

**EAST TENNESSEE TECHNOLOGY PARK  
ADMINISTRATIVE WATERSHED REMEDIAL ACTION REPORT  
COMPREHENSIVE MONITORING PLAN,  
OAK RIDGE, TENNESSEE**



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COMPREHENSIVE MONITORING PLAN,  
OAK RIDGE, TENNESSEE**

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Prepared for  
U.S. Department of Energy  
Office of Environmental Management

by

URS | CH2M Oak Ridge LLC  
Managing and Safely Delivering the Department of Energy's Vision  
for the East Tennessee Technology Park Mission  
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## ACRONYMS

AM	Action Memorandum
AR	Administrative Record
AWQC	ambient water quality criteria
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CMP	Comprehensive Monitoring Plan
CWTS	Chromium Water Treatment System
DNAPL	dense non-aqueous phase liquid
DOE	U.S. Department of Energy
ELCR	excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
EPPP	Excavation/Penetration Permit Program
ETTP	East Tennessee Technology Park
FFA	Federal Facility Agreement
FY	fiscal year
FYR	Five-Year Review
HI	Hazard Index
IP	integration point
LUC	land use control
MCL	maximum contaminant level
MIK	Mitchell Branch kilometer
Notice	Notice of Land Use Restrictions
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NSC	Non-significant Change
ORR	Oak Ridge Reservation
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
QAPP	Quality Assurance Project Plan
RA	remedial action
RAO	remedial action objective
RAR	Remedial Action Report
RCRA	Resource Conservation and Recovery Act of 1976
RER	Remediation Effectiveness Report
RmA	removal action
RmAR	Removal Action Report
ROD	Record of Decision
SVOC	semivolatile organic compound
TC	time-critical
TCA	<i>Tennessee Code Annotated</i>
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
UCOR	URS   CH2M Oak Ridge LLC
UU/UE	unlimited use/unrestricted exposure
VOC	volatile organic compound
WRRP	Water Resources Restoration Program

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# 1. INTRODUCTION

## 1.1 PURPOSE

The purposes of this *East Tennessee Technology Park Administrative Watershed Remedial Action Report Comprehensive Monitoring Plan, Oak Ridge, Tennessee* (RAR CMP) are to:

- Assemble all performance and baseline environmental media monitoring and Land Use Controls (LUCs) and their verification requirements for completed Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) remedial actions (RAs) and media removal actions (RmAs) at the East Tennessee Technology Park (ETTP) into a single document. Some completed actions, e.g., K-1007-P1 Pond ecological enhancement, may include ongoing operations.
- Assemble all remedial action objectives (RAOs) and performance goals for completed CERCLA RAs and media RmAs at ETTP into a single document.
- Describe performance and baseline environmental media monitoring for ETTP.
- Identify LUCs, their objectives, and their verification requirements.
- Serve as ETTP Land Use Control Implementation Plan.

For the purpose of this document, environmental media monitoring includes monitoring of groundwater, surface water, and biological media, e.g., fish, turtles, biota surveys, etc., for both performance and baseline data assessments of trends, regulatory compliance, future actions, or in support of the Five-Year Review (FYR) of remedy protectiveness. In addition, the verification of LUCs is identified to ensure the integrity of the remedy is maintained.

Since unlimited use/unrestricted exposure (UU/UE) seldom is achieved by these completed CERCLA RAs and media RmAs, attainment of RAOs and/or performance goals must be evaluated periodically to determine if the remedy is performing adequately. These RAOs and performance objectives are contained in the decision documents and/or the completion documents. In order to evaluate performance and effectiveness, environmental monitoring is required. Since all planned RAs, including groundwater, have not been completed for the watershed, baseline monitoring also is required so that RAOs and performance objectives of the subsequent CERCLA actions can be established.

Similarly, the decision documents and/or completion documents contain the LUCs required to achieve the remedy objective(s). The LUCs also need to be verified periodically to determine if the remedy remains protective. Therefore, this RAR CMP assembles all of the RAOs, performance objectives, LUCs, and monitoring and verification requirements into a single document for ease of implementation and tracking.

Table 1 indicates which decision and completion documents contain requirements for monitoring and LUCs, and Table 2 describes the environmental monitoring performance goals. While the completion documents demonstrate that the remedy was completed per requirements, the monitoring and verification requirements in this RAR CMP allow the periodic evaluation of the completed CERCLA actions.

The ETTP RAR CMP includes and consolidates the environmental monitoring and verification requirements for LUCs in prior CERCLA decision and post-decision documents (see Table 1). Additionally, as new CERCLA decision and post-decision documents are approved, the monitoring and

verification requirements will be added to this CMP. After these requirements have been added to the ETPP RAR CMP and approved, future changes and revisions to these requirements will be made through the CMP revision process.

## 1.2 REMEDIATION STRATEGY

In Oak Ridge, the U.S. Department of Energy (DOE) and its predecessor agencies have had a mission since the 1940s of uranium enrichment, weapons production, and energy research. As a result of this mission, there is a legacy of hundreds of contaminated sites on the Oak Ridge Reservation (ORR). The ORR Site was placed on the CERCLA National Priorities List (NPL) in 1989. The *Federal Facility Agreement for the Oak Ridge Reservation* (FFA; DOE/OR-1014), signed by DOE, the U.S. Environmental Protection Agency (EPA), and the Tennessee Department of Environment and Conservation (TDEC) in 1991, and implemented on January 1, 1992, describes how remediation under CERCLA will be performed.

In the mid-1990s, DOE, EPA, and TDEC recognized that making numerous, individual remedial decisions on the ORR was an inefficient use of limited resources, that remediation dealing with comingled radioactive elements and research developed compound releases generally would not result in UU/UE, and that inconsistent remedial decisions would result without an overall strategy tied to the anticipated end use of the area being addressed. Therefore, they agreed to make remedial decisions at a watershed scale using consensus end uses developed by the citizen stakeholders for the watersheds to develop protective, risk-based remediation levels. DOE commissioned the End Use Working Group Stewardship Committee to recommend end uses, and they published the Stakeholder Report on Stewardship in 1998 that made such recommendations. When surface water is addressed in the watershed decisions, the stream classification, e.g., recreational, fish and aquatic life, drinking water, etc., is acknowledged. Groundwater has not been included in the watershed decisions, but when groundwater has been included in other decisions or when it is being considered for future decisions, restoration is acknowledged.

The watersheds were used as a basis for decision-making because the primary pathway for offsite contaminant transport is via surface water. The Clinch River bounds the ORR on three sides, and there are active creeks that flow down the valleys to the Clinch River (Figure 1). These surface water systems are fed by runoff from rainfall and by the groundwater that continually discharges to the surface streams. As much as 90 percent of the water entering the ground flows rapidly through highly porous, shallow soil, which contains most of the contaminated sites, before discharging to nearby surface water. Consequently, the primary pathway for contaminant migration is through shallow groundwater to surface water which then has the potential to flow offsite. Because of abundant rainfall (an average of 54 in/yr), contaminant transport by shallow subsurface flow to surface waters, and the presence of contaminated sites in defined watersheds, a watershed strategy became the basis for remedial decision-making. Watershed remedial decision-making is an integrated, holistic approach to restore and protect ecosystems and to protect human health by focusing on hydrologically defined drainage basins. Watershed remedial decision-making is applied to the environmental restoration of the ORR by grouping contaminated sites into the following five watersheds (Figure 1):

- Bethel Valley
- Melton Valley
- Bear Creek Valley
- Upper East Fork Poplar Creek

- ETPP

Additionally, decisions have been made and/or actions taken offsite (Lower East Fork Poplar Creek, Clinch River/Poplar Creek, Union Valley, and Lower Watts Bar Reservoir) and onsite, within Chestnut Ridge, White Wing Scrap Yard and Oak Ridge Associated Universities South Campus Facility.

The watershed Records of Decision (RODs) contain performance objectives to be met and a series of RAs designed to achieve them. Completed CERCLA actions in the watershed are gauged against their action-respective goals through performance monitoring. However, when CERCLA actions have yet to be fully implemented within a watershed, monitoring of baseline conditions are conducted, against which the effectiveness of the actions can be evaluated in the future. Contaminants released from the contaminated sites accumulate in floodplain soils and aquatic sediments. Contaminants not retained, or those remobilized, are released to the surface waters and potentially offsite to the Clinch River. Therefore, the surface water acts as an integrator of contaminant flux, and integration points (IPs; Figure 3) are identified in each watershed at which contaminant releases can be measured, assessed, tracked, and prioritized. Surface water contaminant IPs are points at which all upstream contaminant releases converge to exit the watershed (or subwatershed in the case of ETPP). Once the baseline monitoring and characterization are completed and the cleanup objectives are defined, the contribution of each RA toward achieving the objectives can be estimated and assessed at the watershed IP. Through surface water monitoring both the specific performance of each action and the cumulative progress toward achieving the cleanup objectives can be assessed.

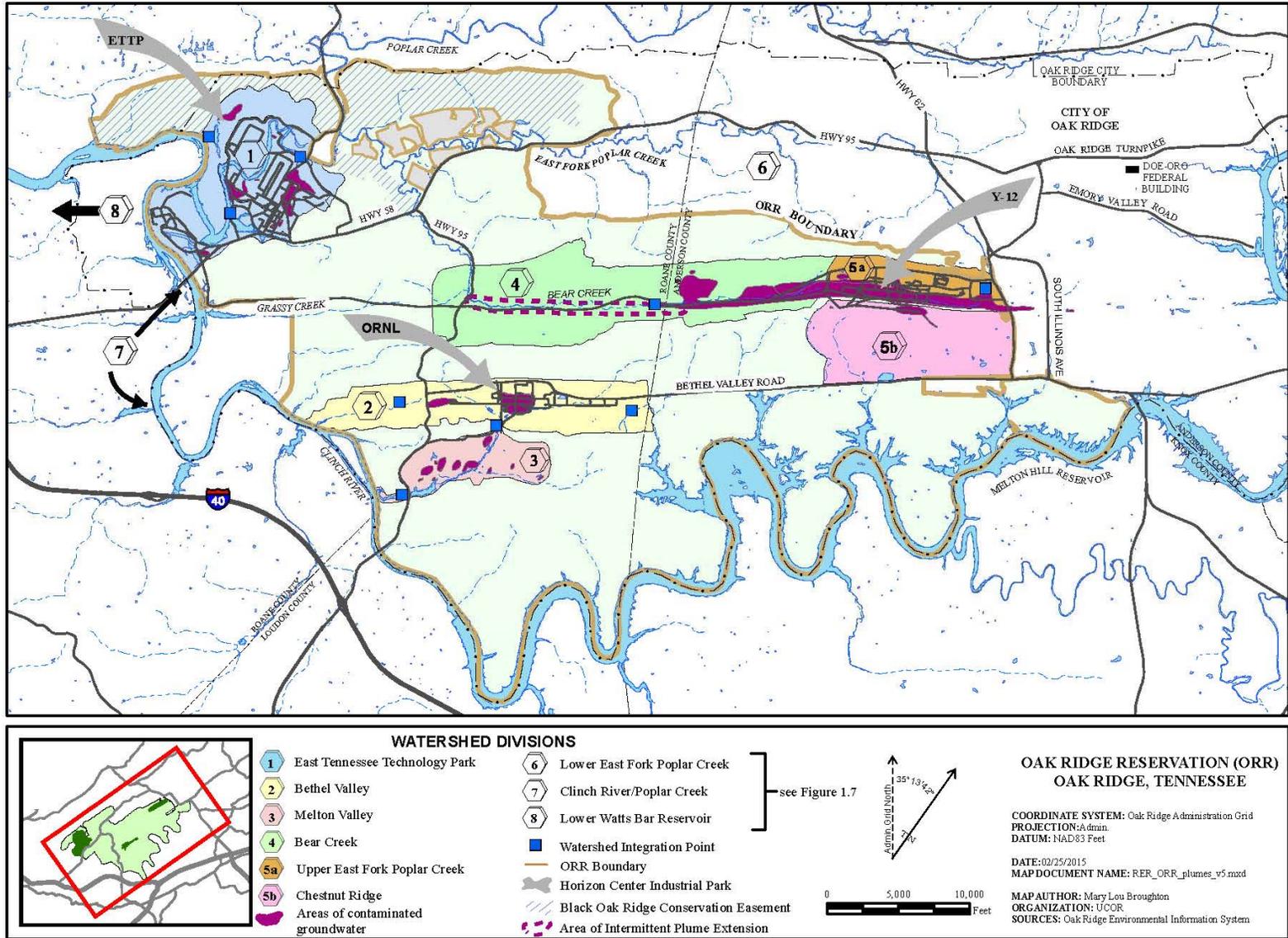


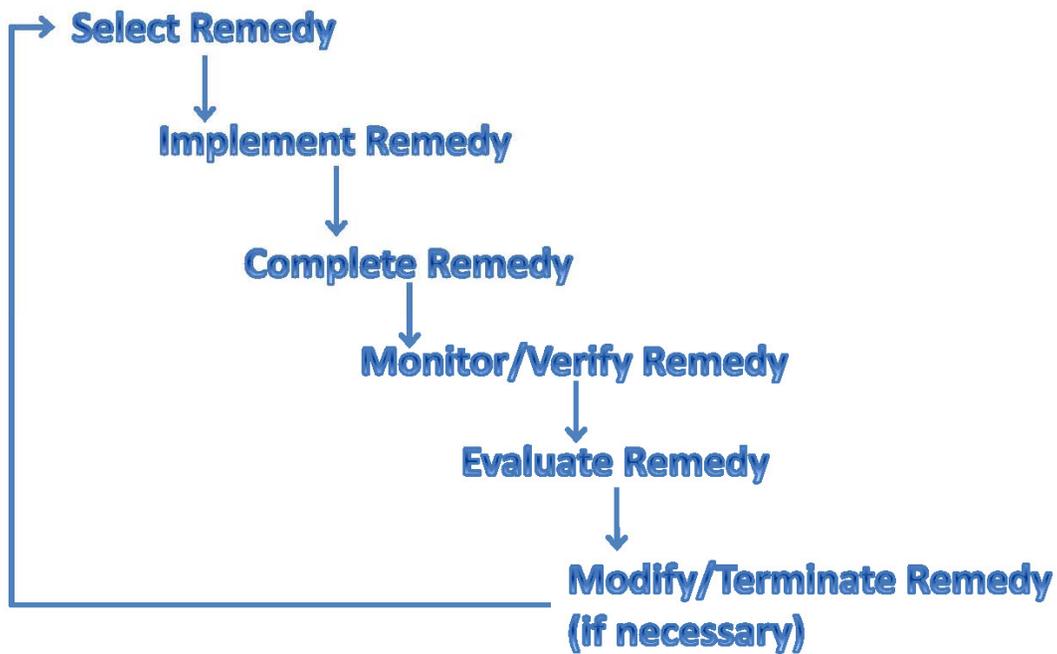
Figure 1. Watersheds on the ORR.

While waiting for the watershed decisions to be made with the associated series of RAs, single-project actions were performed primarily to mitigate immediate risks and to reduce further migration of contaminants offsite. In addition, interim RODs have been signed for sources and soil. This allowed decisions to be made and remediation performed on sources and soil and the more complex decisions on topics such as groundwater, surface water, sediment, ecological protection, and final LUCs to be deferred until the source terms are remediated and there is a better understanding of the contaminant pathways. These interim RODs also are interim for the sources and may be changed in the final RODs.

The CERCLA remedy evaluation process begins with the expectation that treatment will be used to address principal threat wastes and that groundwater will be returned to its beneficial use. Because most of the remediation decisions for ORR sites do not allow for UU/UE, LUCs are required at these sites. While UU/UE is commonly referred to as “residential” use, it is more accurately described as a condition that allows a property to be put to any use without the need for limitations or restrictions to prevent unacceptable human exposure or environmental impacts from occurring as a result of the presence of residual contamination. LUCs allow the realization of economically profitable and socially beneficial use or reuse of property while simultaneously ensuring protection of human health and the environment.

LUCs are any restriction or control, arising from the need to protect human health and the environment, that limits use of and/or exposure to any portion of that property, including water resources. LUCs encompass institutional controls (EPA 2000), such as property record restrictions, property record notices, zoning notices, Excavation/Penetration Permit Programs (EPPPs), easements, covenants, well drilling prohibitions, land use restrictions, zoning, permits, advisories, and other legal restrictions (EPA 2000) and access restrictions achieved by engineered barriers such as a fence or by human means such as security guards.

The framework for remediation has been considered linear, progressing from identification of a potentially contaminated site through completion of remediation. However, because residual contamination on ORR will remain for long periods of time, a framework (NRC 2002) is needed that recognizes the iterative process of remediation (Figure 2). Table 1 lists all of the completed watershed-scale and single-project actions at ETPP that require monitoring and/or LUCs. A purpose of the RAR CMP is to assemble all of these requirements into a single primary document and then to make subsequent changes to these requirements through a revision to the RAR CMP and not to the plethora of completion documents. This consolidation will decrease the administrative burden of making and tracking changes, but, more importantly, will improve and simplify the understanding of the many requirements in each watershed. Thus, the RAR CMP will integrate the requirements currently in multiple documents into a single document. As additional response actions are completed, the RAR CMP will be revised to include them. If the annual Remediation Effectiveness Report (RER) or the FYR recommends changes, the changes will be made in the RAR CMP and not the underlying completion document. This approach recognizes that, if a prescriptive component of a ROD is recommended for change, the ROD will have to be revised prior to the RAR CMP being changed.



**Figure 2. Framework for remediation.**

Because most of the completed RAs and environmental media removal actions at ETP do not allow UU/UE, these sites require performance monitoring (Table 2) and/or LUCs to protect human health and the environment from physical hazards, residual contamination, and wastes remaining following remediation.

Environmental monitoring and verification of LUCs are used to assess the performance of completed CERCLA actions in which residual contamination is left that does not allow for UU/UE. The ORR Water Resources Restoration Program (WRRP) was established by DOE in 1996 to implement a consistent approach to long-term environmental monitoring and verification of the completed CERCLA response actions across the ORR. The WRRP provides a central administrative and reporting function that integrates and coordinates the numerous activities associated with this monitoring and verification, including the preparation of watershed-specific RAR CMPs and a single *Quality Assurance Project Plan for the Water Resources Restoration Program, U.S. Department of Energy, Oak Ridge Reservation, Oak Ridge, Tennessee* (UCOR-4049).

### **1.3 ORGANIZATION OF THE ETP WATERSHED RAR CMP**

This RAR CMP is organized as follows:

- Chapter 1 explains how CERCLA remediation is implemented on ORR and provides background on performance and baseline monitoring and LUCs.
- Chapter 2 provides background information about ETP, including a brief site history and watershed description. The watershed description provides an overview of the site hydrogeology, a conceptual model for contaminant transport in the subwatersheds, as well as the primary contaminants of concern at ETP.

