	GW-253		WG	G			FLD(1,2), ION(1,2), MET(1,2), VOC(1,2), SLD, ALPHA, BETA
	EXP	GW-618		WG	G			FLD(1,2), ION(1,2), MET(1,2), VOC(1,2), SLD, ALPHA, BETA
EFW-6a	EXP	GW-149	Q2	WG	WL			ANNUAL WATER LEVEL
	EXP	GW-151		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-152		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-153		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-168		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-223		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-381		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-384		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-605		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-733		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-734		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-735		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-750		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-763		WG	WL			ANNUAL WATER LEVEL
	EXP	GW-832		WG	WL			ANNUAL WATER LEVEL
EFW-6b	EXP	GW-722 – 33	Q2	WG	G			FLD(1), VOC(1)
	EXP	GW-722 – 22*		WG	G			FLD(1), VOC(1)
	EXP	GW-722 – 20*		WG	G			FLD(1), VOC(1)
	EXP	GW-722 – 14		WG	G			FLD(1), VOC(1)
	EXP	GW-722-17*		WG	G			FLD(1), VOC(1)
	EXP	GW-722 – All Zones		NA	P			FLD(4)

Table C.5. Sample groups for the YWQP in the U C Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring frequency[c]	Matrix[d]	Sample type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
EFW-7a	EEVOC	EEVOC Influent (Valve 600-C)	Q1-Q4	WG	G			FLD(1), ION(2), MET(1,2,3), U
	EEVOC	EEVOC Effluent (Valve 620-L or -M)*		WG	G			FLD(1), ION(2), MET(1,2,3), U
EFW-7b	BSWTS	Outfall 51	M	WS	G	I		FLD(1), MET(4)
	BSWTS	BSWTS INFLUENT		WG	G			MET(4)
	EEVOC	EEVOC Influent (Valve 600-C)		WG	G			VOC(1) [NOTE: One sample per quarter is collected in compliances with RAR requirements]
	EEVOC	EEVOC Effluent (Valve 620-L or -M)*		WS	G			VOC(1) [NOTE: One sample per quarter is collected in compliances with RAR requirements]
EFW-7c	BSWTS	BSWTS-EFFLUENT	Q2, Q4	WG	G			FLD(1), ION(1,2), MET(1,2,4), VOC(1), ALPHA, BETA, U
EFW-7d	BSWTS	BSWTS-EFFLUENT*	W	WG	C	C		MET(4)
EFW-8[k]	EEFS	GW-281	Q3	WG	G			FLD(1), VOC(1)[k]
	EEFS	GW-658		WG	G			FLD(1), VOC(1)[k]
	EEFS	GW-802		WG	G			FLD(1), VOC(1)[k]
RMPE-7	LEFPC	EFK 6.3	Q1, Q3[i]	WS	G	I		FLD(1), MET(4,6), SLD[j]
	LEFPC	EFK 13.8		WS	G	I		FLD(1), MET(4,6), SLD[j]
	LEFPC	EFK 18.2		WS	G	I		FLD(1), MET(4,6), SLD[j]
	UEFPC Exit Point	Station 17		WS	G	I		FLD(1), MET(4,6), SLD[j]
	UEFPC	EFK 24.8		WS	G	I		FLD(1), MET(4,6), SLD[j]
	UEFPC@ N/S Pipe	Clinch River (raw H2O)[n]		WS	G	I		FLD(1), MET(4,6), SLD[j]
	Reference	Hinds Creek (HCK 20.6)		WS	G	I		FLD(1), MET(4,6), SLD[j]
RMPE-8[m]	UEFPC	Station 17*	D (M-TH)	WS	G			FLD(1), MET(4), SLD[m]
	UEFPC	Station 17	MON	WS	G			MET(1,2)[m]
	UEFPC	Station 8	W	WS	G	C		FLD(1), MET(4), SLD[m]
	UEFPC	Outfall 200A6		WS	C	C		FLD(1), MET(4), SLD
	UEFPC	UEFPC at OF 125[o]		WS	G	C		FLD(1), MET(4), SLD

Table C.5. Sample groups for the YWQP in the U[illegible]C Watershed during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring frequency[c]	Matrix[d]	Sample type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
CRS-4	EXP	SCR 1.25SP	Q2, Q4	WS	G			FLD(1), ION(1,2), MET(1,2), VOC(1), SLD, ALPHA, BETA
	EXP	SCR 3.5SP		WS	G			FLD(1), ION(1,2), MET(1,2), VOC(1), SLD, ALPHA, BETA
CRS-5	FCAP	MCK 2.00*	Q2, Q4	WS	G			FLD(1), ION(1), MET(1,2,4,6), SLD, ALPHA, BETA
	FCAP	MCK 2.05		WS	G		X	FLD(1), ION(1), MET(1,2), SLD, ALPHA, BETA
	MCK	MCK 1.4		WS	G			FLD(1), MET(1,4,6)
CRS-6	UNCS	1090	Q2, Q4	WG	G			FLD(1), ION(1,2), MET(1,2), SLD, ALPHA, BETA, SR, U
	UNCS	GW-203		WG	G			FLD(1), ION(1,2), MET(1,2), SLD, ALPHA, BETA, SR, U
	UNCS	GW-205*		WG	G			FLD(1), ION(1,2), MET(1,2), SLD, ALPHA, BETA, GAMMA, SR, TC, U
	UNCS	GW-221		WG	G			FLD(1), ION(1,2), MET(1,2), SLD, ALPHA, BETA, SR, U
	UNCS	UNC SW-1		WS	G	I		FLD(1), ION(1,2), MET(1), ALPHA, BETA, GAMMA

Notes for Upper East Fork Poplar Creek Watershed Table C.5:

a **Sample Group:**
EFW = Upper East Fork Poplar Creek sample group number
RMPE = Reduction of Mercury in Plan Effluents program sample group number
CRS = Chestnut Ridge subwatershed sample group number

Samples in each group will be collected during as short a time period as possible, following the schedule provided.

b **Location and Sampling Point:**
BSWTS = Big Spring Water Treatment System
EEFS = East End Fuel Station.
EEVOC = East End VOC Plume Removal Action Treatment Facility.
EFK = East Fork Poplar Creek kilometer.
EXP = Exit Pathway: Maynardville Limestone, springs, or surface water.
FCAP = Filled Coal Ash Pond.
GW = Monitoring well.
HCK = Hinds Creek kilometer
LEFPC = Lower East Fork Poplar Creek.
MCK = McCoy Branch kilometer (surface water).
NHP = New Hope Pond.
OF = Outfall (surface water).
S-2 = S-2 Site.
SCR = South side of Chestnut Ridge (spring).
UEFPC = Upper East Fork Poplar Creek.
UNCS = United Nuclear Corporation Site.
UV = Union Valley.

c **Monitoring Frequency**
Q_ = Quarter of the fiscal year (e.g., Q1, Q2, Q3, Q4)
M = Monthly
D = Daily
MON = Monday only
W = Weekly

d **Matrix**
WS = Surface water
WG = Groundwater
NA = not applicable

e **Sample Type**
G = grab
C = composite
WL = water levels
P = pressure profile

f **Flow/Precipitation**
C = continuous flow measurement (often accompanied by a flow-proportional composite sample)
I = instantaneous flow measurement (often accompanied by a grab sample)

g **Duplicate**
X = field duplicate sample will be collected.

h **Analyte/parameter group:**
See Table D.1 for a list of parameter groups and analytes.
NOTE: Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D.21, in addition to MET(1), MET(4), VOC(1), AND SVOC, per methods and PQLs contained therein.

i Coordinate sampling with the Y-12 Environmental Compliance Department (Water Compliance Section) so that samples are collected at approximately the same time as samples obtained from wells GW-153, GW-220, GW-381, and GW-383 **(There is the potential for deployment of Hydrasleeve no-purge sampling devices in these wells during late 2008 or 2009).**

k The thickness of any free product in EFW-8 wells will be measured and recorded.

l Longitudinal sampling performed in December and June in conjunction with BMAP sampling for the Y-12 NPDES Program. Samples collected for miscellaneous parameters (total suspended solids and in-field measurements), total and dissolved mercury, and total and dissolved methyl mercury.

m Grab samples collected daily Monday through Thursday at Station 17 for FLD(1), MET(4), and SLD.
One grab sample per week (Mondays) also analyzed for total uranium and zinc (MET 1,2). Zinc only to be reported on MET 1.
Per Non-Significant Change to Phase I Interim Source Control Action, continue flow monitoring at Station 8 and weekly grab sample to evaluate ungauged Hg influx to UEFPC.

n Clinch River (raw H2O)—flow management input to UEFPC at North/South Pipe.

o UEFPC at OF-125—UEFPC main channel at Outfall 125.

* In Sampling Point column, denotes high-priority locations for full data validation.

AWQC = ambient water quality criteria
BMAP = Biological Monitoring and Abatement Program
FY = fiscal year
NPDES = National Pollutant Discharge Elimination System
PQL = project quantitation limit
Y-12 = Y-12 National Security Complex.
YWQP = Y-12 Water Quality Program.

Table C.6. Sample groups for the YWQP RCRA post-closure permit monitoring at Y-12 during FY 2009

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
BC-1	EXP	GW-712	Q2, Q4	WG	G			FLD(1), ION(2), MET(1,2), VOC(1), ALPHA, BETA, TC, U
	EXP	GW-713*		WG	G		X	FLD(1), ION(2), MET(1,2), VOC(1), ALPHA, BETA, TC, U
	EXP	GW-714		WG	G			FLD(1), ION(2), MET(1,2), VOC(1), ALPHA, BETA, TC, U
	EXP	SS-6[i]*		WS	G			FLD(1), ION(2), MET(1,2), VOC(1), ALPHA, BETA, TC, U
	OLF	GW-008		WG	G			FLD(1), MET(1,2,3), VOC(1), ALPHA, BETA
	BCBG	GW-046		WG	G			FLD(1), MET(2), VOC(1), ALPHA, BETA, TC, U
	S-3	GW-276[j]		WG	G			FLD(1), ION(2), MET(1,2,3), VOC(1), ALPHA, BETA, AM, NP, RA, SR, TC, U
EFW-1	T2331	GW-193	Q2, Q4	WG	G			FLD(1), TC
	EXP	GW-733*		WG	G			FLD(1), VOC(1), ALPHA, BETA, TC
	EXP	GW-605		WG	G		X	FLD(1), ION(1,2), MET(1,2), VOC(1), ALPHA, BETA, TC
	EXP	GW-606		WG	G			FLD(1), ION(1,2), MET(1,2), VOC(1), ALPHA, BETA, TC
	S-3	GW-108[k]		WG	G			FLD(1), ION(1,2), MET(1,2,3), VOC(1), ALPHA, BETA, TC
CRS-1	KHQ	GW-231	Q2[L]	WG	G		X	FLD(1), MET(1,2,3), VOC(1), SLD, ALPHA, BETA
	KHQ	GW-143*		WG	G			FLD(1), MET(1,2,3), VOC(1), SLD, ALPHA, BETA
	KHQ	GW-144		WG	G			FLD(1), MET(1,2,3), VOC(1), SLD, ALPHA, BETA
	KHQ	GW-145		WG	G			FLD(1), MET(1,2,3), VOC(1), SLD, ALPHA, BETA
CRS-2	CRSDB	GW-159	Q2[L]	WG	G			FLD(1), MET(1,2,3), SLD
	CRSDB	GW-731		WG	G			FLD(1), MET(1,2,3), SLD
	CRSDB	GW-732		WG	G			FLD(1), MET(1,2,3), SLD
	CRSDB	GW-156		WG	G		X	FLD(1), MET(1,2,3), SLD
CRS-3	FCAP	GW-831[m]	Q2, Q4	WG	G			FLD(1), VOC(1)
	CRBAWP	GW-301[m]		WG	G		X	FLD(1), VOC(1)
	CRSP	GW-177[m]		WG	G			FLD(1), MET(1,2,3), VOC(1), SLD, ALPHA, BETA
CRS-11	ECRWP	GW-161	Q2, Q4	WG	G			FLD(1), ION(1,2), MET(1,2,3), VOC(1), ALPHA
	ECRWP	GW-294		WG	G		X	FLD(1), ION(1,2), MET(1,2,3), VOC(1), ALPHA
	ECRWP	GW-296*		WG	G			FLD(1), ION(1,2), MET(1,2,3), VOC(1), ALPHA
	ECRWP	GW-298		WG	G			FLD(1), ION(1,2), MET(1,2,3), VOC(1), ALPHA
CRS-12	ECRWP Leachate Sump	T043M	Q2[n]	L	G		X*	LEACHATE, FLD(1) - pH only