- Chapter 3 presents a summary of the status of each CERCLA action at ETTP and indicates whether the completed actions require performance monitoring and/or verification of LUCs.
- Chapter 4 discusses CERCLA-derived environmental monitoring objectives and performance goals for completed actions and baseline monitoring for the watershed as a whole.
- Chapter 5 discusses the LUCs on both a watershed scale and a site-specific scale that are deemed necessary to protect human health and the environment from residual contamination that remains following remediation or have been put in place until a selected remedial alternative can be implemented. Chapter 5 also includes information regarding the requirements for provisional management of contaminated slabs that are not remediated immediately upon demolition of the overlying building. These provisional management requirements end when the slab is remediated.
- Chapter 6 outlines the overall plan for the environmental monitoring in ETTP administrative watershed, including sampling locations and monitored parameters.
- Chapter 7 describes the data management protocols which are consistent with CERCLA and implemented by the WRRP.
- Chapter 8 lists the references.
- Appendix A contains the figures showing where environmental monitoring takes place.
- Appendix B summarizes relevant sampling and analysis information for each monitoring location.
- Appendix C contains the Administrative Sample Group Tables for each monitoring location. Technical details regarding specific sampling and analysis requirements are deferred to the WRRP Quality Assurance Project Plan (QAPP; UCOR-4049) that meets CERCLA requirements. This QAPP identifies the field sampling procedures, laboratory analytical methods, and detailed data management protocols that are followed to ensure that the environmental monitoring data used for the purposes of the WRRP achieve appropriate levels of quality assurance and quality control.
- Appendix D outlines the formal change request process for a RAR CMP.
- Appendix E lists the LUCs and identifies the areas affected by each.
- Appendix F contains requirements for the provisional management of contaminated slabs.

## 2. BACKGROUND

### 2.1 SITE HISTORY

ETTP, formerly known as the Oak Ridge Gaseous Diffusion Plant and the K-25 Site, began operations in World War II as part of the Manhattan Project. The plant's original mission was to produce uranium enriched in the  $^{235}\text{U}$  isotope for use in atomic weapons. After the end of the war, ETTP produced enriched uranium for the commercial nuclear power industry from 1945 to 1985 and was permanently shut down in 1987. Currently, ETTP is undergoing environmental cleanup to allow re-use of the site's assets.

### 2.2 WATERSHED DESCRIPTION

ETTP is not comprised of a single watershed in which a single exit pathway for surface water and groundwater exists. However, rather than subdivide the site into several subwatersheds (i.e., component parts), it is convenient to refer to it as a single watershed, or a single 'administrative' watershed. The developed portions of the ETTP administrative watershed are located in East Fork Valley between Black Oak Ridge to the north, Pine Ridge to the southeast, and the smaller McKinney Ridge to the northeast, with the Clinch River on the southwest border and Poplar Creek bisecting the main plant area (Figure 3). A tributary of Poplar Creek, Mitchell Branch drains much of the eastern section of the main plant area.

For planning purposes, the ETTP administrative watershed is divided into two areas that include the bulk of the contaminated sites (Zone 1 and Zone 2), surrounded by primarily uncontaminated areas. Zone 1 comprises approximately 1,400 acres outside the fenced main plant area, but within the area where most waste management and disposal activities took place, and Zone 2 comprises approximately 800 acres containing the main plant area (Figure 3). The remainder of the ETTP administrative watershed, which includes approximately 2,800 acres surrounding Zone 1 and Zone 2, is primarily uncontaminated and part of DOE's on-going footprint reduction program.

#### 2.2.1 Site Hydrogeology

Inter-bedded shale, siltstone, and limestone formations of the Chickamauga Group underlie the bulk of the ETTP administrative watershed, with the Knox Group dolostone formations underlying the northern portion of the watershed (Black Oak Ridge), and sandstones of the Rome Formation underlying the Mitchell Branch and southeastern (Pine Ridge) areas of the watershed. The Chickamauga Group formations exhibit substantial variation in hydraulic conductivities, primarily because of varying degrees of fracturing and conduit flow in the carbonate (karst) units. In addition, the shallow subsurface throughout much of the ETTP main plant area has been altered by an extensive underground industrial support system (e.g., process pipelines, utilities, storm sewers, and basement sumps), with much of the ground covered by impervious paved surfaces and roofed structures. Together, the complex hydrogeologic system and man-made features have resulted in some known and likely some unknown preferential flowpaths for contaminant transport in the ETTP administrative watershed.

The complex hydrogeology, substantial influence of the physical features, and the ubiquitous nature of potential exit pathways influence the WRRP strategy for monitoring water quality and documenting remedial effectiveness from one hydrologic subwatershed to another. The rate and direction of water flow in both surface water and groundwater are transient and vary based on rainfall, upstream and downstream flood control operations, and seasonal conditions. Groundwater flow and occurrence at the ETTP are influenced by the complex geology, past cut and fill, transient interactions with bounding surface water bodies, and numerous anthropogenic features, including building sumps, leaking subsurface drains and utilities, and extensive areas covered by impermeable paved surfaces and roofed structures. The water

table usually occurs in the unconsolidated zone, where flowpaths to surface water bodies are typically short, mimicking local topography.

ETTP does not have a single surface water IP at which all upstream contaminant releases converge to exit the watershed. Instead, ETTP encompasses several hydrologic subwatersheds culminating in three IPs: K-901A, where the K-901-A Holding Pond discharges to the Clinch River; the K-1007 Weir, where the K-1007-P1 Pond discharges into Poplar Creek; and the K-1700 Weir near the confluence of Mitchell Branch and Poplar Creek (Figure 3). Contaminated groundwater locally discharges into the surface water as diffuse flow from the unconsolidated zone, direct discharge from discrete springs, and via seep and spring discharge to surface water bodies that flow into the Clinch River, including K-901 Pond, the K-1007 Ponds, and Mitchell Branch/Poplar Creek. However, complete flowpaths between all primary contaminant source areas at ETTP and the surface water features that flow into the Clinch River have not been identified (DOE/OR/01-2505&D2).

### **2.2.2 Watershed Conceptual Model**

Figure 4 presents a conceptual model for contaminant transport at ETTP, schematically illustrating the principal contaminant source areas, types of contaminants, and general pattern of contaminant migration/transport. The following overview of environmental contamination at ETTP provides the general context for WRRP environmental monitoring in the ETpage TP administrative watershed.

With few exceptions, the primary contaminant sources at the ETTP originate from within the vadose (unsaturated) zone in the unconsolidated materials overlying the extensively faulted, folded, and fractured limestone, sandstone, and shale bedrock. An exception to this condition is where evidence suggests the presence of free-phase dense non-aqueous phase liquids (DNAPLs) at greater depth in the subsurface.

Groundwater in the unconsolidated zone is typically the first to be impacted by a contaminant release. Soluble constituents have dissolved into groundwater in the unconsolidated zone, creating a groundwater plume. Commingling of these groundwater contaminant plumes has occurred in some parts of the ETTP administrative watershed, particularly in areas where Mitchell Branch serves as a discharge zone for shallow groundwater flowing beneath numerous potential source areas in the northeastern portion of the site (Figure 5).

Future assessment of all migration pathways, including deep groundwater, will be performed in accordance with the CERCLA process in the ETTP Sitewide ROD.

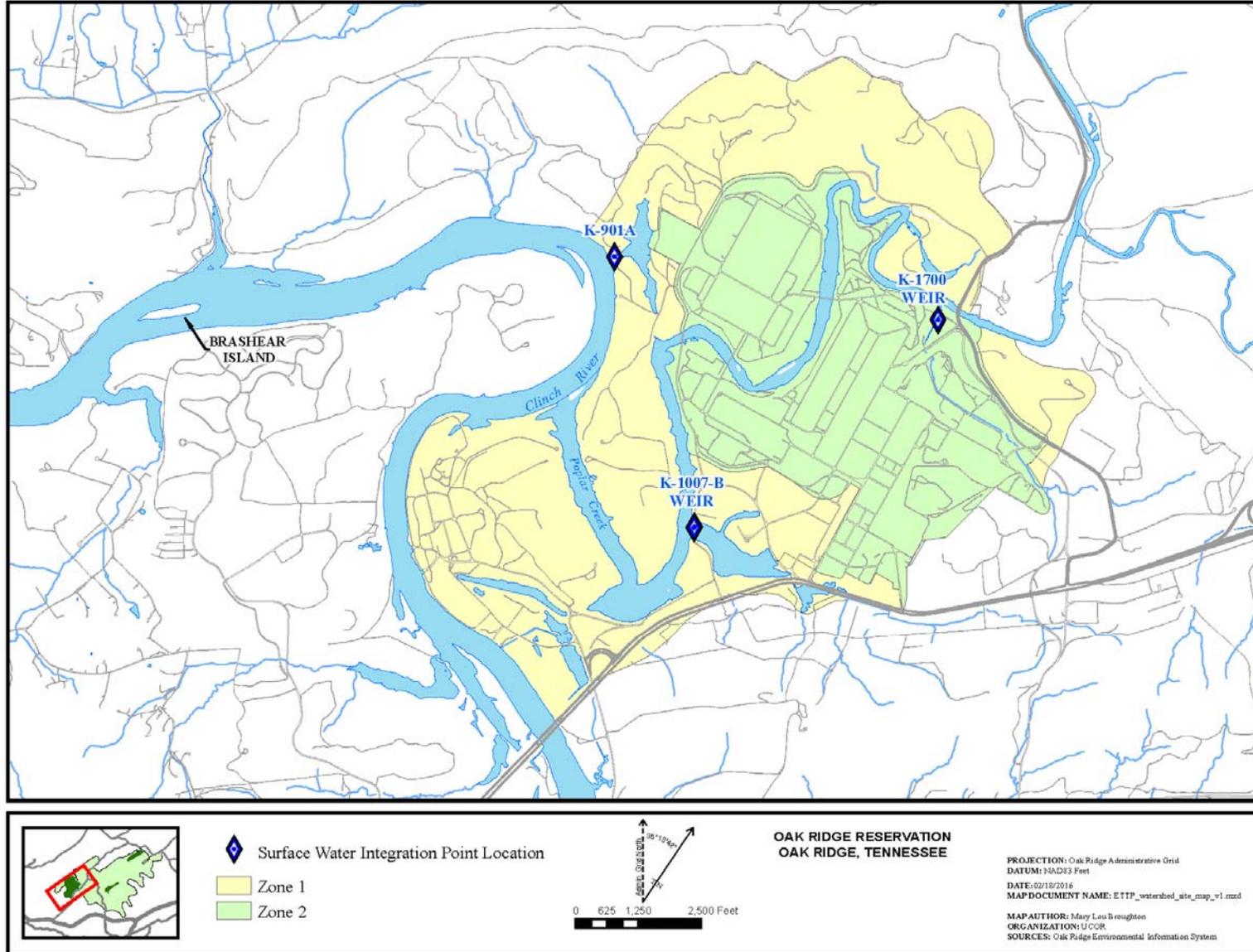


Figure 3. ETPP administrative watershed with surface water IPs.

### 2.2.3 Contaminants of Concern

Most of the contaminants detected in groundwater at ETTP are chemicals used in maintenance and waste management activities associated with the gaseous diffusion process. Volatile organic compounds (VOCs), primarily chlorinated hydrocarbons, are the principal groundwater contaminants, with trichloroethene (TCE) being the most prevalent compound and a fairly reliable indicator of the overall extent of dissolved VOC plumes in the groundwater (Figure 5). The VOC-contaminated groundwater in some areas also contains other contaminants, such as metals or gross alpha activity, but typically only in a single well such that a delineated “plume” is not evident.

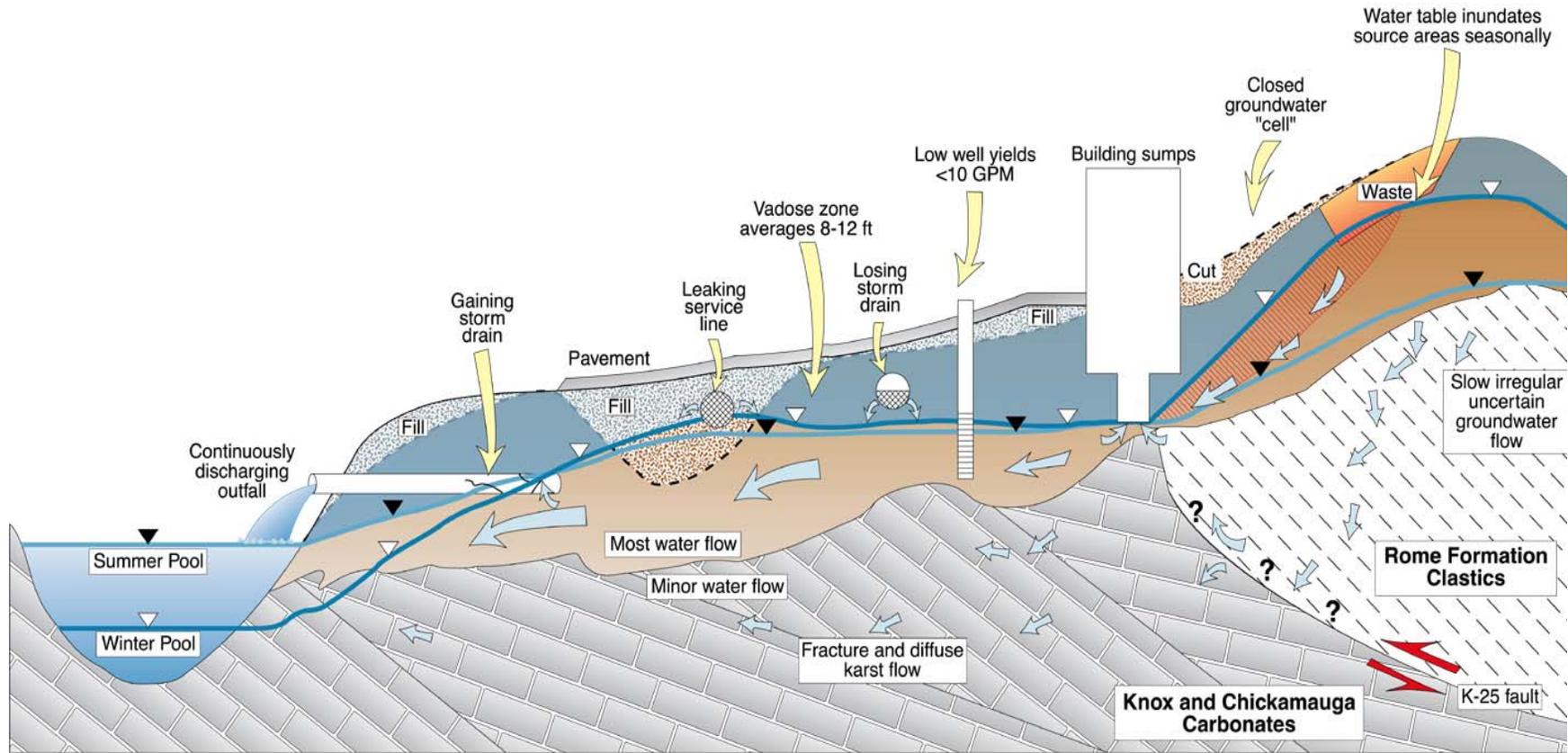
For the most part, plumes of dissolved VOCs in the groundwater are prevalent in four general areas at ETTP (Figure 5): (1) the K-901 area, where a plume extends from the suspected source (former K-1070-A Burial Ground) southward to the K-901-A Holding Pond; (2) the K-27/K-29 area, where a plume originates from an unknown source or sources; (3) a plume associated with unknown source(s) located south of the K-1004-L building; and (4) a plume north of the K-1200 building, where suspected DNAPL may have originated from disposals in the K-1070-C/D Burial Ground area (DOE/OR/01-2505&D2).

Other areas where VOC concentrations exceed 1 percent of solubility limits and suggest the possible presence of DNAPL are the K-1035 area, the K-1401 Acid Line area, and the K-1407-B Pond/Mitchell Branch area. At many of these source areas, the primary VOCs have been present in the groundwater for decades and mature contaminant plumes have evolved, although the extent of chemical degradation of the primary chlorinated hydrocarbon compounds is highly variable across the ETTP site (DOE/OR/01-2505&D2). In the vicinity of the K-1070-C/D Burial Ground, a high degree of degradation has occurred, although a strong source of contamination still remains in the vicinity of the “G-Pit,” where approximately 9,000 gal of chlorinated hydrocarbon liquids were disposed in an unlined pit. Other areas where transformation is significant include the K-1401 Acid Line and the K-1407-B Holding Pond. Degradation processes are weak or inconsistent at the K-1004 and K-1200 area, K-1035, K-1413, and K-1070-A Burial Ground and little transformation of TCE is observed in the K-27/K-29 source and plume area.

Runoff from storm water outfalls at the ETTP ultimately discharge to surface waters in Mitchell Branch, Poplar Creek, or the Clinch River. The ETTP storm water contaminants of concern are radionuclides, VOCs, polychlorinated biphenyls (PCBs), and metals, including mercury. These parameters are measured and evaluated through monitoring programs for the storm water network, storm water outfalls, in-stream surface waters, and biological sampling and stream condition evaluations. For mercury, quarterly sampling at storm water outfalls 05A, 170, 180, and 190 (see Appendix A Figure A.1) is required under the National Pollutant Discharge Elimination System (NPDES) Storm Water Permit in support of potential future CERCLA actions.

The State of Tennessee 303(d) list includes the following ETTP surface waters as impaired waterways for the following parameters:

- Mitchell Branch is listed as water quality-impaired due to the channelization of the stream and due to the presence of PCBs; hexavalent chromium is also listed on the proposed final 2012 State of Tennessee 303(d) list.
- Poplar Creek is listed as water quality-impaired due to the presence of PCBs and mercury.
- The Clinch River is listed as water quality-impaired due to the presence of PCBs, mercury, and chlordane.



**Water table fluctuates with Watts Bar pool**

- Low in winter
- High in summer

**Water table remains fairly stable with major anthropogenic impacts**

**Water table fluctuates with recharge**

- High in winter
- Low in summer

**Figure 4. Conceptual model for shallow groundwater contaminant transport in the ETP administrative watershed.**

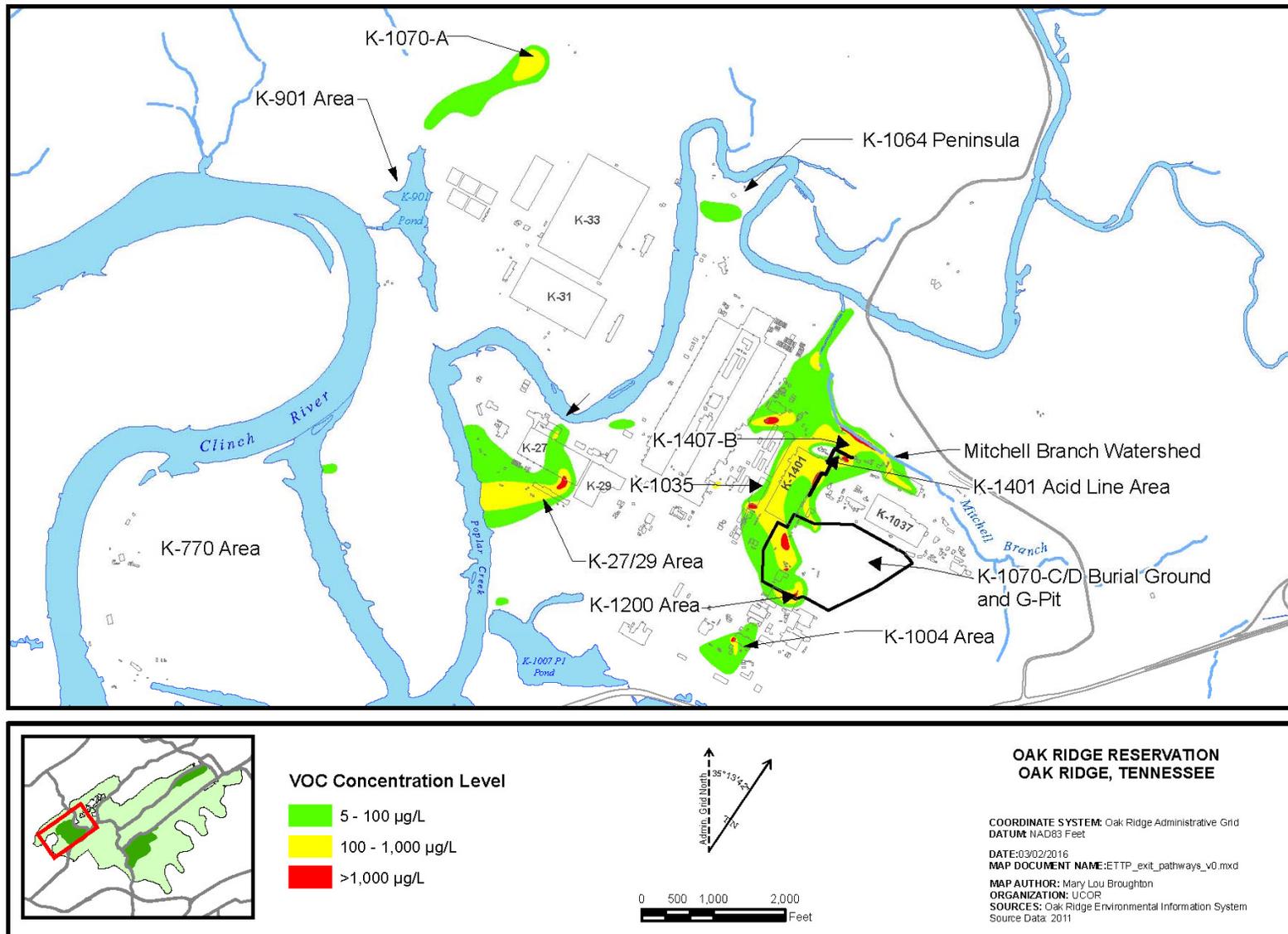


Figure 5. Distribution and concentration of the primary VOCs in groundwater in the ETPP administrative watershed.

The primary contaminants found in sediments at ETTP are inorganic elements, radionuclides, and PCBs. The K-1007-P1 Pond contains PCBs, with PCBs also present in sediment in Mitchell Branch. Principal contaminants in soils at ETTP include inorganic elements, radionuclides, semivolatile organic compounds (SVOCs), particularly polycyclic aromatic hydrocarbons (PAHs), and VOCs. The first three chemical groups are all relatively insoluble in water and are not easily leached from and transported through soils. Available data indicate that only limited areas of soil contamination (e.g., K-1420) serve as continuing sources to groundwater (DOE/OR/01-2505&D2).

### 3. CERCLA ACTIONS AT ETPP

Table 1 lists the completed CERCLA actions in the ETPP administrative watershed as of September 30, 2015 and identifies those that require continued monitoring or verification of LUCs. These actions are located in Figure 6. Performance monitoring requirements are discussed in Section 4; verification requirements for LUCs are discussed in Section 5.

Most of the completed remedies at ETPP have been single-action projects to address primary sources of contamination or primary release mechanisms. Concurrent with these actions, demolition of most buildings at ETPP is occurring under CERCLA removal authority. While these actions ultimately help to reduce contaminant loading and minimize the potential for future releases to exit pathways from ETPP, the goals of many of these actions have not included specific, measureable performance criteria for reductions in flux or risk in surface water and groundwater at the watershed scale. More recent watershed-scale decisions are the *Record of Decision for Interim Actions in Zone 1, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-1997&D2; Zone 1 Interim ROD) and the *Record of Decision for Soil, Buried Waste, and Subsurface Structure Actions in Zone 2, Oak Ridge, Tennessee* (DOE/OR/01-2161&D2; Zone 2 ROD), which address contaminated soil, buried waste, and subsurface structures necessary to ensure protection of human health and limit further contamination of groundwater.

The future sitewide CERCLA ROD is expected to address sitewide contaminated media, e.g., groundwater, surface water, and soils/sediments, and protection of ecological receptors. The FFA parties (DOE, EPA, and TDEC) preferred to first complete source control actions, monitor their effectiveness, and collect limited additional characterization data before formulating the future CERCLA decisions. The balance of site acreage within the ETPP administrative watershed, which includes areas outside of Zone 1 and Zone 2 (Figure 4), is primarily uncontaminated and portions include areas previously addressed as DOE footprint reduction sites.

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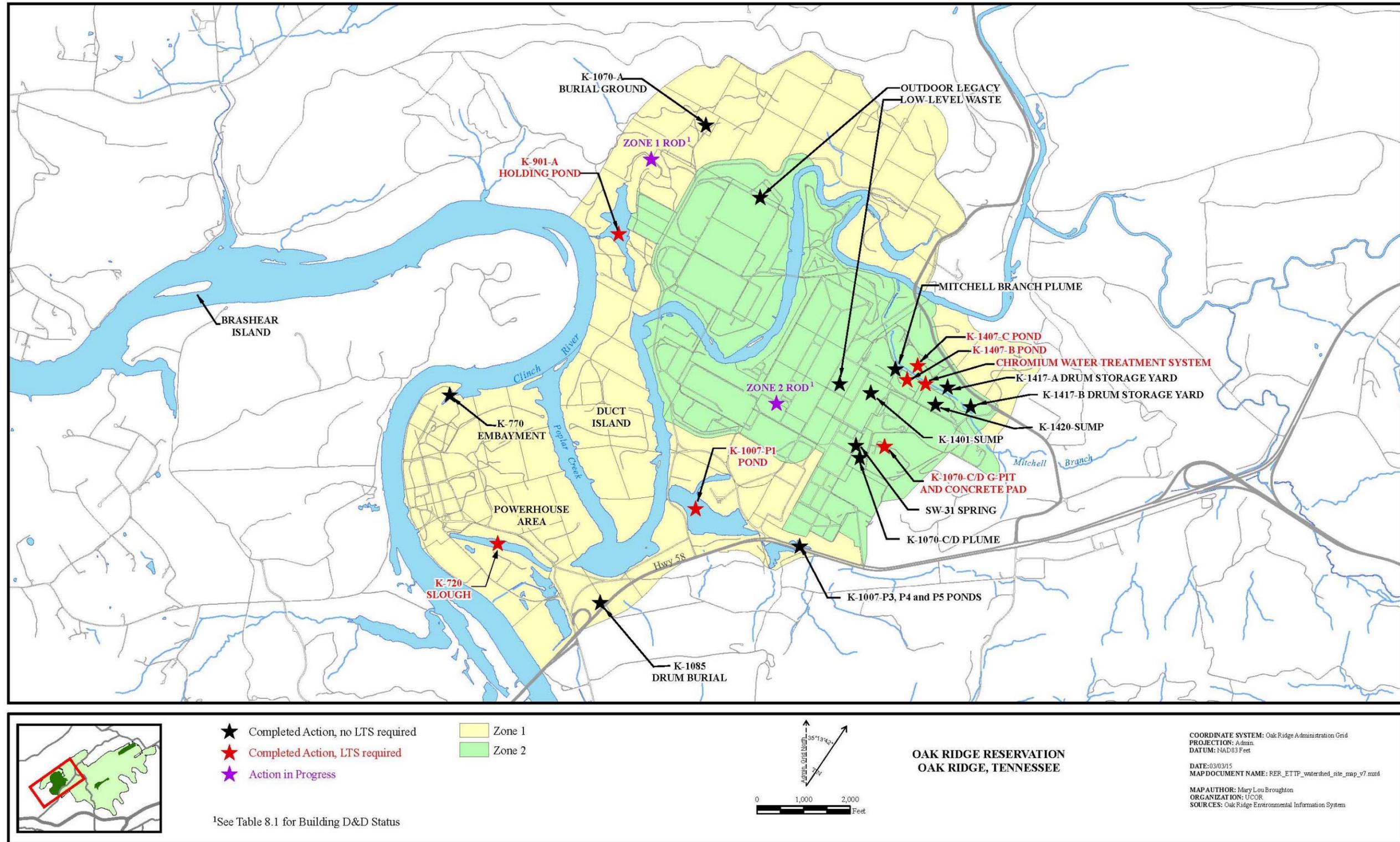


Figure 6. CERCLA actions in the ETTP administrative watershed as of September 30, 2015.

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**Table 1. Completed actions at ETP administrative watershed**

CERCLA action	Decision document: date signed (mm/dd/yy)	Action/Document status <sup>a</sup>	Action	Monitoring/LUC <sup>b</sup>
<b>Watershed-scale actions</b>				
Zone 1 Interim Actions	ROD (DOE/OR/01-1997&D2): 11/08/02	Watershed-scale requirements provided in ROD	-	No/Yes
		Duct Island/K-901 Area PCCR (DOE/OR/01-2261&D2) approved 04/03/06	Characterization and Remediation of EUs	No/No
		<ul style="list-style-type: none"> <li>Duct Island/K-901 Area PCCR Addendum (DOE/OR/01-2261&amp;D2/A1/R2) approved 02/28/11</li> </ul>	Characterization and Remediation of EUs	No/No
		K-1007 Ponds/Powerhouse PCCR (DOE/OR/01-2294&D2) approved 10/04/06	Characterization of EUs	No/No
		<ul style="list-style-type: none"> <li>K-1007 Ponds/Powerhouse PCCR Addendum (DOE/OR/01-2294&amp;D2/A1/R1) approved 12/31/11</li> </ul>	Characterization and Remediation of EUs	No/No
		<ul style="list-style-type: none"> <li>K-1007 Ponds/Powerhouse PCCR Addendum (DOE/OR/01-2294&amp;D2/A2) submitted 06/20/11</li> </ul>	Characterization and Remediation of EUs	No/No
		K-770 Scrap Removal PCCR (DOE/OR/01-2348&D1) approved 05/30/07	Removal of Scrap	No/No <sup>c,f</sup>
		<ul style="list-style-type: none"> <li>K-770 Scrap Removal PCCR Addendum (DOE/OR/01-2348&amp;D1/A1) approved 12/03/10</li> </ul>	Transfer of Cesium Casks for Disposal	No/No
		FY 2008 PCCR for Units Z1-01, Z1-03, Z1-38, Z1-49 (DOE/OR/01-2367&D2) approved 04/23/08	Remediation of EUs	No/No
Zone 2 Soil, Buried Waste, and Subsurface Structure Interim Actions	ROD (DOE/OR/01-2161&D2): 04/19/05	Watershed-scale requirements provided in ROD	-	Yes/Yes
		FY 2006 PCCR for EUs 2, 7, 9, 10, 27, and 42 (DOE/OR/01-2317&D2) approved 02/08/07	Characterization of EUs	No/No
		FY 2007 PCCR for EUs 1, 3, 8, 23, 24, 28, 33, 34, 35, 36, 37, 41, 43, and 44 (partial) (DOE/OR/01-2723&D2) approved 06/09/08	Characterization and Remediation of EUs	No/No
		<ul style="list-style-type: none"> <li>FY 2007 PCCR Addendum for EU 44 (DOE/OR/01-2723&amp;D2/A1) approved 10/07/14 with submission of Erratum</li> </ul>	Characterization and Remediation of EUs	No/No

**Table 1. Completed actions at ETTP administrative watershed (cont.)**

<b>CERCLA action</b>	<b>Decision document: date signed (mm/dd/yy)</b>	<b>Action/Document status<sup>a</sup></b>	<b>Action</b>	<b>Monitoring/LUC<sup>b</sup></b>
		FY 2008 PCCR for EU Z2-33 (DOE/OR/01-2368&D2/R1) approved 09/28/09	Characterization and Remediation of EUs	No/No
		<ul style="list-style-type: none"> <li>FY 2008 PCCR for EU Z2-33 – Erratum (DOE/OR/01-2368&amp;D2/R2 approved 12/16/09)</li> </ul>	-	No/No
		FY 2009 PCCR for EU Z2-36 (DOE/OR/01-2399&D1) approved 06/03/09	Characterization of EU	No/No
		FY 2009 PCCR for EUs 11, 12, 17, 18, 29, 38 (DOE/OR/01-2415&D2) approved 04/02/10	Characterization of EUs	No/No
		FY 2010 PCCR for EU Z2-31 (DOE/OR/01-2443&D2) approved 10/22/10	Characterization and Remediation of EU	No/No
		FY 2010 PCCR for EU Z2-32 (DOE/OR/01-2452&D1) approved 04/08/10	Characterization and Remediation of EU	No/No
		PCCR for EU Z2-30 (K-1070-B Burial Ground) (DOE/OR/01-2521&D2) approved 03/15/13	Characterization and Remediation of EU	No/No
		<ul style="list-style-type: none"> <li>PCCR for EU Z2-30 – Erratum (K-1070-B Burial Ground) (DOE/OR/01-2521&amp;D2) submitted 5/16/13 (no approval required)</li> </ul>	-	No/No
		PCCR for EUs 4 and 5 (K-33 slab) (DOE/OR/01-2590&D1) approved 02/11/13	Characterization and Remediation of EUs	No/No
		PCCR for EU 35 Sumps (DOE/OR/01-2618&D2) approved 05/07/14	Characterization of Sumps	Yes/Yes
<b>Single-project actions</b>				
K-1417-A/B Drum Storage Yards	ROD (DOE/OR-991&D1): 09/19/91	RAR (Letter) approved 03/02/95	Remediation of Drum Storage Yards	No/No
K-1070-C/D SW-31 Spring	Interim ROD (DOE/OR-1050&D2): 09/30/92 ESD (DOE/OR/02-1132&D2): 07/08/93	RAER (DOE/OR/01-1520&D1/R1) approved 12/11/96	Treatment System	Superseded by RAER Addendum – Erratum (DOE/OR/01-1520&D1/R1/A1) to eliminate monitoring <sup>g</sup>
		<ul style="list-style-type: none"> <li>RAER Addendum (DOE/OR/01-1520&amp;D1/R1/A1) to terminate action approved 02/28/07</li> </ul>	Treatment System	
		<ul style="list-style-type: none"> <li>RAER Addendum – Erratum (DOE/OR/01-1520&amp;D1/R1/A1) to eliminate monitoring approved 10/03/13</li> </ul>		No/No

**Table 1. Completed actions at ETTP administrative watershed (cont.)**

<b>CERCLA action</b>	<b>Decision document: date signed (mm/dd/yy)</b>	<b>Action/Document status<sup>a</sup></b>	<b>Action</b>	<b>Monitoring/LUC<sup>b</sup></b>
K-1407-B/C Ponds	ROD (DOE/OR/02-1125&D3): 09/30/93 (Also, closed under RCRA)	RAR (DOE/OR/01-1371&D1) approved 08/16/95	Cover Contamination	Superseded by RAR Erratum <sup>g</sup>
		<ul style="list-style-type: none"> <li>RAR Erratum (DOE/OR/01-1371&amp;D1) approved 05/26/15</li> </ul>		Yes/Yes
K-1401 and K-1420 Sumps	AM (DOE/OR/02-1610&D1): 08/18/97 NSC (DOE/OR/02-1610/R1): 10/23/07 (reroute K-1401 sump discharge to sanitary wastewater treatment)	RmAR (DOE/OR/01-1754&D2) approved 02/01/99	Treatment System	Terminated by RmAR Addendum (DOE/OR/01- 1754&D2/A1)
		<ul style="list-style-type: none"> <li>RmAR Addendum (DOE/OR/01-1754&amp;D2/A1) to terminate operation approved 04/21/06</li> </ul>		
K-1070-C/D and Mitchell Branch	AM (DOE/OR/02-1611&D2): 08/25/97	RmAR (DOE/OR/01-1728&D3) approved 03/02/99	Treatment System	Terminated <sup>d</sup>
		<ul style="list-style-type: none"> <li>Approval to terminate operation of non-cost effective system 12/17/04</li> </ul>		
K-901-A and K-1007-P Pond	AM (DOE/OR/02-1550&D2): 10/15/97 (superseded by AM (DOE/OR/01-2314&D2))	RmAR (DOE/OR/01-1767&D2) approved 11/12/99	Pond Cleanup	Superseded by RmAR (DOE/OR/01- 2456&D1/R1) <sup>g</sup>
K-1070-C/D G-Pit and Concrete Pad	ROD (DOE/OR/02-1486&D4): 01/23/98	RAR (DOE/OR/01-1964&D2) approved 10/15/03	Excavation and Soil Cover	Superseded by RAR Erratum <sup>g</sup>
		<ul style="list-style-type: none"> <li>Completion letter (waste) approved 10/29/03</li> </ul>		No/No
		<ul style="list-style-type: none"> <li>RAR Erratum (DOE/OR/01-1964&amp;D2) approved 03/13/15</li> </ul>		No/Yes <sup>e</sup>
K-1070-A Burial Ground	ROD (DOE/OR/01-1734&D3): 01/13/00	RAR (DOE/OR/01-2090&D1) approved 11/28/03	Remediation of Burial Ground	Superseded by Duct Island/K-901 Area PCCR (DOE/OR/01- 2261&D2) approved 04/03/06 <sup>g</sup>
K-1085 Old Firehouse Burn Area Drum Burial Site Removal Action	AM (DOE/OR/01-1938&D1): 03/27/01	RmAR (DOE/OR/01-2050&D1) conditionally approved 02/18/03	Removal of Buried Drums	No/No
		Completion Letter approved 01/19/07		
Outdoor LLW Removal	AM (DOE/OR/01-2109&D1): 11/14/03	RmAR (DOE/OR/01-2225&D2) approved 08/24/05	Removal of Outdoor LLW	No/No
ETTP Ponds removal action	AM (DOE/OR/01-2314&D2): 03/12/07 (K-1007-P and K-901-A holding ponds, K-720 Slough, and 770 Embayment) (supersedes DOE/OR/01-1550&D2)	RmAR (DOE/OR/01-2456&D1/R1) approved 03/10/11 (supersedes DOE/OR/01-1767&D2)	Ecological Enhancement	Yes/Yes

**Table 1. Completed actions at ETTP administrative watershed (cont.)**

CERCLA action	Decision document: date signed (mm/dd/yy)	Action/Document status <sup>a</sup>	Action	Monitoring/LUC <sup>b</sup>
Mitchell Branch Chrome Reduction	AM (DOE/OR/01-2369&D1): 12/20/07 (Reduction of Hexavalent Chromium Releases to Mitchell Branch Time-Critical)	RmAR (DOE/OR/01-2384&D1) submitted 07/30/08; review and approval suspended 10/09/08	Treatment System	Superseded by RmAR (DOE/OR/01-2598&D2) <sup>s</sup>
	AM (DOE/OR/01-2448&D1) (Long-Term Reduction of Hexavalent Chromium Releases to Mitchell Branch) approved 04/13/10 (supersedes DOE/OR/01-2369&D1)	RmAR (DOE/OR/01-2598&D2) approved 04/04/13	Treatment System	Yes/No
K-25 Group II, Phase 3 Building Demolition, Remaining Facilities removal action		PCCR for Decommissioning Central Neutralization Facility (DOE/OR/01-2619&D2) approved 11/24/14	Decommissioning Central Neutralization Facility	No/Yes
		<ul style="list-style-type: none"> <li>PCCR for Decommissioning Central Neutralization Facility – Erratum (DOE/OR/01-2619&amp;D2) submitted 10/23/14</li> </ul>		No/Yes

<sup>a</sup>Information on the enforceable agreement milestones for ongoing actions is in Appendix E of the FFA for the ORR (DOE/OR-1014) and is available at <[http://www.ucor.com/ettp\\_ffa\\_appendices.html](http://www.ucor.com/ettp_ffa_appendices.html)>.