Notes for RCRA Post-Closure Permit monitoring at Y-12, Table C.6:

a **Sample Group:**
EFW = UEFPC watershed sample group number
BC = Bear Creek watershed sample group number
CRS = Chestnut Ridge subwatershed sample group number
Samples in each group will be collected during as short a time period as possible during the fiscal year quarter indicated (e g , Q1)

b **Location and Sampling Point:**
BCBG = Bear Creek Burial Grounds
CRBAWP = Chestnut Ridge Borrow Area Waste Pile
CRSDB = Chestnut Ridge Sediment Disposal Basin
CRSP = Chestnut Ridge Security Pits
ECRWP = East Chestnut Ridge Waste Pile
EXP = Exit Pathway
FCAP = Filled Coal Ash Pond
KHQ = Kerr Hollow Quarry
OLF = Oil Landfarm

c **Monitoring Frequency**
Q_ = Quarter of the fiscal year (e g , Q1, Q2, Q3, Q4)

d **Matrix**
WG = Groundwater
L = Leachate

e **Sample Type:**
G = grab sample

f **Flow/precipitation** - not applicable

g **Duplicate**
X = field duplicate sample will be collected
X* = Collect duplicate samples for total-U and wt% U-238 only

h **Analyte/parameter group:**
See Table D 1 for a list of parameter groups and analytes

i Sampling location SS-6 represents combined flow from SS-6 East and SS-6 West

j Results from EPA Method 905 0 will be reported as total radioactive strontium, which accounts for the presence of both ^{90}Sr, and, if present, ^{89}Sr, as provided in the Bear Creek Hydrogeologic Regime RCRA post-closure permit

k The analytical method is laboratory dependent, based on ability to achieve the required project quantitation level When method SW846-6020 (i e , ICP-MS) is used, the resulting total U value will be accepted However, when KPA analysis is the only option, the sample must be analyzed for isotopic U due to interference caused by high calcium concentration (>1000 mg/L), and total U will be calculated from isotopic U results

L Obtain annual sample alternating between wet and dry season (e g , FY09-Q2, FY10-Q4, FY11-Q2, FY12-Q4 etc)

m Coordinate sampling with the Y-12 Landfill Waste Management Operations so that samples are collected contemporaneously in shared wells GW-521, GW-557, GW-582, GW-798, GW-799, GW-801, and spring SCR 4 3SP.

n Obtain annual sample alternating between wet and dry season (e g , FY09-Q2, FY10-Q4, FY11-Q2, FY12-Q4 etc)

* In Sampling Point column, denotes high-priority location for data validation

EPA = Environmental Protecation Agency
FY = fiscal year
ICP-MS = inductively-coupled plasma - mass spectrometry
KPA = kinetic phosphorescence analysis
RCRA = Resource Conservation and Recovery Act of 1976
UEFPC = Upper East Fork Poplar Creek
YWQP = Y-12 Water Quality Program

Table C.7. Sample groups for the YWQI ... off-site locations during FY 2009

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
OFF-3	SCF	GW-841[*]	Q2	WG	G			FLD(1), VOC(1)
	SCF	GW-842		WG	G		X	FLD(1), VOC(1)
	SCF	SCF-WS2		WG	G			FLD(1), VOC(1)
	SCF	SCF-WS1		WG	G			FLD(1), VOC(1)

Notes for Off-site locations Table C.7:

a **Sample Group:**
OFF = Offsite sample group number.

Samples will be collected during as short a time as possible, following the schedule indicated.

b **Location and Sampling Point:**
GW = groundwater well
SCF = South Campus Facility.

c **Monitoring Frequency:**
Q_ = lists sample schedule for FY quarters

d **Matrix:**
WG = Groundwater.

e **Sample Type:**
G = grab sample

f **Flow/Precipitation** - not applicable

g **Duplicate:**
X = field duplicate sample will be collected

h **Analyte/parameter Group:**
See Table D.1 for a list of parameter groups and analytes.

* In Sampling Point column, denotes high-priority locations for full data validation.

Table C.8. Sample groups for biological monitoring conducted by the water quality programs during FY 2009

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
ETTP-9	K-1007P	K-1007-P1	Q3	SF	NA			B-PCB, LIPIDS
MV-12	MV	MEK 0.2	Q3	B	NA			B-MET(1,2), B-PCB, B-GAMMA
	MV	MEK 0.6		B	SV			BENTHIC
	MV	WCK 1.5		B	NA			Hg and PCBs in fish (2 species: bluegill and largemouth bass)
MV-13	MV	MEK 0.6	Q1, Q3	B	SV			FISH
MV-14	MV	MEK 0.6	Q4	B	NA			TDEC RAPID BIOASSESSMENT PROTOCOL
BC-4a	S-3	BCK-12.4	Q4	B	NA			TDEC RAPID BIOASSESSMENT PROTOCOL
	EXP	BCK-9.9		B	NA			TDEC RAPID BIOASSESSMENT PROTOCOL
	EXP	BCK-4.6		B	NA			TDEC RAPID BIOASSESSMENT PROTOCOL
	EXP	BCK-3.3		B	NA			TDEC RAPID BIOASSESSMENT PROTOCOL
	BYBY	NT-03		B	NA			TDEC RAPID BIOASSESSMENT PROTOCOL
BC-4b	BYBY	NT-03	Q4	B	NA			Riparian monitoring (vegetation recovery)
	EXP (Haul Road)	BCK-4.6		B	NA			Riparian monitoring
BC-10	EXP	BCK-3.3	Q1, Q3	B	NA			FISH, BENTHIC
	EXP	BCK-4.6		B	NA			FISH, BENTHIC
	EXP	BCK-9.9		B	NA			FISH, BENTHIC
	BYBY	NT-03		B	NA			FISH, BENTHIC
	EXP	BCK-12.4		B	NA			FISH, BENTHIC
	REF	GHK 1.6		B	NA			BENTHIC
	REF	GHK 2.9		B	NA			BENTHIC
	REF	MBK 1.6		B	NA			FISH, BENTHIC
	REF	PHK 1.6		B	NA			FISH
BC-11	EXP	BCK-3.3	Q1, Q3	SRM	NA			B-MET(1,2), B-PCB, LIPIDS
	EXP	BCK-3.3		RB	NA			B-MET(2), B-PCB, LIPIDS
	EXP	BCK-9.9		SRM	NA			B-MET(1,2), B-PCB, LIPIDS
	EXP	BCK-12.4		SRM	NA			B-MET(1,2)
	REF	HCK 20.6		SRM	NA			B-MET(1,2), B-PCB, LIPIDS
	REF	HCK 20.6		RB	NA			B-MET(2), B-PCB, LIPIDS
EFW-9	Poplar Creek	PCK 8.2	Q3	SF	NA			B-MET(2)
CRS-8	MCK	MCK 1.9	Q1, Q3	B	NA			BENTHIC
	MCK	MCK 1.4		B	NA			BENTHIC
	MCK	MCK 1.6		B	NA			FISH
CRS-9	RQ	Rogers Quarry	Q4	LMB	NA			B-MET(1,2)
	MCK	MCK 1.9		B	NA			TDEC RAPID BIOASSESSMENT PROTOCOL
	MCK	MCK 1.4		B	NA			TDEC RAPID BIOASSESSMENT PROTOCOL
OFF-1	CR-PC	CRM 23.4–24.7	Q4	LMB	NA			B-MET(2)

Table C.8. Sample groups for biological monitoring conducted , the water quality programs during FY 2009 (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
	CR-PC	CRM 23.4–24.7		CF	NA			B-MET(2), B-PCB, LIPIDS
	CR-PC	CRM 19.7–20.7		LMB	NA			B-MET(2), B-GAMMA
	CR-PC	CRM 19.7–20.7		CF	NA			B-MET(2), B-PCB, LIPIDS, B-GAMMA,
	CR-PC	PCM 1.0		LMB	NA			B-MET(2)
	CR-PC	PCM 1.0		CF	NA			B-MET(2), B-PCB, LIPIDS
	CR-PC	CRM 10.5–12*		LMB	NA			B-MET(2)
	CR-PC	CRM 10.5–12*		CF	NA			B-MET(2), B-PCB, LIPIDS
	LWBR	TRM 530-532		LMB	NA			B-MET(2)
	LWBR	TRM 530-532		CF	NA			B-MET(2), B-PCB, LIPIDS
OFF-2	CR-PC	CRM 48	Q2	SB	NA			B-PCB, LIPIDS
	CR-PC	CRM 2.6		SB	NA			B-PCB, LIPIDS

Notes for Table C.8, Biological Monitoring:

a **Sample Group:**

BC = Bear Creek Watershed sample group number to be determined.
CRS = Chestnut Ridge subwatershed sample group number
EFW = East Fork Poplar Creek sample group number
ETTP = East Tennessee Technology Park Administrative Watershed sample group number to be determined.
MV = Melton Valley Watershed sample group number to be determined.
OFF = Offsite sample group number to be determined.

Samples will be collected within each sample group during as short a time as possible, following the schedule indicated.

b **Location and Sampling Point:**

BYBY = Boneyard/Burnyard
CR = Clinch River
CRM = Clinch River Mile
EXP = Exit pathway
PC = Poplar Creek
MCK = McCoy] Branch kilometer
MV = Melton Valley
PCM = Poplar Creek Mile
REF = Reference site
RQ = Rogers Quarry
TRM = Tennessee River Mile

c **Monitoring Frequency:**

Q_ = Quarter(s) of the fiscal year

d **Matrix:**

B = biological
CF = cat fish
LMB = largemouth bass
SB = striped bass
SF = sunfish
SRM = stone roller minnow (whole body)
RB = rock bass (fillets)

e **Sample Type:**

SV = survey
NA = not applicable

f **Flow/Precipitation:** not applicable

g **Duplicate:** Field duplicate samples will be collected, as appropriate.

h **Analyte/parameter Group:**

See Table D.1 for a list of parameter groups and analytes.

i Rogers Quarry - fish collected from Rogers Quarry proper.