<sup>b</sup>“No/No” indicates no monitoring/other LTS requirements are identified in the CERCLA action completion document beyond those identified in the watershed RODs. Refer to Table 8.3 for watershed-scale monitoring requirements and Figure 8.2 and Table 8.2 for watershed-scale LUCs and other LTS requirements.

<sup>c</sup>The *Addendum II to the Phased Construction Completion Report for the K-1007 Ponds Area and Powerhouse North Area in Zone 1, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2294&D2/A2) documents the characterization and remediation of the associated EUs and recommends NFA because all remediation levels were met. The EPA and TDEC have not approved the *Addendum* but have no technical disagreement with the conclusions. Therefore, the interim LTS requirements in the *Phased Construction Completion Report for the K-770 Scrap Removal Project of the Zone 1 Remediation at the East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2348&D1) are no longer required for areas in these Zone 1 EUs.

<sup>d</sup>In a letter dated December 1, 2004, DOE proposed to EPA and TDEC to discontinue operation of the groundwater collection system because it was not cost-effectively reducing contaminant flux. TDEC and EPA approved the proposal on December 15, 2004 and December 17, 2004, respectively, and the groundwater collection system was terminated.

<sup>e</sup>The action for the K-1071 concrete pad is an interim action, and a final RA will be performed under the *Record of Decision for Soil, Buried Waste, and Subsurface Structure Actions in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2161&D2).

<sup>f</sup>The process for managing potentially contaminated slabs has been determined and is being implemented.

<sup>g</sup>The “Monitoring/Other LTS” requirements in a completion document have been superseded, or replaced, by the requirements in the subsequent, referenced completion document.

AM = Action Memorandum  
 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980  
 DOE = U.S. Department of Energy  
 EPA = U.S. Environmental Protection Agency  
 ESD = Explanation of Significant Difference  
 ETTP = East Tennessee Technology Park  
 EU = exposure unit  
 FFA = Federal Facility Agreement  
 FY = fiscal year  
 LLW = low-level waste  
 LTS = long-term stewardship

LUC = land use control  
 NFA = no further action  
 NSC = Non-Significant Change  
 ORR = Oak Ridge Reservation  
 PCCR = Phased Construction Completion Report  
 RA = remedial action  
 RAER = Remedial Action/Effectiveness Report  
 RAR = Remedial Action Report  
 RCRA = Resource Conservation and Recovery Act of 1976  
 RmAR = Removal Action Report  
 ROD = Record of Decision  
 TDEC = Tennessee Department of Environment and Conservation

## 4. ENVIRONMENTAL MEDIA MONITORING OBJECTIVES AND PERFORMANCE GOALS

### 4.1 INTRODUCTION

Environmental monitoring in the ETP administrative watershed includes two components: (1) performance monitoring required by approved CERCLA decision or post-decision documents and (2) baseline monitoring conducted, as necessary, to track changes in contaminant concentrations at source areas in interior locations and at IPs and exit pathways to monitor for potential offsite transport/release.

### 4.2 PERFORMANCE MONITORING

As shown in Table 1, environmental monitoring is required by the applicable CERCLA decision documents or post-decision documents for the following completed CERCLA actions in the ETP administrative watershed:

- Zone 2 ROD, which includes the K-1070-C/D Burial Grounds
- Non-time-critical (TC) RmA for reduction of chromium in Mitchell Branch
- K-1407-B/C Ponds RA, and
- ETP Ponds RmA, including the K-1007-P1 and K-901-A holding ponds, the K-720 Slough, and the K-770 Embayment.

Table 2 summarizes the environmental monitoring objectives and performance goals for these CERCLA actions in the ETP administrative watershed as established by applicable CERCLA decision document(s) referenced in Table 1. The annual RER for the ORR describes the WRRP technical approach and rationale for surface water, groundwater, and biological monitoring in the ETP administrative watershed.

The Zone 2 ROD defines two primary RAOs: (1) to protect human health under an industrial land use to an excess lifetime cancer risk (ELCR) at or below  $1 \times 10^{-4}$  and non-cancer risk levels at or below a Hazard Index (HI) of 1, and (2) to protect groundwater to levels at or below maximum contaminant levels (MCLs) for drinking water (DOE/OR/01-2161&D2). The Zone 2 ROD also requires groundwater monitoring near potential sources of groundwater contamination, including the K-1070-C/D Burial Grounds, but specific sampling locations, analytical parameters, and clean-up levels (i.e., performance standards) are not identified. Under the WRRP, performance monitoring associated with the Zone 2 ROD has included semiannual collection of groundwater samples from selected wells located outside the perimeter of the K-1070-C/D Burial Grounds, with laboratory analyses of the samples for VOCs and water quality parameters (Table 2). The monitoring locations, sampling frequency, and laboratory analytes currently designated for Zone 2 ROD performance monitoring purposes are expected to continue under the WRRP until superseded by performance monitoring requirements specified in a future sitewide ROD for ETP. Baseline monitoring (Section 4.3) describes sampling and analysis of other potential sources of groundwater contamination at the ETP.

A non-TC Action Memorandum (AM; DOE/OR/01-2448&D1) describes two long-term goals to address releases of chromium into Mitchell Branch: (1) collect and treat hexavalent chromium-contaminated groundwater to reduce its toxicity prior to discharge into Mitchell Branch, and (2) protect water quality in Mitchell Branch at levels consistent with TDEC hexavalent chromium ambient water quality chronic criterion of 0.011 mg/L for the protection of fish and aquatic life. This non-TC AM supersedes the previous

TC AM (DOE/OR/01-2369&D1), which addressed the short-term reduction of hexavalent chromium releases into Mitchell Branch. Under the non-TC RmA, the existing extraction wells pump the groundwater to the Chromium Water Treatment System (CWTS), where a reducing agent is added to convert the hexavalent chromium to trivalent chromium. The water is then pumped through the existing air stripper to remove VOCs and discharged to the Clinch River via the existing pipeline. The treatment system began operating continuously in May 2012, and the *Removal Action Report for the Long-Term Reduction of Hexavalent Chromium Releases into Mitchell Branch at the East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2598&D2) was approved in April 2013. The Removal Action Report (RmAR) specifies quarterly performance monitoring at Mitchell Branch kilometer (MIK) 0.79, Storm Drain-170, monitoring well 289 (TP-289), the two collection system wells IW-416 and IW-417, and the treatment system discharge (Table 2). Both total and hexavalent chromium analyses are performed on samples from all locations, with additional analyses for pH, select VOCs, total uranium, and select radionuclide constituents performed on the treatment system discharge. The non-TC RmA can be terminated when the concentration of hexavalent chromium in Mitchell Branch is protective of the designated uses for the creek without collection and treatment of the contaminated plume. The point of compliance for this action is MIK 0.79 that is downstream of the Storm Drain-170 and the Mitchell Branch mixing zone.

The ROD for the K-1407-B/C Ponds (DOE/OR/01-1125&D3) addresses potential risks associated with residual wastes and soils remaining in the ponds after the initial removal of sludge conducted as a previous closure action under the Resource Conservation and Recovery Act of 1976 (RCRA). Major components of the selected remedy included placement of clean soil and rock fill for isolation and shielding, maintenance of institutional controls, and groundwater monitoring to assess performance of the action and to determine the effectiveness of the remedy. The RAR (DOE/OR/01-1371&D1) proposed semiannual groundwater monitoring in seven wells for nitrate, metals, and selected radionuclides, including gross alpha and beta activity,  $^{99}\text{Tc}$ ,  $^{137}\text{Cs}$ ,  $^{230,232}\text{Th}$ ,  $^{234,238}\text{U}$ , and  $^{90}\text{Sr}$ . As recommended by the EPA (Weeks 1995), with concurrence from TDEC (McCoy 1995), performance monitoring is conducted in two wells, UNW-003 and UNW-009, and the Mitchell Branch weir (K-1700 weir). Because VOCs are the primary groundwater contaminant in the Mitchell Branch area of the ETTP, the WRRP added VOCs to the list of contaminants for routine monitoring (Table 2). Performance criteria or clean-up standards were not specified.

The components of the non-TC RmA for the K-901-A and K-1007-P holding ponds are provided in an AM (DOE/OR/01-2314&D2), which was approved in March 2007 and supersedes a previous AM (DOE/OR/01-1550&D2), which addressed the removal and disposition of gas cylinders and other hazardous material containers and debris from the two holding ponds. The more recent AM includes decisions for both the K-901-A and K-1007-P holding ponds, K-720 Slough, and the K-770 Embayment. The actions taken include the ecological enhancement of the K-1007-P1 Holding Pond, as well as LUCs and monitoring of the K-1007-P1 and K-901-A holding ponds, and the K-720 Slough. No action was recommended for the K-770 Embayment and the K-1007-P3, -P4, and -P5 holding ponds.

RmAs specified for the K-1007-P1 Holding Pond in the AM were completed during fiscal year (FY) 2009 and included draining the pond, removing undesirable fish (i.e., fish that bioaccumulate PCBs, cause resuspension of contaminated sediment, or consume aquatic vegetation), re-contouring approximately one quarter of the pond bottom to create a suitable environment for aquatic vegetation, planting a variety of aquatic vegetation in the pond, restocking the pond with desirable fish species (primarily sunfish and various minnows), construction of a fish barrier fence to prevent the migration of undesirable fish species from Poplar Creek into the pond, and establishment of a riparian buffer zone to discourage geese from using the pond and to improve habitat (DOE/OR/01-2505&D2). A revised RmAR (DOE/OR/01-2456&D1/R1) documenting completion of the non-TC RmA was approved in March 2011. An earlier version of the report was prepared describing how the removal action was implemented, but the constructed fish barrier at the K-1007-P1 Holding Pond weir was damaged during December 2009 and May 2010 storm events. The May 2010 event resulted in the inadvertent reintroduction of undesirable fish species back into the K-1007-P1

Pond. The revised RmAR includes a description of the repair of the damaged fish barrier adjacent to the weir and the measures taken to remove the undesirable fish that entered the pond.

In accordance with the revised RmAR (DOE/OR/01-2456&D1/R1), monitoring is being performed in two phases (Table 2): (1) the first phase, operational monitoring, began after the pond had been restocked and continues until both aquatic vegetation and a desirable mix of fish species are established; (2) the second phase, performance monitoring, involves sampling to determine if PCB uptake in the fish remains below protective risk-based levels ( $\leq 1$  mg/kg PCBs in fish fillets or  $\leq 2.3$  mg/kg PCBs whole body). Performance monitoring began immediately in the K-901-A Holding Pond and the K-720 Slough, and overlapped with operational monitoring at the K-1007-P1 Holding Pond beginning in FY 2010. In addition, as part of performance monitoring at the K-1007-P1 Holding Pond, species identification and enumeration of the fish community at least once per year for four years and PCB bioavailability in caged clams at four locations annually for a four-week exposure will be conducted. Performance monitoring will continue and be reassessed each year after the initial four years until acceptable risk-based levels are achieved.

### **4.3 BASELINE MONITORING**

In conjunction with the performance monitoring required by the above-referenced decision documents for CERCLA actions in the ETTP administrative watershed, the WRRP has implemented baseline (i.e., trend) monitoring. Baseline monitoring is conducted at exit pathways where contaminants in groundwater or surface water have the potential to flow through and ultimately exit the ETTP subwatersheds to discharge offsite to Poplar Creek or the Clinch River. Monitoring locations for exit pathways at ETTP include unconsolidated zone and bedrock zone wells, springs, and surface water IPs. Baseline monitoring also includes interior monitoring locations near known (or potential) contaminant sources that are used to detect concentration changes in primary groundwater plumes.

Of particular concern in recent years is the increasing trend in mercury concentrations in the Mitchell Branch subwatershed noted from NPDES sample results from outfalls 180 and 190, as well as instream concentrations observed at the Mitchell Branch K-1700 weir. Concentrations frequently exceed the ambient water quality criteria (AWQC) of 51 ng/L (DOE/OR/01-2594&D2). The source of the mercury releases is unknown, so continued monitoring will assess potential mercury releases from legacy sources and support any required CERCLA cleanup. In addition to monitoring of mercury in the Mitchell Branch subwatershed, storm water Outfall 05A is also sampled for mercury discharges on a quarterly basis in accordance with the requirements of the current ETTP NPDES permit. This outfall discharges directly into Poplar Creek and consistently exceeds the AWQC of 51 ng/L. The outfall receives storm water runoff from a subwatershed that primarily includes the inactive K-1203 sewage treatment plant that was shutdown in 2008. These locations are included as quarterly baseline monitoring locations for mercury analysis in the ETTP RAR CMP, although they are currently sampled by the ETTP Environmental Compliance Organization for NPDES permit compliance.

Performance criteria have not been established for baseline monitoring locations. Table 3 summarizes the baseline monitoring conducted in the ETTP administrative watershed and provides the monitoring objective for each group of monitoring locations.

**Table 2. CERCLA action performance monitoring in the ETTP administrative watershed<sup>a</sup>**

CERCLA action	Performance goal	Performance standard	Monitoring location(s)	General schedule and monitored parameters
<i>Performance Monitoring</i>				
Zone 2 Soil, Buried Waste, and Subsurface Structure RAs (includes K-1070-C/D Burial Ground)	Protect human health under an industrial land use to an ELCR at or below $1 \times 10^{-4}$ and non-cancer risk levels at or below a HI of 1. Protect groundwater to levels at or below MCLs for drinking water.	Drinking water MCLs.	<i>Groundwater</i> TMW-011 UNW-064 UNW-114	Semiannual sampling (seasonally wet and dry conditions). Laboratory analyses for VOCs and water quality parameters.
Long-term Reduction of Hexavalent Chromium Releases to Mitchell Branch (Non-TC RmA)	Collect and treat hexavalent chromium-contaminated groundwater to reduce its toxicity prior to discharge into Mitchell Branch. Protect water quality in Mitchell Branch at levels consistent with AWQC.	Hexavalent chromium concentrations below 0.011 mg/L AWQC in Mitchell Branch immediately downstream of Storm Drain-170 discharge.	<i>Surface water</i> MIK-0.79 Storm Drain-170  <i>Groundwater</i> TP-289 IW-416 and IW-417  <i>Treatment System Discharge</i>	Quarterly sampling of all monitoring locations. Laboratory analyses (unfiltered samples) for total and hexavalent chromium in surface water, groundwater, and treatment system discharge samples. Treatment system discharge samples also analyzed for pH, total U, VOCs, gross alpha and beta, and select radionuclides.
K-1407-B/C Ponds RA	Reduce potential threats to human health and the environment posed by residual contamination in pond soils by providing isolation and shielding with rock fill and intact soil cover.	Remediation target concentrations were not established in the CERCLA decision or post-decision documents.	<i>Surface water</i> Weir  <i>Groundwater</i> UNW-003 UNW-009	K-1700 Semiannual sampling. Laboratory analyses for nitrate, field parameters, VOCs, metals, gross alpha and beta, <sup>99</sup> Tc, <sup>90</sup> Sr, <sup>137</sup> Cs, <sup>230,232</sup> Th, and <sup>234,238</sup> U.

**Table 2. CERCLA action performance monitoring in the ETP administrative watershed<sup>a</sup> (cont.)**

CERCLA action	Performance goal	Performance standard	Monitoring location(s)	General schedule and monitored parameters
K-901-A and K-1007-P1 Holding Ponds and K-720 Slough RA	The goal of the ecological enhancement performed at the K-1007-P1 Holding Pond is to establish a new steady-state condition within the pond that reduces risks from PCBs by enhancing components of the ecology that minimize PCB uptake, which will reduce risks to human and piscivorous wildlife by interdicting contaminant exposure pathways associated with these receptors.	PCB concentration of 1 mg/kg in fish fillets (2.3 mg/kg whole body).	<p><u>Operational</u> Monitoring at K-1007-P1 Pond only:</p> <ol style="list-style-type: none"> <li>1. Presence of original fish</li> <li>2. PCBs in fish</li> <li>3. Condition of vegetation</li> <li>4. Species of fish</li> <li>5. Water quality</li> <li>6. PCBs in clams</li> <li>7. Geese/waterfowl population</li> </ol> <p><u>Performance</u> Monitoring at K-1007-P1 &amp; K-901-A Holding Ponds, and K-720 Slough:</p> <ol style="list-style-type: none"> <li>1. PCBs in fish</li> <li>2. Species of fish in K-1007-P1 only</li> <li>3. PCBs in clams in K-1007-P1 only</li> </ol>	<ol style="list-style-type: none"> <li>1. Once, after fish removal</li> <li>2. Annually</li> <li>3. 2x/yr during growing season</li> <li>4. Annually</li> <li>5. 3x/yr during growing season</li> <li>6. Four locations annually for a four week exposure</li> <li>7. Monthly identification and enumeration of all waterfowl in and around pond</li> </ol> <ol style="list-style-type: none"> <li>1. Annually for four years, then reassess for every other year until acceptable risk documented for each pond.</li> <li>2. Annually for four years (reassess after four years, as above).</li> <li>3. Four locations annually for a four week exposure (reassessed after four years, as above).</li> </ol>

<sup>a</sup>Changes to performance monitoring for RAs require prior approval from the EPA and TDEC.

AWQC = ambient water quality criteria  
 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980  
 ELCR = excess lifetime cancer risk  
 EPA = U.S. Environmental Protection Agency  
 ETP = East Tennessee Technology Park  
 HI = hazard index  
 MCL = maximum contaminant level

MIK = Mitchell Branch kilometer  
 PCB = polychlorinated biphenyl  
 RA = remedial action  
 RmA = removal action  
 TC = time-critical  
 TDEC = Tennessee Department of Environment and Conservation  
 VOC = volatile organic compound

**Table 3. Baseline monitoring in the ETPP administrative watershed<sup>a</sup>**

Area of ETPP	Media	Monitoring location(s)	General schedule and monitoring parameters	Monitoring objective
<i>Baseline Monitoring</i>				
Mitchell Branch Area	Surface water	K-1700 Weir (IP)	Quarterly sampling for VOCs, metals (including mercury), gross alpha and gross beta activity, and select radionuclides	Mitchell Branch discharge to Poplar Creek at the K-1700 weir; potential mercury source area to Mitchell Branch
		Outfall 180 Outfall 190	Quarterly sampling for mercury	Potential mercury releases from legacy sources to Mitchell Branch
	Groundwater	BRW-083 UNW-107	Semiannual sampling for VOCs, metals, gross alpha, and gross beta activity	Groundwater exit pathway from Mitchell Branch area to Poplar Creek
K-901-A Holding Pond Area (including Duct Island and K-1070-A Burial Grounds)	Surface water	K-901-A Weir (IP)	Semiannual sampling for VOCs, metals, gross alpha and gross beta activity, and PCBs	Exit pathway from K-1070-A/K-901-A areas to Poplar Creek/Clinch River
	Groundwater	BRW-035 BRW-068 UNW-066 UNW-067 Spring 21-002 PCO Spring	Semiannual sampling for VOCs, gross alpha and gross beta activity (except Spring PC-0 can only be sampled annually when lake level is lowered)	
K-1064 Peninsula Area	Groundwater	BRW-003 BRW-017	Semiannual sampling for VOCs	Groundwater exit pathway from K-1064 Peninsula area to Poplar Creek
K-31/K-33 Area	Groundwater	BRW-066 UNW-080	Semiannual sampling for VOCs and metals	Exit pathway discharge from K-31/K-33 area to Poplar Creek
		UNW-043 BRW-030	Semiannual sampling for metals	Interior monitoring of residual chromium contamination
K-27/K-29 Area	Surface water	Outfall 05A	Quarterly sampling for mercury	Direct discharge to Poplar Creek from subwatershed that primarily includes the inactive K-1203 sewage treatment plant
	Groundwater	BRW-058	Semiannual sampling for VOCs	Exit pathway discharge to Poplar Creek from K-1413 area
		BRW-016 UNW-038 UNW-096	Semiannual sampling for VOCs and metals	Groundwater exit pathway to Poplar Creek from K-27/K-29 area

**Table 3. Baseline monitoring in the ETPP administrative watershed<sup>a</sup> (cont.)**

Area of ETPP	Media	Monitoring location(s)	General schedule and monitoring parameters	Monitoring objective
K-1007-P1 Holding Pond Area	Surface water	K-1007-B Weir (IP)	Semiannual sampling for VOCs, metals, PCBs, and gross alpha and gross beta activity	Exit pathway discharge to Poplar Creek from the K-1007-P1 Holding Pond area
	Groundwater	BRW-084 UNW-108		
K-770 Area	Groundwater	UNW-013 UNW-015	Semiannual sampling for gross alpha and gross beta activity	Exit pathway groundwater monitoring from the K-770 area along the Clinch River

<sup>a</sup>Changes to baseline monitoring in this RAR CMP require prior approval from the EPA and TDEC.

CMP = Comprehensive Monitoring Plan  
 EPA = U.S. Environmental Protection Agency  
 ETPP = East Tennessee Technology Park  
 IP = Integration Point  
 PCB = polychlorinated biphenyl  
 RAR = Remedial Action Report  
 TDEC = Tennessee Department of Environment and Conservation  
 VOC = volatile organic compound

## 5. LAND USE CONTROL IMPLEMENTATION PLAN

### 5.1 INTRODUCTION

As stated previously, because most of the remediation decisions in the ETP administrative watershed do not allow for UU/UE, LUCs are required. This chapter addresses the LUCs necessary in the ETP administrative watershed to ensure the remediated areas are protective of human health and the environment. This chapter describes the LUC objectives, the LUCs, transfer of property, and LUC verification and reporting for the ETP administrative watershed.

A future, final ROD for the ETP administrative watershed will select the remedies necessary to address the remaining environmental media, e.g., groundwater and surface water, and ecological protection. This future, final ROD will address any additional LUCs or changes to previously implemented LUCs for the ETP administrative watershed. The current schedule for this ROD is available in Appendix J of the FFA.

The federal government, currently through DOE is responsible for implementing, maintaining, reporting on, and, if appropriate, enforcing LUCs. Although DOE may transfer these procedural responsibilities to another party, DOE shall retain ultimate responsibility for the integrity of remediation. DOE will seek the necessary funding for the implementation and maintenance of LUCs through the congressional appropriations process or other available mechanism. The process for DOE funding remediation projects, including any required LUCs, is described in the *Federal Facility Agreement for the Oak Ridge Reservation* Section XXXVIII (DOE/OR-1014).

DOE shall not modify or terminate LUCs and implementation actions per approved RODs or modify end use without approval by EPA and TDEC. DOE shall seek prior concurrence before any anticipated action that may disrupt the effectiveness of the LUCs or any action that may alter or negate the need for LUCs.

### 5.2 LUC OBJECTIVES

During the CERCLA decision-making process assumptions are made about the future end uses of the areas to be remediated so that the need for LUCs to maintain these uses over time can be evaluated. The Zone 1 Interim ROD (DOE/OR/01-1997&D2) and Zone 2 ROD (DOE/OR/01-2161&D2) contain remediation levels related to anticipated future industrial end use.

The LUC objectives necessary to ensure the protectiveness of the selected remedies are to:

- Prevent access to or use of groundwater unless approved by DOE, EPA, and TDEC.
- Prohibit unauthorized excavation inconsistent with the LUCs described in Section 5.3.
- Prohibit the development and use of the area that is inconsistent with remediation levels, e.g., residential housing, elementary and secondary schools, playgrounds, and child care facilities.
- Prevent unauthorized contact, removal, or excavation of waste material inconsistent with the LUCs described in Section 5.3.
- Maintain the integrity of any current or future remedial action where waste remains in place or required monitoring systems have been implemented.

DOE shall notify EPA and TDEC 45 days in advance of any proposed end use changes that are inconsistent with the LUC objectives or the selected remedy.

The LUC objectives are identified to prohibit uses of the post remediation areas within the watershed that will be harmful to the remediation activities performed, to the environment, and/or to humans that may be located at or visit the areas. LUC objectives are also used to ensure the integrity of the completed RA.

Because the Zone 1 Interim ROD and Zone 2 ROD cover a large watershed and not a single remediation unit, some LUC objectives will be associated with the whole ETPP administrative watershed and some with individual affected areas (Table E.1).

### 5.3 LUCs

LUCs are used to achieve the LUC objectives. LUCs are to be maintained until the concentration of contamination in the soil and/or groundwater are at such levels to allow UU/UE.

The implemented LUCs are identified in Table E.1 in Appendix E. A description of each LUC follows:

- **Property Record Restrictions.** The purpose of a Property Record Restriction is to restrict the use of property and/or prohibit the use of groundwater by imposing limitations. DOE shall record property record restrictions in accordance with state law at the Roane County Register of Deeds office. Each transfer or fee title from the United States federal government will include a CERCLA 120(h) covenant that will have a description of the residual contamination on the property and the environmental use restrictions expressly prohibiting activities inconsistent with the LUC objectives to the degree practicable to ensure the clear delineation of the restriction.
- **Property Record Notices.** The purpose of a Property Record Notice is to provide notice to the public about the existence and location of regulated hazardous substance and the location of land that is not appropriate for UU/UE and limitations on the use. DOE acquired the land now within the ORR through various methods of acquisition, including condemnation through use of eminent domain; purchase; and transfer from other federal, state, and local government agencies. The acquisitions by eminent domain and purchase have been filed for record at the pertinent county offices of record.

There are two types of Property Record Notices that will need to be filed by DOE. The first type, a general notice, is filed when regulated hazardous substances, e.g., radionuclides, hazardous chemicals, and asbestos) are left in place in an area at levels that may pose an unreasonable threat to public health, safety, or the environment. The second type, a more specific notice for individual areas, is filed after completion of remediation of the specific unit, e.g., landfill, when hazardous wastes or asbestos-containing materials are left in place in the unit. These two types of Property Record Notices are described below:

1. Tennessee law requires that a Notice of Land Use Restrictions (Notice) be prepared and recorded by a property owner when hazardous substances, as defined under CERCLA §101, are left in place and land use restrictions are required as part of the RA on such property. This Notice with general locations identified will be filed by DOE as soon as practicable after signing the ROD, upon completion of all RAs, and upon transfer of affected areas, if that occurs. The Notice will be filed with Roane County Register of Deeds Office in a manner consistent with *Tennessee Code Annotated (TCA) 68-212-225* and containing information similar to that required by CERCLA Section 120(h). If the property is transferred, the Notice also will be filed with the zoning commission. As required by *TCA 68-212-225(b)*, the Notice that DOE files will include a legal description of the site; identify generally the type, location, and quantity of regulated hazardous

substances and regulated substances known to exist on the site; and identify the location and dimensions of the areas of potential environmental concern with respect to surveyed, permanent benchmarks (where the site encompasses more than once parcel or tract of land, a composite map or plat showing all parcels or tracts may be recorded). The Notice will also list the LUCs used to protect workers and the public from risks associated with residual contamination and any other controls that may be implemented on the current or future use of the site. DOE will include statements, along with the Notice information, that the groundwater shall not be used without approval from DOE, EPA, and TDEC. DOE will also include statements that soil will only be used consistent with the anticipated end use assumptions in the [relevant] ROD.

2. An additional more specific Notice, with survey plat indicating the location and dimensions of the landfill cells or hazardous waste or asbestos disposal units with respect to permanently surveyed benchmarks, will also be filed by DOE with the Roane County Register of Deeds Office within 60 days of submitting the completion document for the RA of any landfill or hazardous waste or asbestos disposal unit where hazardous waste or asbestos is left in place within an affected area. The survey plat will be accomplished by a registered land surveyor under the direction and approval of a DOE official that depicts the relevant contamination/waste disposal areas. The plat must contain a note, prominently displayed, which states the owner/operator obligation to restrict disturbance of the landfill. The Notice must include a record of the type, location, and quantity of hazardous or asbestos wastes disposed of within each cell of the unit. DOE must also record, in accordance with state law, a notation on the deed to the facility property or on some other legal instrument which is normally examined during a title search that will in perpetuity notify any potential purchaser of the property that the land has been used to manage hazardous or asbestos wastes, its use is restricted under 40 *Code of Federal Regulations* (CFR) Part 264 Subpart G or 40 CFR Part 61 Subpart M regulations, respectively, and the survey plat and record of the type, location, and quantity of hazardous or asbestos wastes disposed within each cell or other waste disposal unit of the facility required by 40 CFR 264.116 and 264.119(a) or 40 CFR 61.151(e) have been filed with the local zoning authority and with the EPA Regional Administrator.

Once the Notices are filed and upon any further transfers of a parcel, any of the aforementioned land use restrictions may be enforced by any owner of the land, TDEC, or any unit of local government having jurisdiction over the property through issuance of an order by means of a civil action.

A copy of all Notices filed also will be mailed to the appropriate State and local governments having jurisdiction over any part of the property (including the zoning commission) within 30 days of being filed. These include, but are not limited to, the city of Oak Ridge and Roane County. Copies will also be provided to EPA Region IV and the TDEC Oversight Office. DOE will formally notify any initial property transferees of the existence of any Notices prior to final agreement on the property transfer.

- **Excavation Penetration Permit Program (EPPP).** The purpose of the EPPP is to provide notice to the worker/developer (i.e., permit requestor) on the extent of contamination and prohibit or limit excavation/penetration activity to ensure that the excavation/penetration activity is conducted safely. An existing internal EPPP currently administered by DOE contractors requires workers/developers to obtain authorization before beginning subsurface excavation/penetration activities. This program, or equivalent, was selected as a CERCLA-imposed LUC in the Zone 1 Interim ROD and the Zone 2 ROD to ensure that planned excavation/penetration activities do not result in an uncontrolled release or unacceptable exposure to subsurface contamination. When an excavation/penetration is necessary, the requester will consult the internal DOE procedure to determine whether a permit is required.

The goals of this program are to restrict subsurface construction and to protect the safety of the workers and the environment. Depending on the location of the excavation/penetration activity, such

permits may contain necessary restrictions, waste disposal/handling requirements, or special work requirements.

DOE and/or its agent will maintain responsibility for the EPPP for contamination handling and locations for on-going federal government activities at the site and for transferred land until the concentrations of hazardous substances are at levels to allow for UU/UE.

- **Access Controls.** The purpose of Access Controls (e.g., fences, gates, portals, signs, and surveillance patrols) is to control and restrict access to workers and the public to prevent unauthorized uses. Access Controls in and around ETTP that restrict/limit access to workers and/or the public to contaminated units/areas will be evaluated by the remediation projects and, if necessary, selected in the corresponding design or construction completion report. DOE will erect and maintain signs across the ETTP administrative watershed at appropriate locations to achieve the LUC objectives. DOE will conduct surveillance patrols across the ETTP administrative watershed to determine that incompatible uses have not occurred for units/areas requiring land use restrictions. The patrols will be implemented, as needed, upon completion of RA. DOE and/or its agent will maintain responsibility for the access controls until the concentrations of hazardous substances are at levels to allow for UU/UE. In the event of property transfer, DOE will document access controls in the transfer documents and deed and will verify they are maintained.

The affected areas for LUCs are listed in Table E.1 and located in Figures A.2 and A.3 in Appendix A. Figure A.2 locates the completed actions, and Figure A.3 locates the transferred parcels. LUCs listed in Table E.1 will be evaluated annually and revised by DOE, as necessary, as part of this primary document. DOE shall report in the annual RER any activity that may be inconsistent or may interfere with the effectiveness of the implemented LUCs. DOE will include in the RER what activity was performed or will be performed.

DOE shall address any activity that is inconsistent and/or may interfere with the LUC objectives or use restrictions as follows:

- DOE will address the activity as soon as practicable but no longer than 10 days after discovery.
- DOE will notify EPA and TDEC of the activity within 10 days after discovery.
- DOE will inform EPA and TDEC how the activity has been or will be addressed within 10 days of the notification.

#### **5.4 TRANSFER OF PROPERTY**

DOE will notify EPA and TDEC at least 90 days prior to any transfer or sale of the ETTP watershed property and will comply with the applicable requirements of Section 120(h) of CERCLA. In addition to the land transfer notice provisions above, DOE further agrees to provide EPA and TDEC with similar notice, within the same time frames, as to federal-to-federal transfer of property. DOE will provide a copy of the final executed transfer document to EPA and TDEC. The deed will include the following language, 'Prior to seeking approval from EPA and TDEC, the owner of the property must notify and obtain approval from DOE of any proposals for an end use change at a site inconsistent with the use restrictions and assumptions in the [relevant] ROD.

Each transfer or fee title will include a CERCLA 120(h) covenant that will have a description of the residual contamination on the property and the environmental use restrictions expressly prohibiting activities inconsistent with the LUC objectives to the degree practicable to ensure the clear delineation of

the restriction. The environmental restrictions are included in a section of the CERCLA 120(h) covenant that DOE is required to include in the deed for any property that has had hazardous substances (as defined and listed in CERCLA §101) stored for one year or more or known to have been released or disposed of on the property.

In the event of property transfer, DOE will ensure that DOE's property disposal agent incorporates the LUC objectives and LUCs into restrictive covenant languages in the deeds transferring the property. Each deed will also contain a reservation of access to the property for DOE, EPA, and TDEC, and their respective officials, agents, employees, contractors, and subcontractors for purposes consistent with the FFA. The deed will contain appropriate provisions to ensure the restrictions continue to run with the land and are enforceable by DOE. The deeds shall also include a description of where the LUCs apply and may reference the interim Notice of Land Use Restrictions (see Property Record Notice) that will be recorded in the County Register of Deeds office and the zoning commission. Prior to final agreement on the property transfer and the transfer of fee title from DOE to the transferee, information regarding the environmental use restrictions and LUCs will be communicated in writing to the property owners and to appropriate state and local agencies to ensure such agencies can factor such conditions into their oversight and decision-making activities regarding the property.

## **5.5 LUC VERIFICATION AND REPORTING**

The annual RER will evaluate the status of the LUCs and how any deficiencies or inconsistent uses have been addressed. The annual evaluation will address whether the use restriction and controls referenced above were communicated in the deed(s), whether the owners and state and local agencies were notified of the use restrictions and controls affecting the property, and whether use of the property has conformed to such restrictions and controls.

## **5.6 PROVISIONAL MANAGEMENT OF SLABS**

The demolition of buildings at ETPP under CERCLA does not include removal of the underlying slab. Appendix K of the *Remedial Design Report/Remedial Action Work Plan for Zone 2 Soils, Slabs, and Subsurface Structures, East Tennessee Technology Park, Oak Ridge, Tennessee (Zone 2 RDR/RAWP, DOE/OR/01-2224&D5)* requires provisional management of contaminated slabs that are not remediated immediately and provides a description of the process used to determine how these slabs will be characterized and managed. A remedial action concurrence form is prepared that documents the provisional management requirements of the slab (e.g., inspections, fixative, monitoring, and land use controls) to be implemented while awaiting remediation. The concurrence form is submitted for regulatory approval by the project team within 30 days of the decision that the slab requires remediation and is then included in the RAR CMP (see Appendix E). Provisional management requirements end when the slab is remediated. Additional regulatory approvals are not required for inclusion or removal of provisional slab management requirements in the RAR CMP.

## 6. ENVIRONMENTAL MEDIA MONITORING PLAN

### 6.1 INTRODUCTION

One of the principal goals of the RAR CMP for the ETP administrative watershed is to meet the monitoring requirements specified by the CERCLA decision and primary post-decision documents for completed CERCLA actions in the watershed. Additional monitoring is conducted voluntarily by DOE to obtain baseline data that will be used to assess current trends and to determine performance of future actions, and to collect data in support of the FYR assessment of remedy protectiveness.

The following subsections briefly describe the organization of some of the RAR CMP appendices, that pertain to the monitoring specifics and details of surface water, groundwater, and biological sampling and analytical requirements of the WRRP environmental media monitoring in the ETP administrative watershed. The monitoring data utilized by WRRP is stored in the Oak Ridge Environmental Information System.

### 6.2 ENVIRONMENTAL MONITORING LOCATIONS

Figure A.1 shows the surface water, groundwater, and biological sampling locations for WRRP environmental monitoring in the ETP administrative watershed. Various symbols are used to indicate the different types of sampling media, e.g., a fish symbol indicates a biological monitoring location. Blue-colored symbols are used for all monitoring conducted by the WRRP; red-colored symbols are used for monitoring conducted by other programs on the ORR (e.g., Biological Monitoring and Abatement Program, ETP Environmental Compliance Program). Appendix C tables contain *only* monitoring activities conducted by the WRRP and *not* by other organizations.

### 6.3 PLANNING TABLES – APPENDIX B TABLES

Table B in Appendix B provides a summary of WRRP environmental monitoring activities in the ETP administrative watershed, including specific monitoring locations, media to be sampled (e.g., surface water, groundwater, biological), type of sample (e.g., grab, composite), class of analytes (e.g., VOCs, metals, or radiological), sampling frequency, rationale for sampling (e.g., performance, baseline, FYR), and applicable performance standard, if available. To facilitate cross-referencing, the Appendix B Planning Table also shows the Appendix C Sample Group designation for the WRRP sampling locations in the ETP administrative watershed.

Footnotes included in Table B define and explain table entries, and provide information to sampling personnel and data managers. An asterisk in the Primary Station Name column denotes a high-priority location for full data validation.

### 6.4 ADMINISTRATIVE SAMPLING GROUPS – APPENDIX C TABLES

Appendix C includes the Administrative Sample Groups for the ETP administrative watershed, which are subwatershed-level groups established for the purpose of managing the sampling work conducted by the WRRP. Table C.1 shows groundwater and surface water Administrative Sample Groups and Table C.2 shows Administrative Sample Groups for biological monitoring conducted in the watershed. Monitoring in the ETP administrative watershed that is conducted by other programs is *not* included in the Appendix C tables.

Administrative Sampling Groups typically are based on the proximity of the sampling locations in the field, but other factors also may be used to group sampling locations, such as the necessity of obtaining contemporaneous data to measure remedial performance, or the timing of sampling conducted by other

programs. Biological monitoring has been grouped together into a separate table to better track implementation by a specialized group of trained sampling personnel.