FY = fiscal year

Table C.9. Sample groups for future monitoring planned by the WRRP

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
BVW-TBD	EXP	Raccoon Creek*	Q4 in year prior to FYR (FY 2010)	WS	G			FLD(1), AWQC, MET(1,4), VOC(1), SVOC
	MPA	First Creek*		WS	G			FLD(1), AWQC, MET(1,4), VOC(1), SVOC
	SWSA3	NWTrib*		WS	G			FLD(1), AWQC, MET(1,4), VOC(1), SVOC
MV-TBD	MV	SRS*	Q2, Q4 in year prior to FYR (FY 2010)	WS	G			FLD(1), AWQC, MET(1,4), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, T
	MV	WOD*		WS	G			FLD(1), AWQC, MET(1,4,6), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, T
	MV	MBWEIR*		WS	G			FLD(1), AWQC, MET(1,4), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, T, U
	MV	WCWEIR*		WS	G			FLD(1), AWQC, MET(1,4,6), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, T, U, C
	MV	WC7500*		WS	G			FLD(1), AWQC, MET(1,4,6), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, T
	MV	WEST SEEP		WS	G	I		FLD(1), AWQC, MET(1,4), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, C, T
	SWSA 5	SWSA5D1		WS	G	I		FLD(1), AWQC, MET(1,4), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, T, U
	SWSA4	SWSA4 SW1*		WS	G	I		FLD(1), AWQC, MET(1,4), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, T, U
	SWSA 5	HRT-1A		WS	G	I		FLD(1), AWQC, MET(1,4), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, T, U
	SWSA 6	WAG 6 MS3		WS	G			FLD(1), AWQC, MET(1,4), VOC(1), SVOC, ALPHA, BETA, GAMMA, SR, T
MV-TBD	MV	MB-HEADWATERS	Q4 in year prior to FYR (FY 2010)	WS	G			FLD(1), AWQC, VOC(1), MET(1,4), SVOC, ALPHA, BETA, GAMMA, SR, T
	SWSA 5	MB2		WS	G	I		FLD(1), AWQC, MET(1,4), VOC(1), SVOC
BC-TBD	EXP	SS-5	Quarterly in year prior to FYR (FY 2010)	WS	G	I		FLD(1), ION(1,2), MET(1,2,4), VOC(1), SLD, TC, U
	EXP	SS-8		WS	G	I	X	FLD(1), ION(1,2), MET(1,2,4), VOC(1), SLD, TC, U
	EXP	SS-7		WS	G	I		FLD(1), ION(1,2), MET(1,2,4), VOC(1), SLD, TC, U
	EXP	SS-6.6		WS	G	I		FLD(1), ION(1,2), MET(1,2,4), VOC(1), SLD, TC, U
	EXP	BCK9.2		WS	G	I		FLD(1), AWQC, ION(1,2), MET(1,2,4), VOC(1), SVOC, SLD, TC, U
	EXP	BCK-3.3		WS	G	I		FLD(1), AWQC, ION(1,2), MET(1,2,4), VOC(1), SVOC, SLD, TC, U
	EXP	BCK-7.87*		WS	G	I		FLD(1), AWQC, ION(1,2), MET(1,2,4), VOC(1), SVOC, SLD, TC, U
	EXP	BCK4.55		WS	G	I		FLD(1), ION(1,2), MET(1,2,4), VOC(1), SLD, TC, U
	S-3/BYBY	BCK-11.54		WS	G	I		FLD(1), AWQC, MET(1,4), ION(1,2), VOC(1), SVOC, SLD, TC, U
	S-3	NT-02		WS	G	I		FLD(1), AWQC, MET(1,2,4), VOC(1), SVOC, ION(1,2), SLD, U
	BYBY	NT-03		WS	G	I		FLD(1), AWQC, MET(1,4), ION(1,2), VOC(1), SVOC, SLD, TC, U
	S-3	BCK-12.34*		WS	G	I		FLD(1), AWQC, ION(1,2), MET(1,2,4), VOC(1), SVOC, SLD, TC, U
	S-3	NT-01		WS	G	I		FLD(1), AWQC, ION(1,2), MET(1,4), VOC(1), SVOC, SLD, TC, U
	S-3	BCK-12.47		WS	G	I		FLD(1), MET(2)
OFF-TBD	CR-PC	CRM 48	Mid-June to August 30 in year prior to FYR (FY 2010)	WS	G			FLD(1), MET(1,4)[i], U
	CR-PC	CRM 23.4–24.7		WS	G			FLD(1), MET(1,4)[i], U
	CR-PC	WOCE*		WS	G			FLD(1), MET(1,4)[i], U
	CR-PC	K-1007-P1 Pond		WS	G			FLD(1), MET(1,4)[i], U
	CR-PC	K-901 Pond		WS	G			FLD(1), MET(1,4)[i], U
	CR-PC	CRM 10.5–12		WS	G			FLD(1), MET(1,4)[i], U
	CR-PC	CRM 0.5–1.5		WS	G			FLD(1), MET(1,4)[i], U
	LWBR	TRM 568.4		WS	G		X	FLD(1), MET(1,4)[i], U
	LWBR	TRM 530-532		WS	G		X	FLD(1), MET(1,4)[i], U

Table C.9. Sample groups for future monit..ng planned by the WRRP (continued)

Sample group[a]	Location[b]	Sampling point[b]	Monitoring Frequency[c]	Matrix[d]	Sample Type[e]	Flow/ Precip[f]	Dup[g]	Analyte/parameter group[h]
OFF-TBD	CR-PC	CRM 48	Mid-June to August 30 in year prior to FYR (FY 2010)	SE	SC			S-MET(1,2), S-GAMMA
	CR-PC	CRM 23.4–24.7		SE	SC			S-MET(1,2), S-GAMMA
	CR-PC	CRM 14–15		SE	SC			S-MET(1,2), S-GAMMA
	CR-PC	PCM 1.0		SE	SC			S-MET(1,2), S-GAMMA, S-U, S-TC, S-PCB
	CR-PC	PCM 3.0		SE	SC			S-MET(1,2), S-GAMMA, S-U, S-TC, S-PCB
	CR-PC	PCM 5.5		SE	SC			S-MET(1,2), S-GAMMA, S-U, S-TC, S-PCB
	CR-PC	CRM 10.5–12		SE	SC		X	S-MET(1,2), S-GAMMA
	CR-PC	CRM 6–7		SE	SC			S-MET(1,2), S-GAMMA
	CR-PC	CRM 0.5–1.5		SE	SC			S-MET(1,2), S-GAMMA
	LWBR	TRM 551-556		SE	SC			S-MET(1,2), S-GAMMA
	LWBR	TRM 530-532		SE	SC		X	S-MET(1,2), S-GAMMA
OFF-TBD	CR-PC	CRM 23.4–24.7	Mid-June to August 30 in year prior to FYR (FY 2010)	T	NA			B-MET(2), B-PCB, LIPIDS, B-GAMMA
	CR-PC	CRM 19.7–20.7		T	NA			B-MET(2), B-PCB, LIPIDS, B-GAMMA
	CR-PC	CRM 10.5-12		T	NA			B-MET(2), B-PCB, LIPIDS, B-GAMMA
ETTP-TBD	K-901	K-901-A Weir*	Q2, Q4 in year prior to FYR (FY 2010)	WS	G	I		FLD(1), AWQC, ION(1), MET(1,4), VOC(1), SVOC, ALPHA, BETA, TC, PCB
	K1070A	21-002 Spring*		WS	G	I		FLD(1,2), AWQC, ION(1,2), MET(1,4), VOC(1,2), SVOC, TOC, ALPHA, BETA, TC, U
	K1007P	K-1007-B Weir*		WS	G	I		FLD(1), AWQC, ION(1), MET(1,4), VOC(1), SVOC, ALPHA, BETA, TC, PCB
	MBA	K-1700 Weir		WS	G	I		FLD(1), AWQC, MET(1,4), VOC(1), SVOC, ALPHA, BETA, TC, PCB

Notes for Table C.9. Future Monitoring:

a **Sample Group:**

BVW = Bethel Valley Watershed sample group number to be determined.
MV = Melton Valley Watershed sample group number to be determined.
BC = Bear Creek Watershed sample group number to be determined.
OFF = Offsite sample group number to be determined.
ETTP = East Tennessee Technology Park Administrative Watershed sample group number to be determined.

Samples will be collected within each sample group during as short a time as possible, following the schedule indicated.

b **Location and Sampling Point:**

BCK = Bear Creek kilometer	MBA = Mitchell Branch Area	SRS = Sediment Retention Structure
BYBY = Boneyard/Burnyard	MBWeir = Melton Branch Weir	SWSA = Solid Waste Storage Area
CR = Clinch River	MPA = Main Plant Area	TRM = Tennessee River Mile
CRM = Clinch River Mile	MV = Melton Valley	WAG = Waste Area Grouping
EXP = Exit pathway]	NT = north tributary	WCWeir = White Oak Creek Weir
HRT = Homogeneous Reactor Test	PC = Poplar Creek	WOCE = White Oak Creek Embayment
LWBR = Lower Watts Bar Reservoir	PCM = Poplar Creek Mile	WOD = White Oak Dam

c **Monitoring Frequency:**

FY2010 = Sampling conducted once every 5 years (year prior to next Five Year Review).
Q_ = Quarter(s) of the fiscal year

d **Matrix:**

WS = Surface Water.
SE = Sediment (samples obtained from historic radiological hotspot in core, based on field gamma scan of core prior to sectioning).
T = Turtles

e **Sample Type:**

G = grab sample   SC = sediment core   NA = not applicable

f **Flow/Precipitation:**

I = instantaneous flow measurement (often accompanied by a grab sample)

g **Duplicate:**

X = field duplicate sample will be collected

h **Analyte/parameter Group:**

See Table D.1 for a list of parameter groups and analytes.
NOTE: Full suite analysis of water for numeric AWQC constituents requires analysis of AWQC parameter group listed in Table D.21, in addition to MET(1), MET(4), VOC(1), and SVOC, per methods and PQLs contained therein.

i Both a filtered and an unfiltered sample will be analyzed for MET(1,4). FLD(1) includes hydrolab profile.

* In Sampling Point column, denotes high-priority locations for full data validation.

AWQC = Ambient Water Quality Criteria
FYR = CERCLA Five-Year Review
PQL = project quantitation limit

APPENDIX D

ADMINISTRATIVE PARAMETER GROUP TABLES

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TABLES

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Table D.1. Parameter groups and analyte groups for WRRP monitoring during FY 2009

Parameter group	Analytes	Table No.
	Water	
FLD(1)	Temperature, dissolved oxygen, turbidity, pH, conductivity, oxidation-reduction potential, water level (in wells)	Table D.2
FLD(2)	Iron (Fe^{2+}), Manganese (Mn^{2+})	Table D.3
FLD(3)	Sulfide	Table D.4
FLD(4)	Pressure profile	Table D.5
ION(1)	Bicarbonate alkalinity, carbonate alkalinity, chloride, fluoride, sulfate	Table D.6
ION(2)	Nitrate-Nitrite (as N)	Table D.7
ION(3)	Bromide	Table D.8
MET(1)	ICP trace metals suite	Table D.9
MET(2)	Total uranium by KPA (RCRA PCP), detection limit = 0.004 mg/L	Table D.10
MET(3)	Mercury (RCRA PCP), detection limit = 0.0002 mg/L	Table D.11
MET(4)	Mercury, detection limit = 0.5 ng/L	Table D.12
MET(5)	Lead	Table D.13
MET(6)	Methyl mercury	Table D.14
VOC(1)	WRRP suite of volatile organic compounds	Table D.15
VOC(2)	Methane, ethane, ethane	Table D.16
SVOC	Semivolatile organic compounds	Table D.17
SLD	Total dissolved solids, total suspended solids	Table D.18
TOC	Total organic carbon	Table D.18
PCB	Polychlorinated biphenyls	Table D.19
ALPHA	Gross alpha activity	Table D.20
BETA	Gross beta activity	Table D.20
GAMMA	^{137}Cs (Cesium), ^{60}Co (Cobalt), ^{40}K (Potassium)	Table D.20
AM	^{241}Am (Americium)	Table D.20
C	^{14}C (Carbon)	Table D.20
CM	^{244}Cm (Curium)	Table D.20
EU	$^{152, 154, 155}Eu$ (Europium)	Table D.20
I	^{129}I (Iodine)	Table D.20
NP	^{237}Np (Neptunium)	Table D.20
PU	$^{238,239,240}Pu$ (Plutonium)	Table D.20
RA	Total radium	Table D.20
SR	^{90}Sr (Strontium)	Table D.20
T	^{3}H (Tritium)	Table D.20
TC	^{99}Tc (Technetium)	Table D.20
TH	$^{228,230,232}Th$ (Thorium)	Table D.20
U	$^{233/234,\ 235/236,\ 238}U$ (Uranium)	Table D.20
AWQC	AWQC [along with MET(1,4), VOC(1), SVOC]	Table D.21