The Appendix C tables also show the specific analyte/parameter group for each sampling point in the ETPP administrative watershed. These analytes/parameters are grouped into Administrative Parameter Groups that are defined in Appendix D tables included in the approved WRRP QAPP noted in Chapter 1 (UCOR-4049). Analytical parameter group definitions have been included in a single QAPP (along with other quality assurance components of the program) because a change in a specified analytical method, detection limit, etc. would necessitate a change to every watershed-specific RAR CMP if all such technical details were included in a combined RAR CMP/QAPP for each administrative watershed.

Each data summary table in Appendix C includes detailed footnotes that provide relevant information to sampling personnel and data managers.

## **7. DOCUMENT CONTROL**

### **7.1 DATA MANAGEMENT**

Monitoring data and meta-data generated by sampling activities in the ETP administrative watershed, together with appropriate historical data required for data analysis and interpretations, are managed using the Project Environmental Measurements System (or equivalent system) and the Oak Ridge Environmental Information System. The Data Management Implementation Plan (UCOR-4160) serves as the project-level plan for managing all data collected by the WRRP and maintaining the integrity of those data. This plan outlines the data management requirements for the program. 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.

### **7.2 CHANGE REQUEST PROCESS**

All modifications to the ETP watershed RAR CMP require an erratum. The instructions for initiating a change request to the RAR CMP are included in Appendix D. The RAR CMP Administrator (or authorized designee) will maintain the Watershed RAR CMP Addenda Log to track and document all changes to the watershed RAR CMP.

## 8. REFERENCES

- DOE/OR/01-1125&D3. *Record of Decision for the K-1407-B/C Ponds at the Oak Ridge K-25 Site, Oak Ridge, Tennessee*, 1993, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-1371&D1. *Remedial Action Report for the K-1407-B Holding Pond and the K-1407-C Retention Basin*, 1995, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-1550&D2. *Action Memorandum for the K-901-A Pond and the K-1007-P1 Pond Removal Action, East Tennessee Technology Park, Oak Ridge, Tennessee*, 1997, U.S. Department of Energy, Environmental Management Program, Oak Ridge, TN.
- DOE/OR/01-1997&D2. *Record of Decision for Interim Actions in Zone 1, East Tennessee Technology Park, Oak Ridge, Tennessee*, 2002, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-2161&D2. *Record of Decision for Soil, Buried Waste, and Subsurface Structure Actions in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee*, 2005, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-2224&D5. *Remedial Design Report/Remedial Action Work Plan for Zone 2, and Subsurface Structures, East Tennessee Technology Park, Oak Ridge, Tennessee*, 2016, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-2294&D2/A2. *Addendum II to the Phased Construction Completion Report for the K-1007 Ponds Area and Powerhouse North Area in Zone 1, East Tennessee Technology Park, Oak Ridge, Tennessee*, 2011, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-2314&D2. *Action Memorandum for the Ponds at the East Tennessee Park, Oak Ridge, Tennessee: K-1007-P Holding Ponds, K-901-A Holding Pond, K-720 Slough, and K-770 Embayment*, 2007, U.S. Department of Energy, Environmental Management Program, Oak Ridge, TN.
- DOE/OR/01-2348&D1. *Phase Construction Completion Report for the K-770 Scrap Removal Project of the Zone 1 Remediation at the East Tennessee Technology Park, Oak Ridge, Tennessee*, 2007, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-2369&D1. *Action Memorandum for Reduction of Hexavalent Chromium Releases into Mitchell Branch at the East Tennessee Technology Park, Oak Ridge, Tennessee*, 2007, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-2448&D1. *Action Memorandum for the Long-Term Reduction of Hexavalent Chromium Releases Into Mitchell Branch at the East Tennessee Technology Park, Oak Ridge, Tennessee*, 2010, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-2456&D1/R1. *Removal Action Report for the Ponds at the East Tennessee Technology Park, Oak Ridge, Tennessee: K-1007-P Holding Ponds, K-901-A Holding Pond, K-720 Slough, and K-770 Embayment*, 2011, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-2505&D2. *2011 Remediation Effectiveness Report for the U.S. Department of Energy Oak Ridge Reservation, Oak Ridge, Tennessee*, 2011, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

- DOE/OR/01-2594&D2. *2013 Remediation Effectiveness Report for the U.S. Department of Energy Oak Ridge Reservation, Oak Ridge, Tennessee*, 2013, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR/01-2598&D2. *Removal Action Report for the Long-Term Reduction of Hexavalent Chromium Releases into Mitchell Branch at the East Tennessee Technology Park, Oak Ridge, Tennessee*, 2013, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE/OR-1014. *Federal Facility Agreement for the Oak Ridge Reservation*, 1992, U.S. Department of Energy, U.S. Environmental Protection Agency Region 4, and Tennessee Department of Environment and Conservation, Washington, D.C. (The Federal Facility Agreement is available online at [http://www.ucor.com/ettp\\_ffa\\_appendices.html](http://www.ucor.com/ettp_ffa_appendices.html)).
- McCoy, R. Doug, August 16, 1995. Tennessee Department of Environment and Conservation, DOE Oversight Division, Oak Ridge, TN, letter to W. Nelson Lingle, U.S. Department of Energy, Environmental Restoration Division, Oak Ridge, TN.
- NRC 2002. *Environmental Cleanup at Navy Facilities: Adaptive Site Management*, National Academy Press, Washington, D.C.
- UCOR-4049. *Quality Assurance Project Plan for the Water Resources Restoration Program, U.S. Department of Energy, Oak Ridge Reservation, Oak Ridge, Tennessee*, latest revision, URS | CH2M Oak Ridge LLC, Oak Ridge, TN.
- UCOR-4160. *Data Management Implementation Plan for the Water Resources Restoration Program, Oak Ridge, Tennessee*, latest revision, URS | CH2M Oak Ridge LLC, Oak Ridge, TN.
- Weeks, Victor L., August 3, 1995. U.S. Environmental Protection Agency, Atlanta, GA, letter to W. Nelson Lingle, U.S. Department of Energy, Environmental Restoration Division, Oak Ridge, TN.

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**APPENDIX A.  
MONITORING LOCATIONS**

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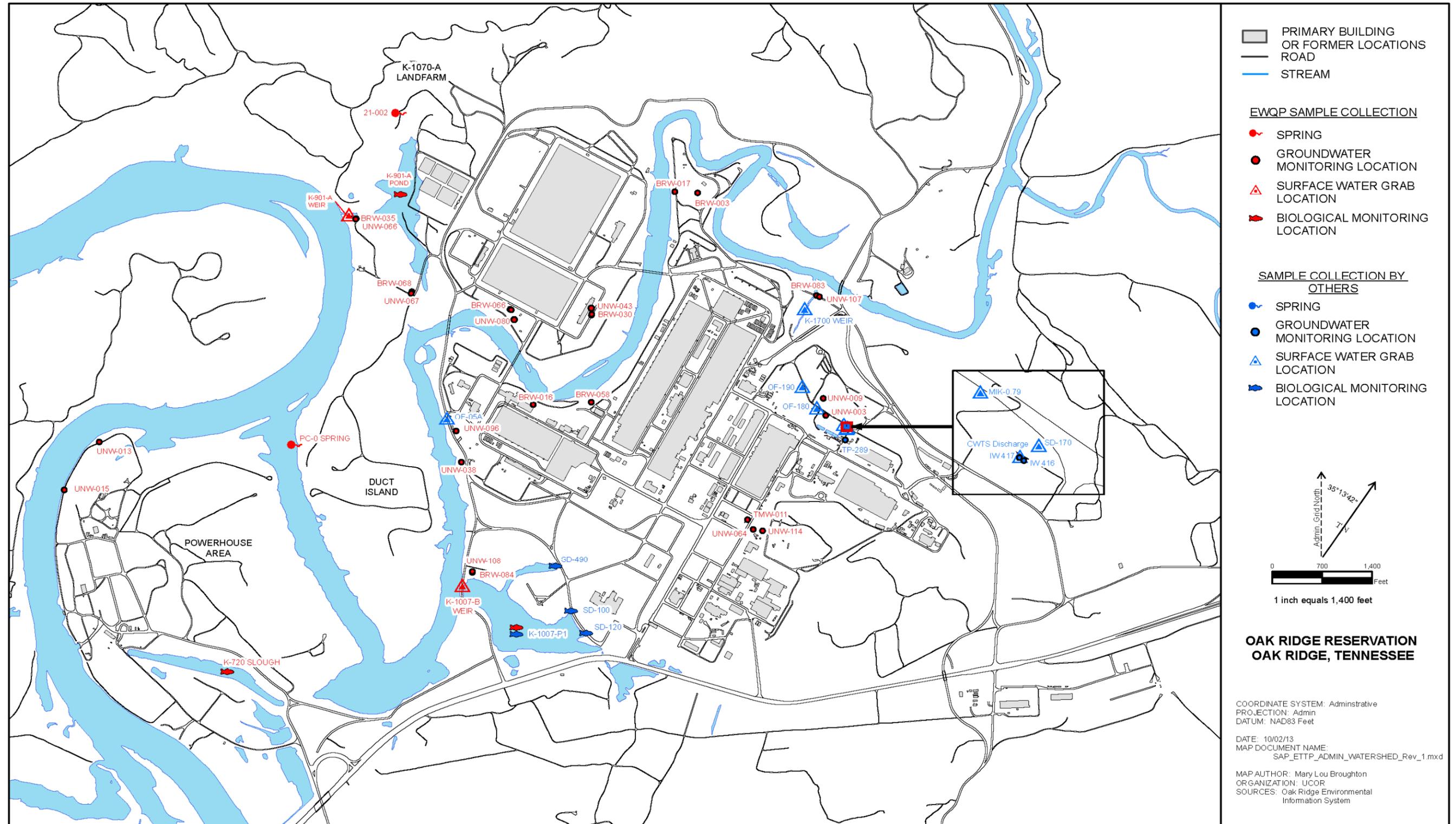


Figure A.1. Water Resources Restoration Program surface water, groundwater, and biological monitoring locations in the East Tennessee Technology Park (ETTP) administrative watershed.

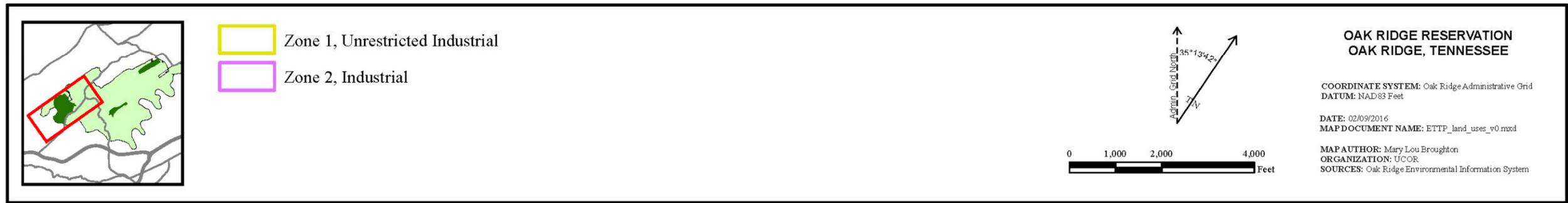


Figure A.2. ETTP administrative watershed areas affected by land use controls (LUCs).

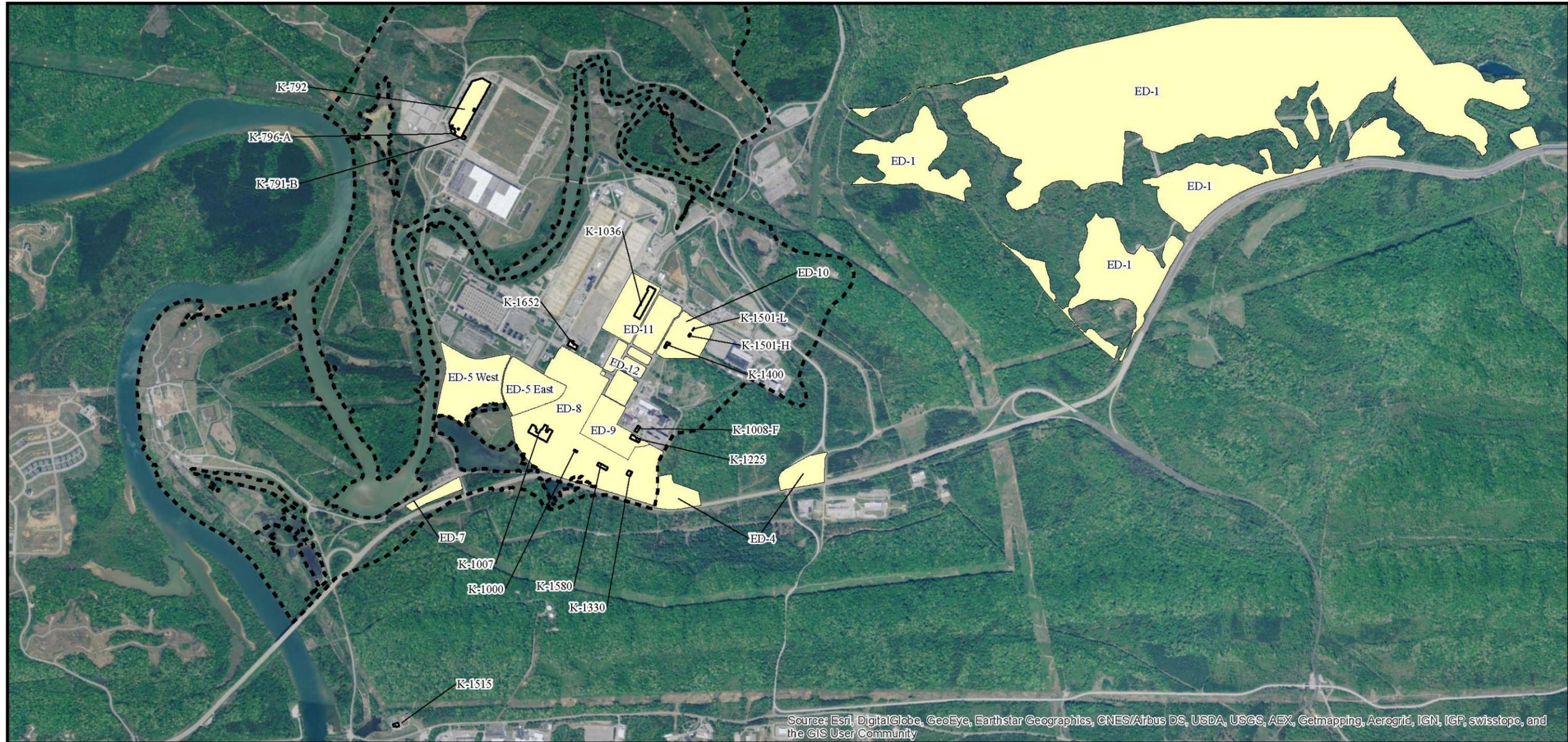


Figure A.3. ETPP administrative watershed transferred areas affected by LUCs.

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**APPENDIX B**  
**PLANNING TABLES**

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**Table B. Sample locations and parameters for the ETP Administrative Watershed**

Sample location	Primary station name*	Monitoring rationale <sup>a</sup>	Performance standard	Sample medium <sup>b</sup>	Sample Type <sup>c</sup>	Appendix C Sample Group <sup>d</sup>	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC <sup>e</sup>	Miscellaneous <sup>f</sup>	Biological Monitoring <sup>g</sup>	Flow/precipitation <sup>h</sup>	Sampling program <sup>i</sup>	Sampling frequency <sup>j</sup>	Comments
<b>K-1070-A Burial Ground</b>																		
21-002 spring	21-002*	BASE	Trend	G	G	ETTP-6	2				2	2			I	EWQP	Q2, Q4	Performance assessment: K-1070-A Burial Ground
<b>K-901-A Holding Pond</b>																		
BRW-035	BRW-035	BASE	Trend	G	G	ETTP-1	2				2	2				EWQP	Q2, Q4	Exit pathway: discharge to Clinch River/Poplar Creek
BRW-068	BRW-068*	BASE		G	G	ETTP-1	2				2	2				EWQP	Q2, Q4	
UNW-066	UNW-066	BASE		G	G	ETTP-1	2				2	2				EWQP	Q2, Q4	
UNW-067	UNW-067	BASE		G	G	ETTP-1	2				2	2				EWQP	Q2, Q4	
K-901-A Pond	K-901-A POND	PERF	≤1 ppm PCBs in fillets human health; ≤2.3 ppm PCBs whole body ecological risk	B	NA	ETTP-13								2		EWQP	Q2	Bioaccumulation of PCBs in largemouth bass (~20 individual fillets) for human health risk evaluation (≤1 ppm) and gizzard shad (6-10 composited whole body) for ecological risk evaluation (≤2.3 ppm) to assess remedy performance.
K-901-A Pond	K-901A WEIR*	BASE	Trend	S	G	ETTP-6	2	2	2		2	2			I	EWQP	Q2, Q4*	Exit pathway monitoring
K-901-A Pond	K-901A WEIR*	FYR	AWQC, risk based	S	G	ETTP-FYR1	2	2	2			2	2		I	EWQP	Q2, Q4 FYR	AWQC assessment of exit pathway
<b>K-1007-P1 Holding Pond</b>																		
K-1007-P1 Pond	BRW-084	BASE	Trend	G	G	ETTP-1	2	2	2		2	2				EWQP	Q2, Q4	Exit pathway monitoring to Poplar Creek from the K-1007-P1 Holding Pond area
K-1007-P1 Pond	UNW-108	BASE		G	G	ETTP-1	2	2	2		2	2				EWQP	Q2, Q4	
K-1007-P1 Pond	K-1007-B WEIR*	BASE		S	G	ETTP-6	2	2	2		2	2			I	EWQP	Q2, Q4*	
K-1007-P1 Pond	K-1007-B WEIR*	FYR	AWQC, risk based	S	G	ETTP-FYR1	2	2	2			2	2		I	EWQP	Q2, Q4 FYR	FYR AWQC assessment monitoring of exit pathway from the K-1007-P1 Holding Pond area
K-1007-P1 Pond	K-1007-P1	OPER	Trend	B	NA	NA								1		BMAP	Q3	Bioaccumulation of PCBs in caged clams at pond outlet to assess post-action performance.
K-1007-P1 Pond	K-1007-P1	PERF	≤1 ppm PCBs in fillets human health; ≤2.3 ppm PCBs whole body ecological risk	B	NA	ETTP-13								2		EWQP	Q2	Bioaccumulation of PCBs in bluegill sunfish [~20 individual fillets for human health risk (≤1 ppm) and 6 composites of ~10 each whole body for ecological risk (≤2.3 ppm) evaluation] to assess remedy performance.