Table D.1. Parameter groups and analyte groups for WRRP monitoring during FY 2009 (continued)

Parameter group	Analytes	
	Sediment	
S-MET(1)	ICP trace metals suite	Table D.22
S-MET(2)	Mercury	Table D.23
S-VOC	WRRP suite of volatile organic compounds	Table D.24
S-PCB	Polychlorinated biphenyls	Table D.25
S-PEST	Pesticides	Table D.26
S-ALPHA	Gross alpha activity	Table D.27
S-BETA	Gross beta activity	Table D.27
S-GAMMA	^{137}Cs (Cesium), ^{60}Co (Cobalt), ^{40}K (Potassium)	Table D.27
S-AM	^{241}Am (Americium)	Table D.27
S-NP	^{237}Np (Neptunium)	Table D.27
S-PU	^{238,239,240}Pu (Plutonium)	Table D.27
S-TC	^{99}Tc (Technetium)	Table D.27
S-U	^{234,235,238}U (Uranium)	Table D.27
	Biota	
B-MET(1)	ICP trace metals suite for fish/turtle tissue	Table D.28
B-MET(2)	Total mercury for fish/turtle tissue	Table D.29
B-PCB	Polychlorinated biphenyls for fish/turtle tissue	Table D.30
B-GAMMA	^{137}Cs (Cesium) for fish/turtle tissue	Table D.31
FISH	Fish community species and diversity determination in creeks with field identification and enumeration, per sampling locality	Table D.32
BENTHIC	Benthic macroinvertebrate community species and diversity determination in creeks with laboratory identification and enumeration, per sampling locality	Table D.33
LIPIDS	Total lipids in fish and turtle tissue measured gravimetrically and reported as weight percent	Table D.34
	Leachate	
LEACHATE	Metals, VOCs, SVOCs, ions, pesticides, RCRA characteristics, other	Table D.35

AWQC = ambient water quality criteria
FY = fiscal year
ICP = inductively coupled plasma
KPA = kinetic phosphorescence analysis
mg/L = milligram per liter
ng/L = nanogram per liter
PCP = Post-Closure Permit
RCRA = Resource Conservation and Recovery Act of 1976
SVOC = semivolatile organic compound
VOC = volatile organic compound
WRRP = Water Resources Restoration Program

Table D.2. FLD(1) parameter group

Parameter	Analytical method	Project quantitation level	Units
Water temperature	NA	NA	°C
Dissolved oxygen	NA	NA	ppm
Turbidity	NA	NA	NTU
pH	NA	NA	pH units
Specific conductance (conductivity)	NA	NA	µmhos/cm
Oxidation-reduction potential	NA	NA	mV
Water level (in wells prior to sampling)	NA	NA	ft

Not all in-field measurements are collected at each sampling location. In-field measurements are collected as directed by appropriate WRRP technical staff
°C = Centigrade
µmhos/cm = micro mhos per centimeter
FLD = field
ft = feet
mV = millivolt
NA = not applicable
NTU = nephelometric turbidity unit
ppm = parts per million
WRRP = Water Resources Restoration Program

Table D.3. FLD(2) parameter group

Parameter	Analytical method	Project quantitation level (mg/L)
Iron (Fe^{2+})	SM3500-Fe-D	100
Manganese (Mn^{2+})	SM3500-Mn-D	5

FLD = field
mg/L = milligram per liter
SM = Standard Methods for the Examination of Water and Wastewater

Table D.4. FLD(3) parameter group

Parameter	Analytical method	Project quantitation level (mg/L)
Sulfide	SM4500-S-D	0.1

FLD = field
mg/L = milligram per liter
SM = Standard Methods for the Examination of Water and Wastewater

Table D.5. FLD(4) parameter group

Parameter	Analytical method	Project quantitation level
Pressure profile of sampling ports within Westbay® well obtained before sampling	NA	NA

FLD = field
NA = not applicable

Table D.6. ION(1) parameter group

Analyte	Analytical method	Project quantitation level (mg/L)
Chloride	EPA-300.0	0.1
Fluoride	SM4500-F-C*	0.05
Sulfate	EPA-300.0	0.1
Alkalinity – HCO_3	SM2320B*	per method
Alkalinity – CO_3	SM2320B*	per method

*EPA promulgated method changes to 40 CFR 136 guidelines
EPA = U. S. Environmental Protection Agency
mg/L = milligram per liter

Table D.7. ION(2) parameter group

Analyte	Analytical method	Project quantitation level (mg/L)
Nitrate-Nitrite (as N)	EPA-353.2	0.1

EPA = U. S. Environmental Protection Agency
mg/L = milligram per liter

Table D.8. ION(3) parameter group

Analyte	Analytical method	Project quantitation level (mg/L)
Bromide	EPA-300.0	0.25

Table D.9. MET(I) parameter group

Analyte	Analytical method	Project quantitation level (mg/L)
Aluminum	SW846-6010B or SW846-6020	0.05
Antimony	SW846-6010B or SW846-6020	0.003
Arsenic	SW846-6010B or SW846-6020	0.005
Barium	SW846-6010B or SW846-6020	0.005
Beryllium	SW846-6010B or SW846-6020	0.001
Boron	SW846-6010B or SW846-6020	0.01
Cadmium	SW846-6010B or SW846-6020	0.00013
Calcium	SW846-6010B or SW846-6020A	0.01
Chromium	SW846-6010B or SW846-6020	0.005
Cobalt	SW846-6010B or SW846-6020	0.005
Copper	SW846-6010B or SW846-6020	0.005
Iron	SW846-6010B or SW846-6020A	0.01
Lead	SW846-6010B or SW846-6020	0.002
Lithium	SW846-6010B or SW846-6020	0.01
Magnesium	SW846-6010B or SW846-6020A	0.05
Manganese	SW846-6010B or SW846-6020	0.005
Nickel	SW846-6010B or SW846-6020	0.01
Potassium	SW846-6010B or SW846-6020A	0.025
Selenium	SW846-6010B or SW846-6020A	0.0025
Silver	SW846-6010B or SW846-6020	0.0015
Sodium	SW846-6010B or SW846-6020A	0.01
Strontium	SW846-6010B or SW846-6020	0.005
Thallium	SW846-6010B or SW846-6020	0.001
Vanadium	SW846-6010B or SW846-6020A	0.01
Zinc	SW846-6010B or SW846-6020	0.01

MET = metals
mg/L = milligram per liter
SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

Table D.10. MET(2) parameter group

Analyte	Analytical method	Project quantitation level (mg/L)
Uranium (RCRA PCP)	ASTM D5174-97 [kinetic phosphorescence analysis (KPA)] or SW846-6020	0.004*+

*Project Quantitation Level of 0.004 mg/L is required regardless of analytical method.

+The analytical method used to achieve the PQL is laboratory dependent. For samples that exhibit a high calcium concentration (>1000 mg/L) and KPA is the only analytical option, the sample will be analyzed for isotopic U and total U will be calculated from those results.

ASTM = American Society for Testing and Materials
MET = metals
mg/L = milligram per liter
PCP = Post-Closure Permit
RCRA = Resource Conservation and Recovery Act of 1976

Table D.11. MET(3) parameter group

Analyte	Analytical method	Project quantitation level (mg/L)
Mercury (RCRA PCP)	SW846-7470	0.0002

MET = metals
mg/L = milligram per liter
PCP = Post-Closure Permit
RCRA = Resource Conservation and Recovery Act of 1976
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

Table D.12. MET(4) parameter group

Analyte	Analytical method	Project quantitation level (ng/L)
Mercury	EPA 1631E	0.5

EPA = U. S. Environmental Protection Agency
MET = metals
ng/L = nanogram per liter
RMPE = Reduction of Mercury in Plant Effluents

Table D.13. MET(5) parameter group

Analyte	Analytical method	Project quantitation level (mg/L)
Lead	SW846-6010B or SW846-6020	0.003

MET = metals
mg/L = milligram per liter
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

Table D.14. MET(6) parameter group

Analyte	Analytical method	Project quantitation level (ng/L)
Methyl mercury	EPA 1630	0.02

EPA = U. S. Environmental Protection Agency
MET = metals
ng/L = nanogram per liter

Table D.15. VOC(1) parameter group

Analyte	Analytical method	Project quantitation level (µg/L)
1,1,1-Trichloroethane	SW846-8260	5
1,1,2,2-Tetrachloroethane	SW846-8260	5
1,1,2-Trichloroethane	SW846-8260	2.5
1,1-Dichloroethane	SW846-8260	5
1,1-Dichloroethene	SW846-8260	3.5
1,2-Dichloroethane	SW846-8260	2.5
1,2-Dichloroethene (total)	SW846-8260	5
1,2-Dichloropropane	SW846-8260	2.5
1,3-dichloropropene (total)	SW846-8260	5
2-Butanone	SW846-8260	10
2-Hexanone	SW846-8260	10
4-Methyl-2-pentanone	SW846-8260	10
Acetone	SW846-8260	10
Benzene	SW846-8260	2.5
Bromodichloromethane	SW846-8260	5
Bromoform	SW846-8260	5
Carbon disulfide	SW846-8260	5
Carbon tetrachloride	SW846-8260	2.5
Chlorobenzene	SW846-8260	5
Chloroethane	SW846-8260	10
Chloroform	SW846-8260	5
Chloromethane	SW846-8260	10
cis-1,2-Dichloroethene	SW846-8260	5
cis-1,3-Dichloropropene	SW846-8260	5
Dibromochloromethane	SW846-8260	5
Ethylbenzene	SW846-8260	5
Bromomethane	SW846-8260	20
Methylene chloride	SW846-8260	2.5
Styrene	SW846-8260	5
Tetrachloroethene	SW846-8260	2.5
Toluene	SW846-8260	5
trans-1,2-Dichloroethene	SW846-8260	5
trans-1,3-Dichloropropene	SW846-8260	5
Trichloroethene	SW846-8260	2.5
Vinyl chloride	SW846-8260	1[a]
Xylenes (total)	SW846-8260	5

[a] May require selective ion mass spectrometer to achieve stated reporting limit
SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
µg/L = microgram per liter
VOA = volatile organic analyte (or analysis)
VOC = volatile organic compound

Table D.16. VOC(2) parameter group

Analyte	Analytical method	Project quantitation level (µg/L)
Methane	SW846, modified 3810/RSK175	10
Ethane	SW846, modified 3810/RSK175	10
Ethene	SW846, modified 3810/RSK175	10

SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
µg/L = microgram per liter
VOC = volatile organic compound

Table D.17. SVOC parameter group

Analyte	Analytical method	Project quantitation level (μg/L)
1,2,4-Trichlorobenzene	SW846-8270C/3510C or 3520C	10
1,2-Dichlorobenzene	SW846-8270C/3510C or 3520C	10
1,3-Dichlorobenzene	SW846-8270C/3510C or 3520C	10
1,4-Dichlorobenzene	SW846-8270C/3510C or 3520C	10
2,4,5-Trichlorophenol	SW846-8270C/3510C or 3520C	25
2,4,6-Trichlorophenol	SW846-8270C/3510C or 3520C	10
2,4-Dichlorophenol	SW846-8270C/3510C or 3520C	10
2,4-Dimethylphenol	SW846-8270C/3510C or 3520C	10
2,4-Dinitrophenol	SW846-8270C/3510C or 3520C	25
2,4-Dinitrotoluene	SW846-8270C/3510C or 3520C	10
2,6-Dinitrotoluene	SW846-8270C/3510C or 3520C	10
2-Chloronaphthalene	SW846-8270C/3510C or 3520C	10
2-Chlorophenol	SW846-8270C/3510C or 3520C	10
2-Methylnaphthalene	SW846-8270C/3510C or 3520C	10
2-Methylphenol	SW846-8270C/3510C or 3520C	10
2-Nitroaniline	SW846-8270C/3510C or 3520C	25
2-Nitrophenol	SW846-8270C/3510C or 3520C	10
3-Methylphenol	SW846-8270C/3510C or 3520C	10
4-Methylphenol	SW846-8270C/3510C or 3520C	10
3,3'-Dichlorobenzidine	SW846-8270C/3510C or 3520C	10
3-Nitroaniline	SW846-8270C/3510C or 3520C	25
4,6-Dinitro-2-methylphenol	SW846-8270C/3510C or 3520C	25
4-Bromophenyl phenyl ether	SW846-8270C/3510C or 3520C	10
4-Chloro-3-methylphenol	SW846-8270C/3510C or 3520C	10
4-Chloroaniline	SW846-8270C/3510C or 3520C	10
4-Chlorophenyl phenyl ether	SW846-8270C/3510C or 3520C	10
4-Nitroaniline	SW846-8270C/3510C or 3520C	25
4-Nitrophenol	SW846-8270C/3510C or 3520C	25
Acenaphthene	SW846-8270C/3510C or 3520C	10
Acenaphthylene	SW846-8270C/3510C or 3520C	10
Anthracene	SW846-8270C/3510C or 3520C	10
Benzo(*a*)anthracene	SW846-8270C/3510C or 3520C	10
Benzo(*a*)pyrene	SW846-8270C/3510C or 3520C	10
Benzo(*b*)fluoranthene	SW846-8270C/3510C or 3520C	10
Benzo(*g,h,i*)perylene	SW846-8270C/3510C or 3520C	10
Benzo(*k*)fluoranthene	SW846-8270C/3510C or 3520C	10
Benzoic acid	SW846-8270C/3510C or 3520C	25
Benzyl alcohol	SW846-8270C/3510C or 3520C	10

Table D.17. SVOC parameter group (continued)

Analyte	Analytical method	Project quantitation level (µg/L)
Bis(2-chloroisopropyl)ether	SW846-8270C/3510C or 3520C	10
Bis(2-chloroethoxy)methane	SW846-8270C/3510C or 3520C	10
Bis(2-chloroethyl)ether	SW846-8270C/3510C or 3520C	10
Bis(2-ethylhexyl)phthalate	SW846-8270C/3510C or 3520C	10
Butyl benzyl phthalate	SW846-8270C/3510C or 3520C	10
Carbazole	SW846-8270C/3510C or 3520C	10
Chrysene	SW846-8270C/3510C or 3520C	10
Di-n-butyl phthalate	SW846-8270C/3510C or 3520C	10
Di-n-octyl phthalate	SW846-8270C/3510C or 3520C	10
Dibenzo(*a,h*)anthracene	SW846-8270C/3510C or 3520C	10
Dibenzofuran	SW846-8270C/3510C or 3520C	10
Diethyl phthalate	SW846-8270C/3510C or 3520C	10
Dimethyl phthalate	SW846-8270C/3510C or 3520C	10
Fluoranthene	SW846-8270C/3510C or 3520C	10
Fluorene	SW846-8270C/3510C or 3520C	10
Hexachlorobenzene	SW846-8270C/3510C or 3520C	10
Hexachlorobutadiene	SW846-8270C/3510C or 3520C	10
Hexachlorocyclopentadiene	SW846-8270C/3510C or 3520C	10
Hexachloroethane	SW846-8270C/3510C or 3520C	10
Indeno(*1,2,3-cd*)pyrene	SW846-8270C/3510C or 3520C	10
Isophorone	SW846-8270C/3510C or 3520C	10
n-Nitroso-di-n-propylamine	SW846-8270C/3510C or 3520C	10
n-Nitroso-diphenylamine	SW846-8270C/3510C or 3520C	10
Napthalene	SW846-8270C/3510C or 3520C	10
Nitrobenzene	SW846-8270C/3510C or 3520C	10
Pentachlorophenol	SW846-8270C/3510C or 3520C	25
Phenanthrene	SW846-8270C/3510C or 3520C	10
Phenol	SW846-8270C/3510C or 3520C	10
Pyrene	SW846-8270C/3510C or 3520C	10

SVOC = semivolatile organic compound
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
µg/L = microgram per liter

Table D.18. Miscellaneous parameter group

Parameter group	Parameter	Analytical method	Project quantitation level (mg/L)
SLD	Total dissolved solids	SM2540C*	2.5
	Total suspended solids	SM2540D*	2.5
TOC	Total organic carbon	SM5320C*	1.0

* EPA promulgated method changes to 40 CFR 136 guidelines
EPA = U. S. Environmental Protection Agency
mg/L = milligram per liter

Table D.19. PCB parameter group

Analyte	Analytical method	Project quantitation level (μg/L)
Aroclor-1016	SW846-8082	0.5
Aroclor-1221	SW846-8082	0.5
Aroclor-1232	SW846-8082	0.5
Aroclor-1242	SW846-8082	0.5
Aroclor-1248	SW846-8082	0.5
Aroclor-1254	SW846-8082	0.5
Aroclor-1260	SW846-8082	0.5

PCB = polychlorinated biphenyl
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
μg/L = microgram per liter

Table D.20. Radiological parameter groups

Parameter group	Analyte	Analytical method	Project quantitation level (MDA) (pCi/L)
ALPHA	Gross Alpha	EPA-900.0	5
BETA	Gross Beta	EPA-900.0	5
GAMMA	^{137}Cs, ^{60}Co, ^{40}K	EPA-901.1	10 ea.
AM	^{241}Am	EPA-907.0	0.4
C	^{14}C	Liquid scint.[a]	0.05
CM	^{244}Cm	EPA-907.0[a]	0.3
EU	$^{152,154,155}Eu$	EPA-907.0[a]	1
I	^{129}I	Liquid scint.[a]	0.25
NP	^{237}Np	EPA-907.0[a]	0.4
PU	$^{238,239,240}Pu$	EPA-907.0[a]	1
RA	Total Radium	EPA-903.0	0.5
SR	^{90}Sr	EPA-905.0	4
T	Tritium	EPA-906.0	300
TC	^{99}Tc	Liquid scint.[a]	10
TH	$^{228,230,232}Th$	EPA-907.0[a]	1
U	$^{233/234,\ 235/236,\ 238}U$	EPA-907.0[a]	1

[a] Public drinking water approved radiochemistry EPA Methods. Non-EPA methods that meet or exceed the intent of the applicable methods may be substituted
EPA = U. S. Environmental Protection Agency
MDA = minimum detectable activity
pCi/L = picoCurie per liter
scint. = scintillation

Table D.21. AWQC[a] parameter group

Analyte	Analytical method	Project quantitation level	Units
	Metals		
Chromium, VI	SW846-7199	10	µg/L
	VOCs		
Acrylonitrile	SW-846-8260	1.2	µg/L
	SVOCs (Acid Extractables)		
Pentachlorophenol	SW846-8270C/3510C or 3520C	0.5	µg/L
	SVOCs (Base Neutrals)		
Benzidine	SW846-8270C/3510C or 3520C	0.01[b,c]	µg/L
Benzo(*a*)anthracene	SW846-8270C/3510C or 3520C	0.1[c]	µg/L
Benzo(*a*)pyrene	SW846-8270C/3510C or 3520C	0.1[c]	µg/L
Benzo(*b*)fluoranthene	SW846-8270C/3510C or 3520C	0.1[c]	µg/L
Benzo(*k*)fluoranthene	SW846-8270C/3510C or 3520C	2.5[c]	µg/L
Bis(2-chlorethyl)ether	SW846-8270C/3510C or 3520C	3	µg/L
Bis(2-ethylhexyl)phthalate	SW846-8270C/3510C or 3520C	0.1[c]	µg/L
Chrysene	SW846-8270C/3510C or 3520C	0.1[c]	µg/L
Dibenz(*a,h*)anthracene	SW846-8270C/3510C or 3520C	0.1[c]	µg/L
3,3-Dichlorobenzidine	SW846-8270C/3510C or 3520C	1[c]	µg/L
1,2-Diphenylhydrazine	SW846-8270C/3510C or 3520C	0.002	µg/L
Hexachlorobenzene	SW846-8270C/3510C or 3520C	2	µg/L
Hexachlorobutadiene	SW846-8270C/3510C or 3520C	0.1[c]	µg/L
Indeno(*1,2,3-cd*)pyrene	SW846-8270C/3510C or 3520C	10	µg/L
n-Nitrosodmethylamine	SW846-8290M	10	µg/L
	Pesticides		
Aldrin	SW846-8081	0.0003	µg/L
a-BHC	SW846-8081	0.025	µg/L
b-BHC	SW846-8081	0.1	µg/L
g-BHC-Lindane	SW846-8081	0.1	µg/L
Chlordane	SW846-8081	0.004	µg/L
4,4'-DDT	SW846-8081	0.001	µg/L
4,4'-DDE	SW846-8081	0.001	µg/L
4,4'-DDD	SW846-8081	0.002	µg/L
Dieldrin	SW846-8081	0.0004	µg/L
a-Endosulfan	SW846-8081	0.025	µg/L
b-Endosulfan	SW846-8081	0.025	µg/L
Endosulfan sulfate	SW846-8081	50	µg/L
Endrin	SW846-8081	0.03	µg/L
Endrin aldehyde	SW846-8081	0.2	µg/L
Heptachlor	SW846-8081	0.0005	µg/L
Heptachlor epoxide	SW846-8081	0.0003	µg/L
PCB aroclors (same as those listed in Table D.18)	SW846-8081	0.025[b]	µg/L
PCB, total	SW846-8081	0.025[b]	µg/L
Toxaphene	SW846-8081	0.02[b]	µg/L

Table D.21. AWQC parameter group (continued)

Analyte	Analytical method	Project quantitation level	Units
	Dioxins		
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	SW846-8290	0.5	pg/L
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	SW846-8290	1	pg/L
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	SW846-8290	1	pg/L
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	SW846-8290	1	pg/L
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	SW846-8290	1	pg/L
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	SW846-8290	1	pg/L
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	SW846-8290	1	pg/L
	Furans		
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	SW846-8290	1	pg/L
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	SW846-8290	1	pg/L
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	SW846-8290	1	pg/L
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	SW846-8290	1	pg/L
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	SW846-8290	1	pg/L
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	SW846-8290	1	pg/L
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	SW846-8290	1	pg/L
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	SW846-8290	1	pg/L
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	SW846-8290	1	pg/L
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	SW846-8290	1	pg/L
	Other		
Cyanide	SM 4500-CN E	5	µg/L

[a] **Full suite analysis of water for numeric AWQC constituents requires analysis of MET(1), MET(4), VOC(1), SVOC, and constituents listed above in this AWQC parameter group per methods and PQLs contained herein.**
[b] PQL does not meet AWQC-required reporting limit but is lowest available reporting limit from lab.
[c] May require selective ion mass spec to achieve stated reporting limit

AWQC = Ambient Water Quality Criteria.
BHC = benzene hexachloride.
DDD = dichlorodiphenyldichloroethane.
DDE = dichlorodiphenyldichloroethylene.
DDT = dichlorodiphenyltrichloroethane.
EPA = U.S. Environmental Protection Agency.
mL = milliliter.
OLM = Organic Laboratory Method.
PCB = polychlorinated biphenyl.
pg/L = picogram per liter.
SVOC = semivolatile organic compound.
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
VOA = volatile organic analyte (or analysis).
VOC = volatile organic compound.
µg/L = microgram per liter.