**Table B. Sample locations and parameters for the ETP Administrative Watershed (cont.)**

Sample location	Primary station name*	Monitoring rationale <sup>a</sup>	Performance standard	Sample medium <sup>b</sup>	Sample Type <sup>c</sup>	Appendix C Sample Group <sup>d</sup>	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC <sup>e</sup>	Miscellaneous <sup>f</sup>	Biological Monitoring <sup>g</sup>	Flow/precipitation <sup>h</sup>	Sampling program <sup>i</sup>	Sampling frequency <sup>j</sup>	Comments
K-1007-P1 Pond	K-1007-P1	PERF	Trend	B	SV	ETTP-13								1		EWQP	Q2	Fish species diversity and density to evaluate removal action performance.
K-1007-P1 Pond	K-1007-P1	OPER	Trend	B	SV	ETTP-10								2		EWQP	Q3/Q4	Plant community survey (operational monitoring)
K-1007-P1 Pond	K-1007-P1	OPER	Trend	B	SV	ETTP-14								12		EWQP	M	Wildlife survey (operational monitoring)
K-1007-P1 Pond	K-1007-P1	OPER	Trend	B	NA	ETTP-10							27	27		EWQP	Q3/Q4	Water quality surveys along 3 transects that includes 3 sample locations per transect. Each transect will be surveyed 3 times during the growing season (Q3/Q4), April through August (operational monitoring).
K-1007-P1 Pond	SD-100	OPER	Trend	B	NA	NA								1		BMAP	Q3	Bioaccumulation of PCBs in caged clams to assess post-action performance
K-1007-P1 Pond	SD-120	OPER		B	NA	NA								1		BMAP	Q3	
K-1007-P1 Pond	SD-490	OPER		B	NA	NA								1		BMAP	Q3	
<b>K-720 Slough</b>																		
K-720 Slough	K-720 Slough	PERF	≤1 ppm PCBs in fillets human health; ≤2.3 ppm PCBs whole body ecological risk	B	NA	ETTP-13								2		EWQP	Q2	Bioaccumulation of PCBs in largemouth bass (20 individual fillets) for human health risk assessment (≤1 ppm) and gizzard shad (6-10 composited whole body) for ecological risk evaluation (≤2.3 ppm) to assess performance.

**Table B. Sample locations and parameters for the ETP Administrative Watershed (cont.)**

Sample location	Primary station name*	Monitoring rationale <sup>a</sup>	Performance standard	Sample medium <sup>b</sup>	Sample Type <sup>c</sup>	Appendix C Sample Group <sup>d</sup>	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC <sup>e</sup>	Miscellaneous <sup>f</sup>	Biological Monitoring <sup>g</sup>	Flow/precipitation <sup>h</sup>	Sampling program <sup>i</sup>	Sampling frequency <sup>j</sup>	Comments
<b>Long-Term Reduction of Hexavalent Chromium Releases to Mitchell Branch</b>																		
MIK-0.79	MIK-0.79	PERF	≤0.011 mg/L Cr <sup>6+</sup> for protection of fish and aquatic life will be maintained at MIK 0.79 point of compliance	S	G	NA			4							EC	Q1-Q4	Performance assessment of hexavalent chromium removal action
SD-170	SD-170	TREND		S	G	NA			4							EC	Q1-Q4	
TP-289	TP-289	TREND		G	G	NA			4							EC	Q1-Q4	
Collection System Wells	IW-416/TW-417 Combined Influent	TREND		G	G	NA			4							EC	Q1-Q4	
Chromium Water Treatment System	CWTS Discharge	PERF	S	C	NA			4		4				C*	ETTP S&M	Q1-Q4		
Chromium Water Treatment System	CWTS Discharge	PERF	S	G	NA	4		4				4			ETTP S&M	Q1-Q4		
<b>Mitchell Branch</b>																		
MBA	UNW-107	BASE	Trend	G	G	ETTP-2	2		2		2					EWQP	Q2, Q4	Exit pathway: direct discharge to Poplar Creek
MBA	BRW-083	BASE		G	G	ETTP-2	2		2		2					EWQP	Q2, Q4	
<b>Mitchell Branch South Bank</b>																		
MBA	UNW-003*	PERF	Trend; performance criteria not established	G	G	ETTP-2	2		2	2	2		2			EWQP	Q2, Q4	Performance assessment: K-1407-B and C Ponds
MBA	UNW-009	PERF		G	G	ETTP-2	2		2	2	2		2			EWQP	Q2, Q4	
MBA	K1700 WEIR	PERF/ BASE		S	G	NA	4		4	4	4		4			EC	Q1-Q4*	
MBA	K1700 WEIR*	FYR	AWQC, risk based	S	G	ETTP-FYR1	2	2	2			2	2		I	EWQP	Q2, Q4 FYR	FYR AWQC assessment at exit pathways
MBA	SD-180	BASE	Trend	S	G	NA			4							EC	Q1-Q4	Potential mercury releases from legacy sources to Mitchell Branch.
MBA	SD-190	BASE		S	G	NA			4							EC	Q1-Q4	

**Table B. Sample locations and parameters for the ETP Administrative Watershed (cont.)**

Sample location	Primary station name*	Monitoring rationale <sup>a</sup>	Performance standard	Sample medium <sup>b</sup>	Sample Type <sup>c</sup>	Appendix C Sample Group <sup>d</sup>	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC <sup>e</sup>	Miscellaneous <sup>f</sup>	Biological Monitoring <sup>g</sup>	Flow/precipitation <sup>h</sup>	Sampling program <sup>i</sup>	Sampling frequency <sup>j</sup>	Comments
<b>K-1070-C/D Area</b>																		
K1070CDN	TMW-011	PERF	Drinking water MCLs	G	G	ETTP-3	2						2			EWQP	Q2, Q4	Interior and performance monitoring: K-1070-D area plume Performance assessment: K-1070-C/D G-Pit
K1070CDN	UNW-064	PERF		G	G	ETTP-3	2						2			EWQP	Q2, Q4	
K1070CDN	UNW-114	PERF		G	G	ETTP-3	2						2			EWQP	Q2, Q4	
<b>K-1064 Peninsula Area</b>																		
K-1064	BRW-003	BASE	Trend	G	G	ETTP-5	2						2			EWQP	Q2, Q4	Exit pathway: direct discharge to Poplar Creek
K-1064	BRW-017	BASE		G	G	ETTP-5	2						2			EWQP	Q2, Q4	
<b>K-27/29 Area</b>																		
K-27/29 Area	BRW-016	BASE	Trend	G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	Exit pathway: direct discharge to Poplar Creek
K-27/29 Area	UNW-038	BASE		G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	
K-27/29 Area	UNW-096	BASE		G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	
K-25/29 Area	OF-05A	BASE	Trend	S	G	NA			4							EC	Q1-Q4	Monitor direct discharge of mercury to Poplar Creek from subwatershed that primarily includes the inactive K-1203 sewage treatment plant.
<b>K-1413 Area</b>																		
K-25	BRW-058	BASE	Trend	G	G	ETTP-5	2						2			EWQP	Q2, Q4	Exit pathway: direct discharge to Poplar Creek
<b>K-770</b>																		
K-770	UNW-013	BASE	Trend	G	G	ETTP-5					2		2			EWQP	Q2, Q4	Exit pathway: direct discharge to Clinch River
K-770	UNW-015	BASE		G	G	ETTP-5					2		2			EWQP	Q2, Q4	
<b>K-1070-F</b>																		
K-1070-F	PC-0 SPRING	BASE	Trend	G	G	ETTP-8	1				1		1		I	EWQP	Q2	Exit pathway - direct discharge to Poplar Creek; monitor possible source of contamination K-1070-F

**Table B. Sample locations and parameters for the ETP Administrative Watershed (cont.)**

Sample location	Primary station name*	Monitoring rationale <sup>a</sup>	Performance standard	Sample medium <sup>b</sup>	Sample Type <sup>c</sup>	Appendix C Sample Group <sup>d</sup>	VOCs	PCBs/SVOCs	Metals	Anions	Radiological	AWQC <sup>e</sup>	Miscellaneous <sup>f</sup>	Biological Monitoring <sup>g</sup>	Flow/precipitation <sup>h</sup>	Sampling program <sup>i</sup>	Sampling frequency <sup>j</sup>	Comments
<i>K-31/K-33 Area</i>																		
K-31	UNW-080*	BASE	Trend	G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	Exit pathway - direct discharge to Poplar Creek
K-31	BRW-066	BASE		G	G	ETTP-5	2		2				2			EWQP	Q2, Q4	
K-31/K-33 Area	UNW-043	BASE		G	G	ETTP-5			2				2			EWQP	Q2, Q4	Interior monitoring of residual chromium contamination
K-31/K-33 Area	BRW-030	BASE		G	G	ETTP-5			2				2			EWQP	Q2, Q4	



**APPENDIX C**  
**ADMINISTRATIVE SAMPLE GROUP TABLES**

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**Table C.1. Sample groups for the ETTP Administrative Watershed**

Sample group <sup>a</sup>	Location <sup>b</sup>	Sampling point <sup>b</sup>	Monitoring Frequency <sup>c</sup>	Matrix <sup>d</sup>	Sample Type <sup>e</sup>	Flow/Precip <sup>f</sup>	Dup <sup>g</sup>	Analyte/parameter group <sup>h</sup>
ETTP-1	K-901-A Pond	UNW-067	Q2, Q4	WG	G		X	FLD(1), VOC(1), ALPHA(1), BETA
	K-901-A Pond	BRW-068*		WG	G			FLD(1), VOC(1), ALPHA(1), BETA
	K-901-A Pond	UNW-066		WG	G			FLD(1), VOC(1), ALPHA(1), BETA
	K-901-A Pond	BRW-035		WG	G			FLD(1), VOC(1), ALPHA(1), BETA
	K-1007-P1 Pond	BRW-084		WG	G			FLD(1), VOC(1), MET(1+F), ALPHA(1), BETA, PCB
	K-1007-P1 Pond	UNW-108		WG	G			FLD(1), VOC(1), MET(1+F), ALPHA(1), BETA, PCB
ETTP-2	MBA	UNW-003*	Q2, Q4	WG	G		X	FLD(1), MET(1+F), ION(2), VOC(1), ALPHA(1), BETA, GAMMA(1), SR(1), TC, TH, U
	MBA	UNW-009		WG	G			FLD(1), MET(1+F), ION(2), VOC(1), ALPHA(1), BETA, GAMMA(1), SR(1), TC, TH, U
	MBA	BRW-083		WG	G			FLD(1), VOC(1), MET(1+F), MET(4), ALPHA(1), BETA
	MBA	UNW-107		WG	G			FLD(1), VOC(1), MET(1+F), MET(4), ALPHA(1), BETA
ETTP-3	K1070CDN	TMW-011	Q2, Q4	WG	G			FLD(1), VOC(1)
	K1070CDN	UNW-064		WG	G			FLD(1), VOC(1)
	K1070CDN	UNW-114		WG	G			FLD(1), VOC(1)
ETTP-5	K-31	BRW-066	Q2, Q4	WG	G		X	FLD(1), MET(1+F), VOC(1)
	K-31	UNW-080*		WG	G			FLD(1), MET(1+F), VOC(1)
	K-31/33	UNW-043		WG	G			FLD(1), MET(1+F)
	K-31/33	BRW-030		WG	G			FLD(1), MET(1+F)
	K-770	UNW-013		WG	G			FLD(1), ALPHA(1), BETA
	K-770	UNW-015		WG	G			FLD(1), ALPHA(1), BETA
	K-1064	BRW-003		WG	G			FLD(1), VOC(1)
	K-1064	BRW-017		WG	G			FLD(1), VOC(1)
	K-27/29	UNW-038		WG	G			FLD(1), VOC(1), MET(1+F)
	K-27/29	UNW-096		WG	G			FLD(1), VOC(1), MET(1+F)
	K-27/29	BRW-016		WG	G			FLD(1), VOC(1), MET(1+F)
K-25	BRW-058	WG	G	FLD(1), VOC(1)				
ETTP-6	K1070A	21-002 Spring*	Q2, Q4	WG	G			FLD(1), VOC(1), ALPHA(1), BETA
	K-901-A Pond	K-901A Weir*		WS	G			FLD(1), VOC(1), MET(1), ALPHA(1), BETA, PCB
	K-1007-P1 Pond	K-1007-B Weir*		WS	G			FLD(1), VOC(1), MET(1), ALPHA(1), BETA, PCB
ETTP-8	K-1070-F	PCO SPRING	Q2	WG	G			FLD(1), VOC(1), ALPHA(1), BETA

**Table C.1. Sample groups for the ETTP Administrative Watershed**

**Notes for ETTP:** Sampling point<sup>b</sup>

**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	MBA = Mitchell Branch South Bank Area
K1070A = K-1070-A Burial Ground	TMW = Temporary monitoring well
K1070CDN = K-1070-C/D Area North	UNW = Unconsolidated interval monitoring well

**c Monitoring Frequency**

Q\_ = Quarter of the FY (e.g., Q1, Q2, Q3, Q4)

**d Matrix**

WG = Groundwater  
WS = Surface water

**e Sample Type**

G = grab sample

**f Flow/Precipitation**

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

**g Duplicate**

X = field duplicate sample collected

**h Analyte/Parame**

See T

\* NOTE: For the AWQC parameter group, DO NOT include PCB aroclors, total PCBs, Dioxins, Furans, or cyanide analyses from the AWQC Parameter Group Table 28.

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.

MET( \_+F) = Indicates that both a filtered and an unfiltered sample are obtained by the sampling personnel for the designated metals analysis to be performed by the laboratory. Otherwise, only an unfiltered sample is obtained and analyzed for metals.

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

AWQC = ambient water quality criteria  
BRW = bedrock well  
ETTP = East Tennessee Technology Park  
FY = fiscal year  
PCB = polychlorinated biphenyls  
UNW = unconsolidated well

**Table C.2. Sample groups for biological monitoring conducted in the ETP Administrative Watershed**

Sample group <sup>a</sup>	Location <sup>b</sup>	Sampling point <sup>b</sup>	Monitoring frequency <sup>c</sup>	Matrix <sup>d</sup>	Sample type <sup>e</sup>	Dup <sup>f</sup>	Analyte/parameter group <sup>g</sup>
ETTP-10	K-1007-P1 Pond	K-1007-P1	Q3/Q4	VEG	SV		Plant community survey (4 locations, twice/year during growing season)
	K-1007-P1 Pond	K-1007-P1		WS	G/SV		Water quality survey at 3 locations in 3 transects for 3 sample events during growing season April through August: TSS, pH, conductivity, temperature, DO, secchi depth at all 9 locations each event; nutrients (total phosphorus, ammonia-nitrogen, nitrate/nitrite nitrogen), and chlorophyll <i>a</i> at all but 3 locations each event
ETTP-13	K-901-A Pond	K-901-A Pond	Q2	LMB	F	X	B-PCB, LIPIDS
	K-901-A Pond	K-901-A Pond		SH	C		B-PCB, LIPIDS
	K-1007-P1 Pond	K-1007-P1		BG	F	X	B-PCB, LIPIDS
	K-1007-P1 Pond	K-1007-P1		BG	C		B-PCB, LIPIDS
	K-1007-P1 Pond	K-1007-P1		B	SV		FISH
	K-720 Slough	K-720 Slough		LMB	F	X	B-PCB, LIPIDS
K-720 Slough	K-720 Slough	SH	C		B-PCB, LIPIDS		
ETTP-14	K-1007-P1 Pond	K-1007-P1	M	WLD	SV		Wildlife survey - monthly identification and enumeration of all waterfowl in and around pond, including presence/absence of nuisance wildlife for control efforts (operational monitoring)

**Table C.2. Sample groups for biological monitoring conducted in the ETPP Administrative Watershed**

**Notes for Table C.2, Biological Monitoring:**

**a Sample Group:**

ETTP = East Tennessee Technology Park Administrative Watershed sample group

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

**b Location and Sampling Point** - self explanatory

**c Monitoring Frequency:** Q\_ = quarter(s) of the FY M = monthly

**d Matrix:** B = biological VEG = plant community  
BG = bluegill sunfish WLD = wildlife  
LMB = largemouth bass WS = surface water  
SH = gizzard shad

NOTE: Species listed are target organisms for sampling. Surrogate species may need to be collected to complete the collection, depending on target sample availability.

**e Sample Type:**

SV = survey G = grab C = whole body composite F = fillet

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

**g Analyte/parameter Group:** See Table D.1 of the Quality Assurance Project Plan (UCOR-4049) for a list of parameter groups and analytes

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

DO = dissolved oxygen

ETTP = East Tennessee Technology Park

FY = fiscal year

PCB = polychlorinated biphenyl

TSS = total suspended solids

**Table C.3. Sample groups for monitoring conducted in support of the CERCLA FYR in the ETPP Administrative Watershed**

Sample group <sup>a</sup>	Location <sup>b</sup>	Sampling point <sup>b</sup>	Monitoring Frequency <sup>c</sup>	Matrix <sup>d</sup>	Sample Type <sup>e</sup>	Flow/Precip <sup>f</sup>	Dup <sup>g</sup>	Analyte/parameter group <sup>h</sup>
ETTP-FYR1	K-901-A Pond	K-901-A Weir <sup>*</sup>	Q2, Q4	WS	G	I		FLD(1), MET(1,4+F), VOC(1), SVOC, AWQC <sup>*</sup>
	K-1007-P1 Pond	K-1007-B Weir <sup>*</sup>		WS	G	I	X	FLD(1), MET(1,4+F), VOC(1), SVOC, AWQC <sup>*</sup>
	MBA	K-1700 Weir <sup>*</sup>		WS	G	I		FLD(1), MET(1,4+F), VOC(1), SVOC, AWQC <sup>*</sup>

**Table C.3. Sample groups for monitoring conducted in support of the CERCLA FYR in the ETP Administrative Watershed (cont.)**

**Notes for Table C.3, FYR Monitoring:**

**a Sample Group:**

ETTP = East Tennessee Technology Park Administrative Watershed sample group

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

**b Location and Sampling Point:**

MBA = Mitchell Branch South Bank Area

**c Monitoring Frequency:**

Q\_ = quarter(s) of the fiscal year

**d Matrix:**

WS = surface water

**e Sample Type:**

G = grab sample

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

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

**h Analyte/parameter Group:**

See Table D.1 of the Quality Assurance Project Plan (UCOR-4049) for a list of parameter groups and analytes.

**\* NOTE: For the AWQC parameter group, DO NOT include PCB aroclors, total PCBs, Dioxins, Furans, or cyanide analyses from the AWQC Parameter Group Table 28.**

MET(\_+F) = Indicates that both a filtered and an unfiltered sample are to be obtained by the sampling personnel for the designated metals analysis to be performed by the laboratory. Otherwise, only an unfiltered sample is obtained and analyzed for metals.

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

AWQC = ambient water quality criteria

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980

ETTP = East Tennessee Technology Park

FYR = Five Year Review

MET = metals

PCB = polychlorinated biphenyls

**APPENDIX D**  
**CHANGE REQUEST PROCESS FOR THE**  
**ADMINISTRATIVE WATERSHED**  
**COMPREHENSIVE MONITORING PLAN**

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**INSTRUCTIONS FOR INITIATING A CHANGE  
TO LONG-TERM STEWARDSHIP REQUIREMENTS  
INCLUDED IN THE WATER RESOURCES RESTORATION PROGRAM  
WATERSHED-SPECIFIC COMPREHENSIVE MONITORING PLAN**

The following delineates the Federal Facility Agreement (FFA) process for the documentation and approval of changes to long-term stewardship (LTS) requirements of the completed Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) actions that have been prescribed in decision documents or primary post-decision documents (e.g., Remedial Action Reports [RARs] or Phased Construction Completion Reports) and consolidated in watershed-specific Comprehensive Monitoring Plans (CMPs). Because most of the remediation decisions do not allow unrestricted end use, these sites will require LTS, which is the set of activities necessary to protect human health and the environment from physical hazards, residual contamination, and wastes remaining following remediation. LTS maintains the protectiveness of and ensures the integrity of the remedy, consisting of engineering controls (e.g., caps, treatment facilities, etc.) and land-use controls (LUCs; e.g., fences, signs, access controls, etc.) for an extended, or possibly indefinite, period of time until residual hazards are reduced sufficiently to permit unrestricted and unlimited access. The integrity of the remedy is ensured through operations, inspection, surveillance, monitoring, maintenance, and evaluation. Together, these controls are the set of activities that ensures that the remedy functions properly and remains protective.