Table D.22. S-MET(1) parameter group

Analyte	Analytical method	Project quantitation level (mg/kg)[a]
Aluminum	SW846-3050A/6010B	1
Antimony	SW846-3050A/6010B	0.5
Arsenic	SW846-3050A/6010B	0.5
Barium	SW846-3050A/6010B	0.5
Beryllium	SW846-3050A/6010B	0.1
Boron	SW846-3050A/6010B	1
Cadmium	SW846-3050A/6010B	0.1
Calcium	SW846-3050A/6010B	5
Chromium	SW846-3050A/6010B	0.5
Cobalt	SW846-3050A/6010B	0.5
Copper	SW846-3050A/6010B	0.5
Iron	SW846-3050A/6010B	1
Lead	SW846-3050A/6010B	0.3
Lithium	SW846-3050A/6010B	1
Magnesium	SW846-3050A/6010B	5
Manganese	SW846-3050A/6010B	0.5
Molybdenum	SW846-3050A/6010B	1
Nickel	SW846-3050A/6010B	1
Potassium	SW846-3050A/6010B	5
Selenium	SW846-3050A/6010B	0.5
Silver	SW846-3050A/6010B	0.5
Sodium	SW846-3050A/6010B	5
Thallium	SW846-3050A/6010B	0.2
Vanadium	SW846-3050A/6010B	1
Zinc	SW846-3050A/6010B	0.5
Uranium	SW846-3050A/6010B	5

[a] Report results on dry-weight basis
MET = metals
mg/kg = milligram per kilogram
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

Table D.23. S-MET(2) parameter group

Analyte	Analytical method	Project quantitation level (mg/kg)[a]
Mercury	SW846-7471	0.1

[a] Report results on dry-weight basis
MET = metals
mg/kg = milligram per kilogram
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

Table D.24. S-VOC parameter group

Analyte	Analytical method	Project quantitation level (µg/kg)[a]
1,1,1-Trichloroethane	SW846-8260B	5
1,1,2,2-Tetrachloroethane	SW846-8260B	5
1,1,2-Trichloroethane	SW846-8260B	5
1,1-Dichloroethane	SW846-8260B	5
1,1-Dichloroethene	SW846-8260B	5
1,2-Dichloroethane	SW846-8260B	5
1,2-Dichloropropane	SW846-8260B	5
2-Butanone	SW846-8260B	10
2-Hexanone	SW846-8260B	10
4-Methyl-2-pentanone	SW846-8260B	10
Acetone	SW846-8260B	10
Benzene	SW846-8260B	5
Bromodichloromethane	SW846-8260B	5
Bromomethane	SW846-8260B	10
Carbon disulfide	SW846-8260B	5
Carbon tetrachloride	SW846-8260B	5
Chlorobenzene	SW846-8260B	5
Chloroethane	SW846-8260B	10
Chloroform	SW846-8260B	5
Chloromethane	SW846-8260B	10
cis-1,3-Dichloropropene	SW846-8260B	5
cis-1,2-Dichloroethene	SW846-8260B	5
Dibromochloromethane	SW846-8260B	5
Ethylbenzene	SW846-8260B	5
Methylene chloride	SW846-8260B	5
Styrene	SW846-8260B	5
Tetrachloroethene	SW846-8260B	5
Toluene	SW846-8260B	2
trans-1,3-Dichloropropene	SW846-8260B	5
trans-1,2-Dichloroethene	SW846-8260B	5
Tribromomethane	SW846-8260B	5
Trichloroethene	SW846-8260B	5
Vinyl chloride	SW846-8260B	2
Xylenes (total)	SW846-8260B	5

[a] Report results on dry-weight basis
VOC = volatile organic compound
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
µg/kg = microgram per kilogram

Table D.25. S-PCB parameter group

Analyte	Analytical method	Project quantitation level (μg/kg)[a]
Aroclor-1016	SW846-8082	33
Aroclor-1221	SW846-8082	67
Aroclor-1232	SW846-8082	33
Aroclor-1242	SW846-8082	33
Aroclor-1248	SW846-8082	33
Aroclor-1254	SW846-8082	33
Aroclor-1260	SW846-8082	33

[a] Report results on dry-weight basis
PCB = polychlorinated biphenyl
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
μg/kg = microgram per kilogram

Table D.26. S-PEST parameter group

Analyte	Analytical method	Project quantitation level (µg/kg)[a]
Aldrin	SW846-8081	1.7
alpha-BHC	SW846-8081	1.7
beta-BHC	SW846-8081	1.7
gamma-BHC	SW846-8081	1.7
delta-BHC	SW846-8081	1.7
alpha-Chlordane	SW846-8081	1.7
gamma-Chlordane	SW846-8081	1.7
Chlordane, not otherwise specified	SW846-8081	100.0
DBCP	SW846-8081	3.3
4,4'-DDD	SW846-8081	3.3
4,4'-DDE	SW846-8081	3.3
4,4'-DDT	SW846-8081	3.3
Dieldrin	SW846-8081	3.3
Endosulfan I	SW846-8081	1.7
Endosulfan II	SW846-8081	3.3
Endosulfan sulfate	SW846-8081	3.3
Endrin	SW846-8081	3.3
Endrin aldehyde	SW846-8081	3.3
Endrin ketone	SW846-8081	3.3
Heptachlor	SW846-8081	1.7
Heptachlor epoxide	SW846-8081	1.7
Methoxychlor	SW846-8081	17.0
Toxaphene	SW846-8081	170.0

[a] Report results on dry-weight basis
BHC = benzene hexachloride
DBCP = dibromochloropropanone
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
PEST = pesticide
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
µg/kg = microgram per kilogram

Table D.27. Radiological parameter groups for sediment

Parameter group	Analyte	Analytical method	Project quantitation level (MDA) (pCi/g)[a]
S-ALPHA	Gross Alpha	EPA-900.0	5
S-BETA	Gross Beta	EPA-900.0	5
S-GAMMA	^{137}Cs ^{60}Co, ^{40}K	EPA-901.1	1 ea.
S-AM	^{241}Am	EPA-908.0	1
S-NP	^{237}Np	EPA-908.0	1
S-PU	$^{238,239,240}Pu$	EPA-908.0	1 ea.
S-TC	^{99}Tc	Liquid scint.[b]	10
S-U	$^{234,235,238}U$	EPA-908.0	1 ea.

[a] Report results on dry-weight basis.
[b] Public drinking water approved radiochemistry EPA methods. Non-EPA methods that meet or exceed the intent of the applicable methods may be substituted.
ea. = each
EPA = U. S. Environmental Protection Agency
MDA = minimum detectable activity
pCi/g = picoCurie per gram
scint. = scintillation

Table D.28. B-MET(1) parameter group for biological sampling

Parameter	Analytical method	Project quantitation level (mg/kg)[a]
Antimony	SW846-6010B or SW846-6020	0.1
Arsenic	SW846-6010B or SW846-6020	0.1
Beryllium	SW846-6010B or SW846-6020	0.05
Cadmium	SW846-6010B or SW846-6020	0.05
Chromium	SW846-6010B or SW846-6020	0.05
Copper	SW846-6010B or SW846-6020	0.05
Lead	SW846-6010B or SW846-6020	0.1
Lithium	SW846-6010B or SW846-6020	0.5
Molybdenum	SW846-6010B or SW846-6020	0.05
Nickel	SW846-6010B or SW846-6020	0.05
Selenium	SW846-6010B or SW846-6020	0.1
Silver	SW846-6010B or SW846-6020	0.05
Thallium	SW846-6010B or SW846-6020	0.1
Uranium	SW846-6010B or SW846-6020	0.05
Zinc	SW846-6010B or SW846-6020	0.05

[a] Report results on wet-weight basis.
MET = metals
mg/kg = milligram per kilogram
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

Table D.29. B-MET(2) parameter group for biological sampling

Parameter	Analytical method	Project quantitation level (mg/kg)[a]
Total mercury	EPA-1631M	0.001

[a] Report results on wet-weight basis.
EPA = U. S. Environmental Protection Agency.
MET = metals.
mg/kg = milligram per kilogram.

Table D.30. B-PCB parameter group for biological sampling

Parameter	Analytical method	Project quantitation level (mg/kg)[a]
Aroclor-1016	SW846-8082	0.017
Aroclor-1221	SW846-8082	0.017
Aroclor-1232	SW846-8082	0.017
Aroclor-1242	SW846-8082	0.017
Aroclor-1248	SW846-8082	0.017
Aroclor-1254	SW846-8082	0.017
Aroclor-1260	SW846-8082	0.017

[a] Report results on wet-weight basis.
PCB = polychlorinated biphenyl.
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
mg/kg = milligram per kilogram.

Table D.31. B-GAMMA parameter group for biological sampling

Parameter	Analytical method	Project quantitation level (pCi/g)[a]
^{137}Cs (Cesium)	EPA-901.1	1

[a] Report results on wet-weight basis.
EPA = U. S. Environmental Protection Agency
pCi/g = picoCurie per gram

Table D.32. FISH parameter group for biological sampling

Parameter	Analytical method	Project quantitation level
Community diversity and density	TP-306-5	NA

NA = not applicable
TP = Technical Procedure

Table D.33. BENTHIC parameter group for biological sampling

Parameter	Analytical method	Project quantitation level
Community diversity and density	TP-306-4	NA

NA = not applicable
TP = Technical Procedure

Table D.34. LIPIDS parameter group for biological sampling

Parameter	Analytical method	Project quantitation level (wt %)
Lipid content of fish/turtle tissue	gravimetric analysis	0.1

wt % = weight percent

Table D.35. LEACHATE parameter group for ECRWP Leachate

Analyte[a]	CAS NO.	Analytical Method[b]	Project Quantitation Level[a]	Units
Aluminum	7429-90-5	SW846-6010B OR SW846-6020	0.05	mg/L
Antimony	7440-36-0	SW846-6010B OR SW846-6020	0.006	mg/L
Arsenic	7440-38-2	SW846-6010B OR SW846-6020	0.005	mg/L
Barium	7440-39-3	SW846-6010B OR SW846-6020	0.005	mg/L
Beryllium	7440-41-7	SW846-6010B OR SW846-6020	0.001	mg/L
Boron	7440-42-8	SW846-6010B	0.01	mg/L
Cadmium	7440-43-9	SW846-6010B OR SW846-6020	0.001	mg/L
Calcium	7440-70-2	SW846-6010B OR SW846-6020	0.200	mg/L
Chromium	7440-47-3	SW846-6010B OR SW846-6020	0.005	mg/L
Copper	7440-50-8	SW846-6010B OR SW846-6020	0.005	mg/L
Cobalt	7440-48-4	SW846-6010B OR SW846-6020	0.005	mg/L
Iron	7439-89-6	SW846-6010B OR SW846-6020	0.01	mg/L
Lead	7439-92-1	SW846-6010B OR SW846-6020	0.003	mg/L
Lithium	7439-93-2	SW846-6010B OR SW846-6020	0.010	mg/L
Manganese	7439-95-4	SW846-6010B OR SW846-6020	0.005	mg/L
Nickel	7440-02-0	SW846-6010B OR SW846-6020	0.010	mg/L
Potassium	7440-09-7	SW846-6010B	0.25	mg/L
Selenium	7782-49-2	SW846-6010B OR SW846-6020	0.005	mg/L
Silver	7440-22-4	SW846-6010B OR SW846-6020	0.005	mg/L
Sodium	7440-23-5	SW846-6010B	0.25	mg/L
Strontium	7440-24-6	SW846-6010B	0.005	mg/L
Thallium	7440-28-0	SW846-6010B OR SW846-6020	0.002	mg/L
Vanadium	7440-62-2	SW846-6010B OR SW846-6020	0.010	mg/L
Zinc	7440-66-6	SW846-6010B OR SW846-6020	0.01	mg/L
Mercury	7439-97-6	7470A	0.0002	mg/L
Nitrate-Nitrite (as N)	E701177	EPA 353.2	0.10	mg/L
Fluoride	16984-48-8	SM4500-F-C [c]	0.10	mg/L
Sulfate	14808-79-8	EPA 300.0	0.10	mg/L
Chloride	16887-00-6	EPA 300.0	0.10	mg/L
1,1,1-Trichloroethane	71-55-6	SW846-8260B	5.0	ug/L
1,1,2,2-Tetrachloroethane	79-34-5	SW846-8260B	5.0	ug/L
1,1,2-Trichloroethane	79-00-5	SW846-8260B	10.0	ug/L
1,1-Dichloroethane	75-34-3	SW846-8260B	5.0	ug/L
1,1-Dichloroethene	75-35-4	SW846-8260B	5.0	ug/L
1,2-Dichloroethane	107-06-2	SW846-8260B	5.0	ug/L
1,2-Dichloropropane	78-87-5	SW846-8260B	5.0	ug/L
2-Butanone	78-93-3	SW846-8260B	10.0	ug/L
2-Hexanone	591-78-6	SW846-8260B	5.0	ug/L
4-Methyl-2-pentanone	108-10-1	SW846-8260B	10.0	ug/L
Acetone	67-64-1	SW846-8260B	10.0	ug/L
Benzene	71-43-2	SW846-8260B	5.0	ug/L
Bromodichloromethane	75-27-4	SW846-8260B	5.0	ug/L
Bromoform	75-25-2	SW846-8260B	5.0	ug/L
Bromomethane	74-83-9	SW846-8260B	10.0	ug/L

Table D.35. LEACHATE parameter group for ECRWP Leachate (continued)

Analyte[a]	CAS NO.	Analytical Method[b]	Project Quantitation Level[a]	Units
Carbon Tetrachloride	56-23-5	SW846-8260B	5.0	ug/L
Carbon disulfide	75-15-0	SW846-8260B	5.0	ug/L
Chlorobenzene	108-90-7	SW846-8260B	5.0	ug/L
Chloroethane	75-00-3	SW846-8260B	10.0	ug/L
Chloroform	67-66-3	SW846-8260B	5.0	ug/L
Chloromethane	74-87-3	SW846-8260B	10.0	µg/L
Dibromochloromethane	124-48-1	SW846-8260B	5.0	ug/L
Ethyl benzene	100-41-4	SW846-8260B	5.0	ug/L
Methylene chloride	75-09-2	SW846-8260B	10.0	ug/L
Styrene	100-42-5	SW846-8260B	5.0	ug/L
Tetrachloroethene	127-18-4	SW846-8260B	5.0	ug/L
Toluene	108-88-3	SW846-8260B	5.0	ug/L
Total Xylene	1330-20-7	SW846-8260B	5.0	ug/L
Trichloroethene	79-01-6	SW846-8260B	5.0	ug/L
Vinyl Chloride	75-01-4	SW846-8260B	2.0	ug/L
cis-1,2-Dichloroethene	156-59-2	SW846-8260B	5.0	ug/L
cis-1,3-Dichloropropene	10061-01-5	SW846-8260B	5.0	ug/L
trans-1,2-Dichloroethene	156-60-5	SW846-8260B	5.0	ug/L
trans-1,3-Dichloropropene	10061-02-6	SW846-8260B	5.0	ug/L
Total U[d]		ASTM D5174-97	0.004	mg/L
%U-235[d]		EPA 907.0	<0.7	wt %
Gross alpha activity	12587-46-1	EPA 900.0	5	pCi/L
Gross beta activity	12587-47-2	EPA 900.0	5	pCi/L

[a]Analytes required by RCRA post-closure permit are noted in blue typeface along with required project quantitation levels listed in the permit.
[b] Equivalent analytical method may be used to achieve project quantitation level (e.g., EPA 604 for SW846-8041, or SW846-6020 for ASTM D5174-97).
[c]EPA promulgated method changes to 40 CFR 136 guidelines.
[d]Collect a duplicate sample for analysis for each sampling event.
ASTM = American Society for Testing and Materials
EPA = U. S. Environmental Protection Agency
µg/L = microgram per liter
mg/L = milligram per liter
pCi/L = picoCurie per liter
SM = Standard Method for the Examination of Water and Wastewater
SW846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
wt % = weight percent

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APPENDIX E

SURFACE WATER FLOW AND CONTAMINANT FLUX MEASUREMENT DATA QUALITY OBJECTIVES

Water Resources Restoration Program
Surface Water Flow and Contaminant Flux Measurement Data Quality Objectives

1. Introduction

Several existing Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) decisions at the Department of Energy (DOE) Oak Ridge Reservation (ORR) contain remediation goals for surface water that are based on attaining and maintaining certain levels of total annual contaminant discharges. Additionally, the regulation of mercury in impacted surface water systems is changing from concentration-based criteria to Total Maximum Daily Load-based (TMDL) criteria. The TMDL is the estimated mass of contaminant released on a daily basis. The Bechtel Jacobs Company LLC (BJC) Water Resources Restoration Program (WRRP) refers to mass loading of contaminants in surface water integrated over any specified time interval as contaminant flux.

Contaminant flux is defined as the contaminant mass that is transported across a measurement plane in surface water in a specified time interval. Units of flux measurement may be grams or kilograms of nonradiological contaminants such as mercury, or millicuries or curies of a radionuclide, such as ^{90}Sr. Contaminant flux integration periods may be daily, weekly, monthly, or yearly, depending on the reporting basis or a time period selected for site flux comparison.

2. WRRP Contaminant Flux Measurement

Contaminant discharge flux is the product of the average contaminant concentration and the total water flow volume within the sample integration period. To obtain a reliable and accurate estimate of flux, surface water flow volume and contaminant concentration in the water must be measured with sufficient accuracy and precision to allow calculation of flux at the required resolution.

2.1 Flow Measurement

Measurement basis: Surface water flow volume measurements are based on measured water levels at specified locations that may be weirs, flumes, or instrumented pipes. Each flow measurement location used to estimate contaminant flux has an established "rating curve" that is used to convert water level to flow rate. In some cases, the flow measurement stations are manufactured structures for which manufacturer-provided rating curves are available. In other cases, flow measurement stations are custom designed and constructed weirs or flumes for which rating curves have been prepared empirically, based on a series of manual flow measurements at various stages of flow. For cases in which flow measurements are made in instrumented pipes, standard theoretical equations for pipe flow are used.

Monitoring station rating-curve data are retained in the WRRP project document-control center as well as by the sampling/monitoring subcontractor. In the event that adjustments are made to a station rating curve, both BJC and the sampling/monitoring subcontractor files are updated to ensure each organization retains and uses the most up-to-date information.

For stations operated by both BJC and UT-Battelle, surface water flow rate measurements used for contaminant flux estimation for CERCLA remediation performance evaluation are based on monitoring of water stage height recorded at 15-minute frequency. The BWXT-Y12 monitoring program uses a 10-minute record frequency at Station 17 on the Upper East Fork of Poplar Creek (UEFPC) to determine flow rates discharged from the Y-12 Complex area. The flow measurement frequencies in use for surface water flux estimation were established in the 1980s and 1990s during ORR-wide surface water program studies of surface water hydrologic characteristics. The measurement frequencies were established to adequately capture fast draining discharge from the relatively small watersheds that contribute runoff to some of the stations. While it may be possible to estimate flows using other measurement frequencies, the BJC WRRP will continue to monitor flow at the established frequencies to ensure that ongoing measurements are comparable with past surface water records.

Data acquisition and processing: The process used by the BJC sampling/monitoring subcontractor to acquire and process flow data is summarized in Fig. 1. This general sequence of activities is used for all surface water flow stations regardless of station configuration.

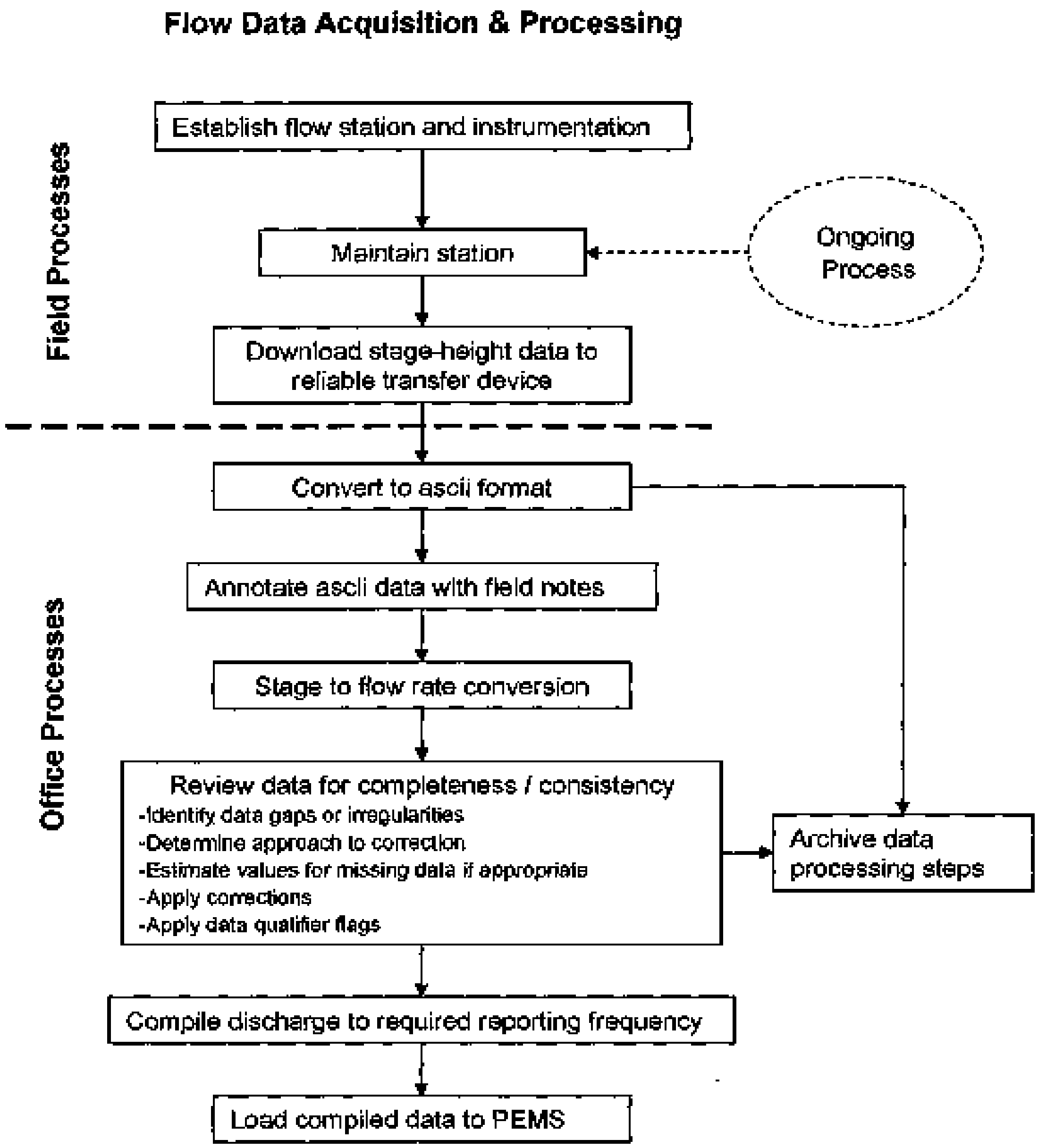

Fig. 1. BJC flow measurement data acquisition and data processing process.

Site instrumentation may vary according to equipment availability and conditions at specific monitoring locations. The stage-height measurement at each monitored location must be accurate within ± 0.01 ft relative to the bottom level of the flow controlling section. Stage height must be measured at an appropriate position relative to the hydraulic conditions for the flow stage being measured. In addition to the record frequency used for flow estimation and the required stage record accuracy described above, monitoring station and instrumentation maintenance are key requirements to obtain reliable and accurate flow data. Station maintenance includes verification that the stage-height recorder level matches the level indicated on a properly positioned staff gauge, removal of any obstructions (logs, sticks, or other debris) from the flow control section, maintenance of any high-flow by-pass controlling or measuring features of the site, and removal of sediment from upstream or downstream reaches as required to allow unrestricted flow. As indicated in Fig. 1, station and equipment maintenance is an ongoing necessity to obtain reliable flow measurement data.