The decision/post-decision document in which the LTS requirement was initiated will have a pointer to the watershed-specific RAR CMP where all LTS changes are henceforward made. These changes may be initiated in response to on-going, real-time data evaluations on and off the Oak Ridge Reservation or in response to recommendations provided in the annual Remediation Effectiveness Report or CERCLA Five-Year Review. The process described herein follows the Federal Facility Agreement protocol presented in Subsection XXI.J *Subsequent Modification of Final Reports* and results in an erratum to the watershed-specific RAR CMP that is approved by all parties to the FFA.

### **1.0 RAR CMP ERRATUM**

When a change in a LTS requirement is identified, the watershed RAR CMP Administrator (Water Resources Restoration Program [WRRP] personnel) is notified to initiate a RAR CMP erratum (see Figure D-1). The RAR CMP Administrator prepares a summary of the change that adequately describes the change and includes a technical justification of sufficient detail that enables reviewers to make an informed decision. This summary is transmitted informally to the FFA Project Managers (PMs) and/or Project Team members via e-mail to determine whether the change will be openly and/or partially received before additional effort is expended to prepare a formal transmittal package with a detailed technical justification, red-lined RAR CMP change pages, etc.

The FFA PMs and/or Project Team members (i.e., regulatory agencies) review the summary and respond (i.e., approve, reject) within 30 days, sending comments or requesting a formal meeting to discuss the change. If there is interest in the proposed summary change request, a RAR CMP erratum is prepared (Figure D-2) providing the necessary technical justification, reviewed by the appropriate classification office for public release, and a formal request is transmitted to the FFA PMs for approval along with red-lined primary document and RAR CMP change-pages attached and a draft watershed-specific erratum log (Figure D-3). The erratum is assigned a number that reflects (1) the fiscal year in which the erratum is issued, (2) the applicable watershed, and (3) a sequential number.

The first time that a change impacts a requirement of a particular CERCLA Record of Decision (ROD) or finalized post-decision remediation document, a pointer will be placed in the relevant document(s) to direct the interested party to the watershed-specific RAR CMP for all watershed requirements and/or changes

henceforth. In the case of a CERCLA ROD, this pointer to the watershed-specific RAR CMP will be treated as a Non-Significant Change (NSC) to the CERCLA decision document and any changed text will be shaded, as appropriate. The WRRP will prepare this documentation for the Administrative Record (AR) Coordinator to place in the appropriate records (see below). After this pointer has been placed in the CERCLA decision/post-decision document that initially identified the LTS requirements, it is not anticipated that additional changes will be required to the finalized primary document and all future revisions to the finalized primary document requirements will be implemented through the watershed-specific RAR CMP using the change process described herein.

## **2.0 RAR CMP ERRATA LOG**

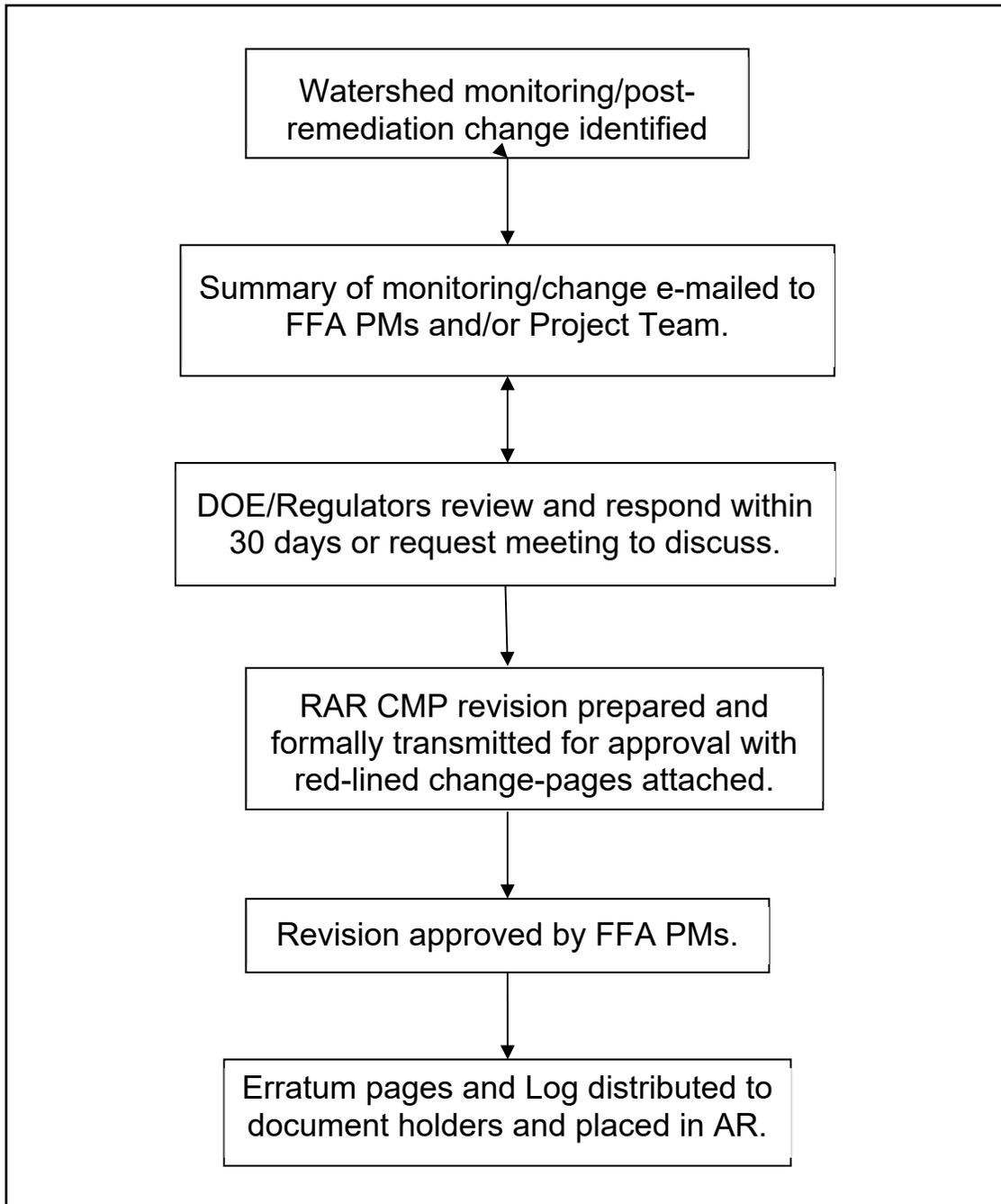
Once the formal RAR CMP erratum is approved by the U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), and Tennessee Department of Environment and Conservation (TDEC), the RAR CMP Errata Log for the applicable watershed is updated by inserting the approval dates into the appropriate column next to the applicable RAR CMP erratum number. The Log serves to document the change, approval dates, and all relevant information associated with the change, including the identification of the primary documents that initially included the requirements for monitoring (which now have a pointer to the watershed-specific RAR CMP) that are part of the AR.

## **3.0 FINAL DISTRIBUTION OF ERRATUM AND LOG**

After approval, the final RAR CMP change pages, with red-lines removed, are distributed to the appropriate watershed RAR CMP holders, along with the updated RAR CMP Errata Log. The erratum number is placed in the footer of each change page to document the change.

## **4.0 AR**

The AR Coordinator is alerted that a change to a CERCLA AR is forthcoming when a letter request for approval of a LTS/LUC change is sent from the DOE to the EPA and TDEC, and both of the approval letters from these regulatory agencies are received by the DOE. The formal letter request for a RAR CMP revision will contain the RAR CMP Errata Log and the erratum, itself, both of which listing the relevant primary documents impacted by the approved erratum and, therefore, identifying the AR. The RAR CMP Administrator provides the AR Coordinator with the documentation for changing the AR: (1) the pointer for the primary document(s) that initially contained the LTS/LUC requirement, as outlined in Section 1.0 (third paragraph), (2) as well as the changed pages to the watershed RAR CMP and a copy of the updated RAR CMP Errata Log, itself. In the case of a closed ROD, the AR Coordinator will “open” the AR and the change will be treated as a NSC to the ROD. An updated final index will be submitted when this is completed.



**Figure D-1. Pathway to watershed RAR CMP changes.**

**WATERSHED COMPREHENSIVE MONITORING PLAN (CMP)  
CHANGE FORM**

**CMP ERRATUM NUMBER:**     FY14-XXX-01          **EFFECTIVE DATE:** \_\_\_\_\_

Watershed affected by change:	<input type="checkbox"/> Melton Valley	<input type="checkbox"/> Bethel Valley
	<input type="checkbox"/> EFPC	<input type="checkbox"/> Bear Creek Valley
	<input type="checkbox"/> ETPP	<input type="checkbox"/> LWBR/CR/PC
	<input type="checkbox"/> N/A	<input type="checkbox"/> Chestnut Ridge

<b>DOCUMENT NO. OF WATERSHED CMP AFFECTED BY CHANGE:</b> _____
<b>PRIMARY DOCUMENT(S) SUPERSEDED BY THIS WATERSHED CMP:</b> _____
_____
_____
_____

<b>Sampling Rationale:</b>	<input type="checkbox"/> CERCLA performance	<input type="checkbox"/> Five-Year Review
	<input type="checkbox"/> CERCLA baseline	<input type="checkbox"/> Other _____
	<input type="checkbox"/> N/A	_____

<b>Description of Change:</b>
-------------------------------

<b>Reason for Change(s):</b>  <p style="text-align: center;">(Include rationale for change as <i>Attachment</i>, if necessary).</p> <p style="text-align: center;">(Include red-lined change pages as <i>Attachment</i>).</p>
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**Figure D-2. FFA Subsection XXI.J primary document erratum form.**

RAR CMP Document Number	RAR CMP Erratum Number	Regulatory Approval Dates	Description of Change
DOE/OR/01-2477&D1	FY13-ETTP-01	EPA: 19SEP13 TDEC: 30SEP13	<p>Eliminated requirement for monitoring of the SW31 Spring. The seep/spring no longer exists and the source of the contamination (G-Pit) has been removed. Wells monitoring the source area are a more effective method of monitoring contaminant transport than the storm catch basin downgradient from the original spring, as the catch basin receives waters from multiple areas.</p> <p>The <i>Addendum to the Remedial Action/Effectiveness Report for the K-1070 Operable Unit SW31 Spring Phase 2 Remedial Action at the Oak Ridge K-25 Site, Oak ridge, Tennessee</i> (DOE/OR/01-1520&amp;D1/R1/A1) was modified with language that pointed to this RAR CMP for elimination of the spring monitoring and any future monitoring, and the Administrative Record has been revised.</p>

Figure D-3. Example watershed-specific RAR CMP errata log.

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**APPENDIX E**  
**LAND USE CONTROLS FOR EAST TENNESSEE TECHNOLOGY PARK**  
**ADMINISTRATIVE WATERSHED**

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**Table E.1. LUCs for ETTP**

Type of control	Duration	Implementation	Affected areas <sup>a</sup>	Verification frequency
1. Property Record Restrictions A. Land use B. Groundwater	Until the concentrations of hazardous substances are at such levels to allow for UU/UE; CERCLA groundwater use prohibitions are in place until the final decision is made on groundwater	Implemented by DOE upon transfer of affected areas. Recorded by DOE in accordance with state law at County Register of Deeds office	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions: A. ED-1, K-1330, K-1007, K-1580, K-1225, K-1400, K-1036, ED-5 East, K-1652, ED-7, K-1515, ED-5 West, K-1000, K-1501-H and L, ED-4, K-1008-F, ED-8, K-792/K-791-B/K-796-A, ED-9, ED-10, ED-11, ED-12 B. ED-1, ED-5 East, ED-7, ED-5 West, ED-8, ED-9, ED-10, ED-11, ED-12	Five years
2. Property Record Notices	Until the concentrations of hazardous substances are at such levels to allow for UU/UE; CERCLA groundwater use prohibitions are in place until the final decision is made on groundwater	Notice recorded by DOE in accordance with state law at County Register of Deeds office and copied to the appropriate zoning office: A. as soon as practicable after signing of the ROD, or B. upon completion of RAs, when appropriate.	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions: A. All ETTP B. K-1007-P1 Pond, K-901-A Pond, and K-720 Slough	Five years
3. Excavation/ Penetration Permit Program	Until the concentrations of hazardous substances are at such levels to allow for UU/UE; unauthorized groundwater use prohibitions are in place until the final decision is made on groundwater	<ul style="list-style-type: none"> <li>Implemented by DOE and its contractors</li> <li>Initiated by permit request</li> </ul>	Remediation systems, all waste management areas, and areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions: All ETTP for groundwater, Zone 1 below 10 ft, all Zone 2	Monitor annually to ensure the permit program is functioning properly
4. Access Controls (e.g., fences, gates, and portals)	Until the concentrations of hazardous substances are at such levels to allow for UU/UE; CERCLA groundwater use prohibitions are in place until the final decision is made on groundwater	Controls maintained by DOE	Remediation systems, all waste management areas, and areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions: K-1007-P1 Pond, K-901-A Pond, and K-720 Slough	Verify annually that controls are being implemented

<sup>a</sup>Affected areas – Specific locations identified in the post-ROD documents.

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980

DOE = U.S. Department of Energy

ETTP = East Tennessee Technology Park

LUC = land use control

RA = remedial action

ROD = record of decision

UU/UE = unrestricted use/unlimited exposure

**APPENDIX F**

**REQUIREMENTS FOR THE PROVISIONAL MANAGEMENT OF SLABS**

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## Project Team Concurrence

Project Team Agreement Log #: 362  
Area: K-27/K-29 Building Group  
FCN-ETTP-Zone 2-195

### Introduction

This concurrence describes the provisional management requirements for the Building K-29 slab located in Exposure Unit (EU) Z2-14.

### Area

Zone 2 K-27/K-29 Building Group, EU Z2-14

### Background

Building K-29 was demolished in Fiscal Year 2006, and demolition was documented in the Phased Construction Completion Report for Building K-29 of the Remaining Facilities Demolition Project at the East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2336&D2) (PCCR). Subsequent to preparation of the PCCR, the end state of the Building K-29 slab changed, and the Addendum to the Phased Construction Completion Report for Building K-29 of the Remaining Facilities Demolition Project at the East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2336&D2/A1) (PCCR Addendum) was prepared to document this change. The changes to the end state follow:

- In order to support the demolition of other buildings at the East Tennessee Technology Park, office and support trailers and storm water collection sumps were installed on the Building K-29 slab.
- Prior to installing the trailers, the slab was covered with asphalt. Raised asphalt and concrete walkways were later added on top of the initial surface layer of asphalt.
- Prior to adding the asphalt slab cover, oil stains were observed on the slab at electrical conduit penetrations and investigated. The oil was sampled at five locations, and each sample was analyzed for polychlorinated biphenyls (PCBs). The maximum detected total PCB concentration was 22,000 µg/kg, the minimum detected concentration was 1800 µg/kg, and the average detected result was 9333 µg/kg.
- The Building K-29 concrete slab area was posted originally as a Fixed Contamination Area. After the Building K-29 slab was paved with asphalt, the slab was down posted to an Underground Radioactive Material Area.

Therefore, the PCCR Addendum determines the Building K-29 slab is potentially contaminated. Based on this contamination, concurrence FCN-ETTP-Zone 2-187 was approved to remove the Building K-29 slab “in order to eliminate potential threats to the industrial worker and groundwater in EU Z2-14 in a cost-conscious and time-saving manner.”

In accordance with the *Remedial Design Report/Remedial Action Work Plan for Zone 2 Soils, Slabs, and Subsurface Structures, East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2224&D5)*, if a decision is made to remove a slab, but removal will not be immediate, then provisional management requirements for the slab are to be documented in a concurrence form.

## Provisional Management Requirements

The provisional management requirements for the Building K-29 slab are in the table below.

Location	Type	Parameters	Frequency	Responsibility
Storm drain 490	Environmental	Gross alpha, gross beta, uranium isotopic, technetium-99, and PCBs	Annual	Environmental Compliance <sup>1</sup>
K-1007-P1 Pond Weir	Environmental	Gross alpha, gross beta, uranium isotopic, technetium-99, and PCBs	Annual	Environmental Compliance <sup>1</sup>
Building K-29 Slab	Radiological	Removable	Annual	Radiation Protection Program <sup>2</sup>

NPDES = National Pollutant Discharge Elimination System  
PCB = polychlorinated biphenyls

<sup>1</sup>For runoff from the Building K-29 slab Environmental Compliance is governed by the Clean Water Act, Section 304(e); 40 CFR 125, “Criteria and Standards for the National Pollutant Discharge Elimination System”; TCA 69-3-108(j); and DOE Order 458.1, “Radiation Protection of the Public and the Environment”. These require Environmental Compliance to minimize or eliminate the discharge of hazardous substances and pollutants in storm water runoff to waters of the U.S., assess the quality of storm water discharges, determine potential sources of pollutants affecting storm water, and provide effective controls to reduce or eliminate pollutant sources.

<sup>2</sup>The Radiation Protection Program is governed by 10 Code of Federal Regulations (CFR) 835, “Occupational Radiation Protection”; DOE Order 458.1, “Radiation Protection of the Public and the Environment. These require the Radiation Protection Program to control releases of ionizing radiation from radiological activities so that releases of ionizing radiation and exposure of workers and members of the public to such radiation do not exceed the standards set in DOE Order 458.1 and 10 CFR 835.

Provisional management requirements will be performed until slab removal is complete. Removal of the Building K-29 slab will be documented in a Zone 2 phased construction completion report. The storm water runoff from the Building K-29 pad drains by sheet flow across gravel and grass covered areas in combination with direct drainage flow paths to storm drain 490 catch basins that discharge at the outfall into the K-1007-P1 pond. The surface water from the K-1007-P1 pond discharges to Poplar Creek at the exit pathway weir K-1007-B4. The discharge from the K-1007-P1 pond weir will be monitored on at least an annual basis for a minimum of the following parameters: gross alpha, gross beta, uranium isotopic, technetium-99, and PCBs. The storm water discharges from storm drain 490 will be characterized annually. The storm drain 490 characterization monitoring will at a minimum include the following parameters: gross alpha, gross beta, uranium isotopic, technetium-99, and PCBs. This storm water runoff sampling verifies the effectiveness of the Radiation Protection Program.

### Conclusion

The provisional management requirements for the Building K-29 slab will be implemented upon approval of this concurrence. These provisional management requirements will be added to the current version of the *East Tennessee Technology Park Administrative Watershed Remedial Action Report Comprehensive Monitoring Plan, Oak Ridge, Tennessee* (DOE/OR/01-2477) (CMP) and will be verified in the annual Remediation Effectiveness Report. Additional approvals for inclusion of these provisional management requirements into the referenced CMP are not required. However, any subsequent changes to the provisional management requirements once incorporated into the CMP will be in accordance with the CMP procedure for revisions.

**DOE/OR/01-2477&D3**

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