Stage height measurements are recorded electronically and are periodically downloaded from the field instrument and are transferred to a sampling/monitoring subcontractor personal computer for flow calculation. Inspection sheets document any observed offset between the station staff gauge and instrument values. Electronically recorded data are downloaded and converted to an *ascii* format file using ISCO® FlowLink® software. Following download of data from each measurement station, the data are examined for completeness and consistency with field events (such as, sensor re-set to correct for drift) during the flow measurement period. Records are annotated to indicate events that may affect the flow calculation. Station rating curves are used to convert water level to flow for each record obtained during the measurement period. Following conversion to flow rate, the data are examined to identify data gaps or other problems that may require correction or data quality flagging. The nature of corrections are identified and applied and data qualifiers are added as annotations to the dataset. Flow data quality criteria for use on WRRP-collected data are included in Table 1.

The reliability and accuracy of surface water flow determined from the recorded stage height at any location depends on the accuracy of the mathematical relationship between the water column height and the flow rate. This mathematical relationship is referred to as the station rating curve. As noted above, the locations used for contaminant flux measurement on the ORR include a variety of flumes, weirs, and pipes. When appropriate, manufacturer specified ratings are used for prefabricated structures. At monitoring stations that have been custom designed and built to meet specific location needs, empirical rating curves were either developed in the early 1990s by the Oak Ridge National Laboratory (ORNL) Surface Water Program (for stations at ORNL) or rating measurements have been conducted by BJC (specifically at station BCK 9.2). In some cases, the station rating curves are determined theoretically using equations of fluid flow and known geometry of the flow control section.

Acquisition of quality flow data also depends on proper time calibration of the site data recorder. The WRRP criterion for time accuracy is to ensure clock accuracy of (Eastern Standard Time) ±10% of the minimum recorded interval (e.g. ± 1.5 minutes for stations recording stage height every 15 minutes). All data is acquired in Eastern Standard Time. Station time calibration will be based on a nationally recognized source of accurate clock time such as the can be obtained from http://www.time.gov. Time accuracy is a component of regular (generally at least weekly) station maintenance visits.

There is not an industry standard practice for revision of station rating curves. The need for additional or revised station rating measurements is based on an apparent imbalance of results between stations on the same stream or apparent unexplainable changes in runoff calculated at a station for similar storm events over a period of time. Ongoing flow and flux data evaluation is used to judge the reliability of flow data and possible major maintenance, such as sediment removal, and/or rating curve adjustment needs.

Table 1. WRRP surface water flow measurement data quality criteria.

Daily Flow Qualifier	Definition
E – Excellent (+/- 3%)	• Data may include gaps of up to 12 data points/3 hours, but estimated data must not include any hydrograph peaks • All data estimates must have a high degree of confidence based on linear flow conditions • Data may include a stage correction based on field measurements for instrument drift • For a stage correction with a low degree of confidence, the Daily Flow Qualifier may be downgraded
G-Good (+/- 3% - 8%)	• Data may include gaps of up to 24 data points/6 hours but estimated data must not include any hydrograph peaks • All data estimates must have a high degree of confidence based on linear flow conditions • Data may include a stage correction based on field measurements for instrument drift • For a stage correction with a low degree of confidence, the Daily Flow Qualifier may be downgraded
F- Fair (+/- 8% - 15%)	• Data may include gaps of up to 48 data points/12 hours • Estimated data may include hydrograph peaks with a moderate degree of confidence • If the estimated hydrograph peaks have a low degree of confidence, the P Qualifier should be used • Data may include a stage correction based on field measurements for instrument drift • For a stage correction with a low degree of confidence, the Daily Flow Qualifier may be downgraded
P-Poor (> 15%)	• Data may include gaps of over 48 data points/12 hours • Estimated data may include hydrograph peaks with a low degree of confidence • Data may include a stage correction based on field measurements for instrument drift

Following completion of the flow calculation process, the data set and all calculations are saved in a data archive to ensure that all primary information used in the flow calculations are recoverable.

For WRRP contaminant flux monitoring stations, the daily average flow rate is calculated for each day within the measuring period. The daily average flow rate is then loaded to the Project Environmental Measurements System (PEMS) database for retrieval and use by others. The daily average flow rate values are ultimately uploaded to the Oak Ridge Environmental Information System (OREIS) for permanent archival and general availability.

2.2 Contaminant Flux Monitoring Locations

Contaminant flux measurements are made to evaluate source area releases and remedial action effectiveness at a number of locations at the ORNL and Y-12 sites. Table 2 includes the administrative watershed name, station name, type of flow control section, contaminants of concern at the station, integration interval used for flux calculation, and organization responsible for monitoring.

2.3 Water Sample Collection and Analysis

Contaminant flux monitoring requires collection of water samples from the locations where flow monitoring is conducted. Samples are typically collected using time-paced or flow rate-paced automatic samplers. Depending on the contaminants required for analysis, refrigeration units may be required to minimize losses to volatilization during the sample integration period. At monitoring locations operated by BJC, sample preservation requirements are dictated by standard operating procedures of the WRRP, as imposed by the annual WRRP Sampling and Analysis Plan (SAP), the WRRP Quality Assurance Project Plan, as flowed down to the BJC sampling/monitoring subcontractor.

Table 2. Contaminant flux monitoring locations on the ORR.

Watershed	Station	Station Type	Rating Curve Type[1]	Contaminants of Concern from Decision Document	Sample Integration Interval	Monitoring Entity
UEFPC	Station 17	Flume	E	Hg	7-days	BWXT-Y12
	Outfall 200A6	Pipe	T	Hg	7-days	BJC
Bear Creek Valley	S07	Flume	M	Uranium, NO_3	7-days[2]	BJC
	BCK 9.2	Flume	E	Uranium, NO_3	7-days[2]	BJC
	BCK 11.54	Flume	M	Uranium, NO_3	7-days[2]	BJC
	BCK 12.34	Flume	M	Uranium, NO_3	7-days[2]	BJC
	NT-8	Flume	M	Uranium	7-day[3]	BJC
	SS-5	Flume	M	Uranium, NO_3	7-day[2]	BJC
Bethel Valley	CH8 Sump	Sump	E	^{90}Sr, Alpha	Monthly[4]	BJC
	7500 Bridge	Weir	E	^{90}Sr, ^{3}H, ^{137}Cs	Monthly[4]	BJC
	Northwest Tributary	Weir	E	^{90}Sr	Monthly[4]	BJC
	First Creek	Flume	E	^{90}Sr	Monthly[4]	BJC
	Sewage Treatment Plant (X01)	Flume	T	^{90}Sr, ^{3}H, ^{137}Cs	Monthly[4]	UT-Battelle
	Non-Radiological Waste Treatment Complex (X12)	Flume	M	^{90}Sr, ^{3}H, ^{137}Cs	Monthly[4]	UT-Battelle
	Raccoon Creek	Weir	E	^{90}Sr	Monthly[4]	BJC
Melton Valley	SWSA4 SW1	Weir	T	^{90}Sr, ^{3}H, ^{137}Cs	Monthly[4]	BJC
	White Oak Creek	Weir	E	^{90}Sr, ^{3}H, ^{137}Cs	Monthly[4]	UT-Battelle
	Melton Branch	Weir	E	^{90}Sr, ^{3}H, ^{137}Cs	Monthly[4]	UT-Battelle
	WAG6 MS3	Weir	M	^{90}Sr, ^{3}H, ^{137}Cs	Monthly[4]	BJC
	White Oak Dam	Weir	E	^{90}Sr, ^{3}H, ^{137}Cs	Monthly[4]	UT-Battelle

[1] Rating curve types: E – empirically derived, T – theoretically derived, M – manufacturer provided.
[2]Normal sample composite integration period is 7-days (beginning and ending on Wednesdays of each week). For Bear Creek stations only, during periods of no-flow sample integration may be extended.
[3]NT-8 experiences long periods when streamflow sinks into streambed upstream of flume. At these time a weekly grab sample is collected and flow is estimated at the point where the stream sinks.
[4]Monthly composite samples are prepared from weekly aliquots. Normal composite integration period begins and ends on the final Wednesday of each calendar month.

Minimum quantification limits required for samples analyzed for contaminants of concern that are used in flux calculations are specified in the annual WRRP SAP. The analytical requirements are typically based on levels established to demonstrate compliance with concentration-based human health or environmental protection, such as ambient water quality criteria, or other site-specific concentration criteria.

3. Contaminant Flux Calculation

Determination of flux at locations of interest is accomplished by following the WRRP Desktop transmittal letter with Instruction for Development of Flux Values for WRRP Remedial Effectiveness Report (WRRP-2007-0018).

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APPENDIX F

ADDENDUM TO THE SAMPLING AND ANALYSIS PLAN FOR THE WATER RESOURCES RESTORATION PROGRAM FISCAL YEAR 2009

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ADDENDUM
WRRP SAMPLING AND ANALYSIS PLAN (SAP)
FISCAL YEAR 2009 (BJC/OR-3121)

Addendum No.: ______________ **Effective Date:** ____________________

Watershed(s) affected by change:	☐ Melton Valley	☐ Bethel Valley
	☐ UEFPC	☐ Bear Creek Valley
	☐ ETTP	☐ Off-site
	☐ N/A	☐ Chestnut Ridge

Type of Change (check all that apply):

☐ Add location
☐ Drop location
☐ Change parameter(s)
☐ Change frequency: ☐ Wet/Dry Season ☐ Monthly
☐ Weekly ☐ Quarterly
☐ Semiannual/Annual
Which quarter(s) of FY? ____________
☐ Other: ______________________________
☐ See Attachment

Change is: ☐ Permanent ☐ Temporary

Reason for Change(s):

Regulatory or Program Driver:	☐ CERCLA baseline	☐ RCRA
	☐ CERCLA performance	☐ DOE Order
	☐ Other ____________	☐ N/A

Requested by: ________________________________ Date: __________
(BJC WQP Manager or authorized designee)

Approved by: ________________________________ Date: __________
(BJC WRRP Manager or authorized designee)

INSTRUCTIONS FOR INITIATING AN ADDENDUM TO THE FISCAL YEAR 2009 WRRP SAMPLING AND ANALYSIS PLAN

The appropriate watershed technical lead or water quality project (WQP) manager is responsible for initiating and approving any changes to the current Sampling and Analysis Plan (SAP). The process to initiate, approve, and distribute addenda to the SAP includes the steps below.

INITIATE AN ADDENDUM

Once it is recognized or decided that a change to the SAP is needed, the watershed technical lead/WQP manager or his/her designee is responsible for communicating the change and rationale for the change to the SAP administrator. The SAP administrator will prepare the addendum form, assign an addendum number, and attach a red-line markup of the impacted SAP tables or text showing the revision. These are provided to the requester for review and verification.

ADDENDUM APPROVAL AND DISTRIBUTION

Once the addendum is finalized, the SAP administrator obtains the required signatures, makes advance copies for the Sample Management Office personnel, sampling subcontractor, and technical lead/WQP manager. The approved original SAP addendum package is provided to WRRP administrative support personnel for transmittal to the Bechtel Jacobs Company (BJC) Document Control personnel for distribution to controlled-document holders.

NOTE: REVISIONS OR AMENDMENTS TO SAMPLING AND/OR ANALYTICAL WORK RELEASES ARE THE RESPONSIBILITY OF EACH WQP MANAGER OR HIS/HER DESIGNEE.

RECORD COPY DISTRIBUTION

File–EMEF DMC–RC