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Remedial Design Report/Remedial Action Work Plan for Water Treatment at Outfall 200 in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee

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Remedial Design Report/Remedial Action Work Plan for Water Treatment at Outfall 200 in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee

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

URS | CH2M Oak Ridge LLC
Managing and Safely Delivering the Department of Energy's Vision
for the East Tennessee Technology Park Mission
under contract DE-SC-0004645

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CONTENTS

FIGURES

TABLE

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ACRONYMS

AFD	adjustable frequency drive
ARAR	applicable or relevant and appropriate requirement
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
BSWTS	Big Spring Water Treatment System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	*Code of Federal Regulations*
CMTS	Central Mercury Treatment System
CNS	Consolidated Nuclear Security, LLC
DNAPL	dense nonaqueous-phase liquid
DOE	U.S. Department of Energy
EEMTS	East End Mercury Treatment System
EFPC	East Fork Poplar Creek
EPA	U.S. Environmental Protection Agency
ES&H	environment, safety, and health
ESD	Explanation of Significant Difference
FFA	Federal Facility Agreement
FY	Fiscal Year
HDPE	high-density polyethylene
HMI	human-machine interface
HVAC	heating, ventilation, and air conditioning
I&C	instrumentation and control
MMF	multi-media filter
MNS	mass notification system
MTF	Mercury Treatment Facility
NEMA	National Electrical Manufacturing Association
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NPO	NNSA Production Office
O&M	operation and maintenance
OF	Outfall
ORP	oxidation reduction potential
ORR	Oak Ridge Reservation
PCB	polychlorinated biphenyl
PLC	programmable logic controller
QAPP	Quality Assurance Program Plan
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act of 1976
RDR/RAWP	Remedial Design Report/ Remedial Action Work Plan
ROD	Record of Decision
SAP	sampling and analysis plan
SCADA	Supervisory Control and Data Acquisition
SNM	special nuclear material
SWPPP	Storm Water Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
UCOR	URS | CH2M Oak Ridge LLC
UEFPC	Upper East Fork Poplar Creek

UL	Underwriter's Laboratory
WEMA	West End Mercury Area
Y-12	Y-12 Nuclear Security Complex

EXECUTIVE SUMMARY

This Remedial Design Report/Remedial Action Work Plan discusses the implementation of the water treatment facility at the Y-12 National Security Complex stormwater Outfall 200 (OF200) in Oak Ridge, Tennessee. The construction and operations of the water treatment facility will be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. The *Amendment to the Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee* (DOE/OR/01-2697&D2) documents a modification to the selected interim remedy (DOE/OR/01-1951&D3) agreed on by the U.S. Department of Energy, the Tennessee Department of Environment and Conservation, and the U.S. Environmental Protection Agency.

The operation of this new water treatment facility will further reduce mercury discharges to the East Fork Poplar Creek (EFPC) surface water and is referred to as the OF200 Mercury Treatment Facility (MTF). It supplements response actions already included in the selected remedy to achieve further reductions in mercury concentrations in EFPC surface water and releases to the offsite environment. The selected remedy addresses mercury-contaminated sediment in storm sewers, point groundwater discharges, and mercury-contaminated sediment in EFPC and Lake Reality, each of which contributes to contamination of surface water within the Upper East Fork Poplar Creek watershed.

The new MTF will collect water at OF200, which is the point where the storm sewer system serving the former mercury-use buildings in the Y-12 West End Mercury Area discharges to the headwaters of EFPC. The discharge from the storm sewer system constitutes a documented source of mercury release to EFPC under base flow conditions. The amount of mercury flux is variable depending on flow conditions and contributions from other sources. The adaptive management approach, described in the ROD amendment and embodied in DOE's Strategic Plan for Mercury Remediation at the Y-12 National Security Center, recognizes the dynamic nature of mercury discharges and impacts. The ROD Amendment provides for evaluation of actual system performance after 2 years of operation and determination of any necessary follow-on actions at that time. The ROD Amendment further specifies that the system may be modified in the future, if warranted by performance monitoring data and/or any future changed conditions, using the adaptive management approach.

The scope of the remedial action includes the construction and operation of the OF200 MTF with a treatment capacity for 3000 gpm (4.3 MGD) of influent surface water. The MTF will also capture stream flow up to 40,000 gpm and store up to 2 million gal of stormwater. The goal of the treatment operation is to reduce mercury concentrations in the treated effluent to 51 ng/L total mercury. This MTF should progress the interim goal of 200 ng/L at Station 17 toward achieving the ultimate goal of attaining the ambient water quality criteria in-stream standard of 51 ng/L.

Early site preparation activities are currently planned to begin in calendar year 2017, with the balance of construction starting in 2018. The OF200 MTF is currently scheduled to be fully operational in late calendar year 2022.

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1. INTRODUCTION

1.1 INTRODUCTION AND PURPOSE

This Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) describes an additional selected remedy for interim remedial actions of specified areas within the Upper East Fork Poplar Creek (UEFPC) watershed at the Y-12 National Security Complex (Y-12) on the U.S. Department of Energy (DOE) Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee. Remediation of the UEFPC watershed is being conducted through a multi-phase remedial action program under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The boundaries of the UEFPC watershed, which includes approximately 1170 acres that encompass the industrialized area of Y-12, extend along the top of Pine Ridge to the north, the top of Chestnut Ridge to the south, the eastern boundary of the Bear Creek Valley watershed to the west, and the DOE property line to the east (Fig. 1).

The first stage of this remedial action program was documented in the *Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee* (DOE/OR/01-1951&D3) (UEFPC Phase I ROD), which was signed on May 2, 2002, by DOE, the Tennessee Department of Environment and Conservation (TDEC), and the U.S. Environmental Protection Agency (EPA). The UEFPC Phase I ROD selected remedy included a series of interim source control actions designed to address the most significant sources of mercury contamination in East Fork Poplar Creek (EFPC) for which sufficient data existed at that time to support appropriate remedy selection decisions. Some of the remedial actions selected and documented in the UEFPC Phase I ROD have been successfully completed, while others are still scheduled for future implementation.

The EFPC flows directly from Y-12 into the city of Oak Ridge (see Fig. 2). The storm sewer network servicing the former mercury processing buildings in the West End Mercury Area (WEMA) has become contaminated from mercury in soil and groundwater. This contaminated storm drain network discharges through a series of outfalls into EFPC surface water. Current and historical contaminant releases from the UEFPC watershed exit the ORR via surface water (EFPC at Station 17) and groundwater (east into Union Valley).

While the remedial actions completed to date have achieved significant reduction in mercury releases from Y-12 at Station 17, the level of mercury in EFPC surface water remains above the interim goal established in the UEFPC Phase I ROD (200 ng/l) and applicable regulatory criteria (51 ng/l). Therefore, the *Amendment to the Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee, Water Treatment at Outfall 200* (DOE/OR/01-2697&D2) (UEFPC Phase 1 ROD Amendment) added the construction and operation of a new water treatment facility at Outfall 200 (OF200) that is designed to achieve further reduction in mercury releases to EFPC surface water. This new facility is referred to as the OF200 Mercury Treatment Facility (MTF).

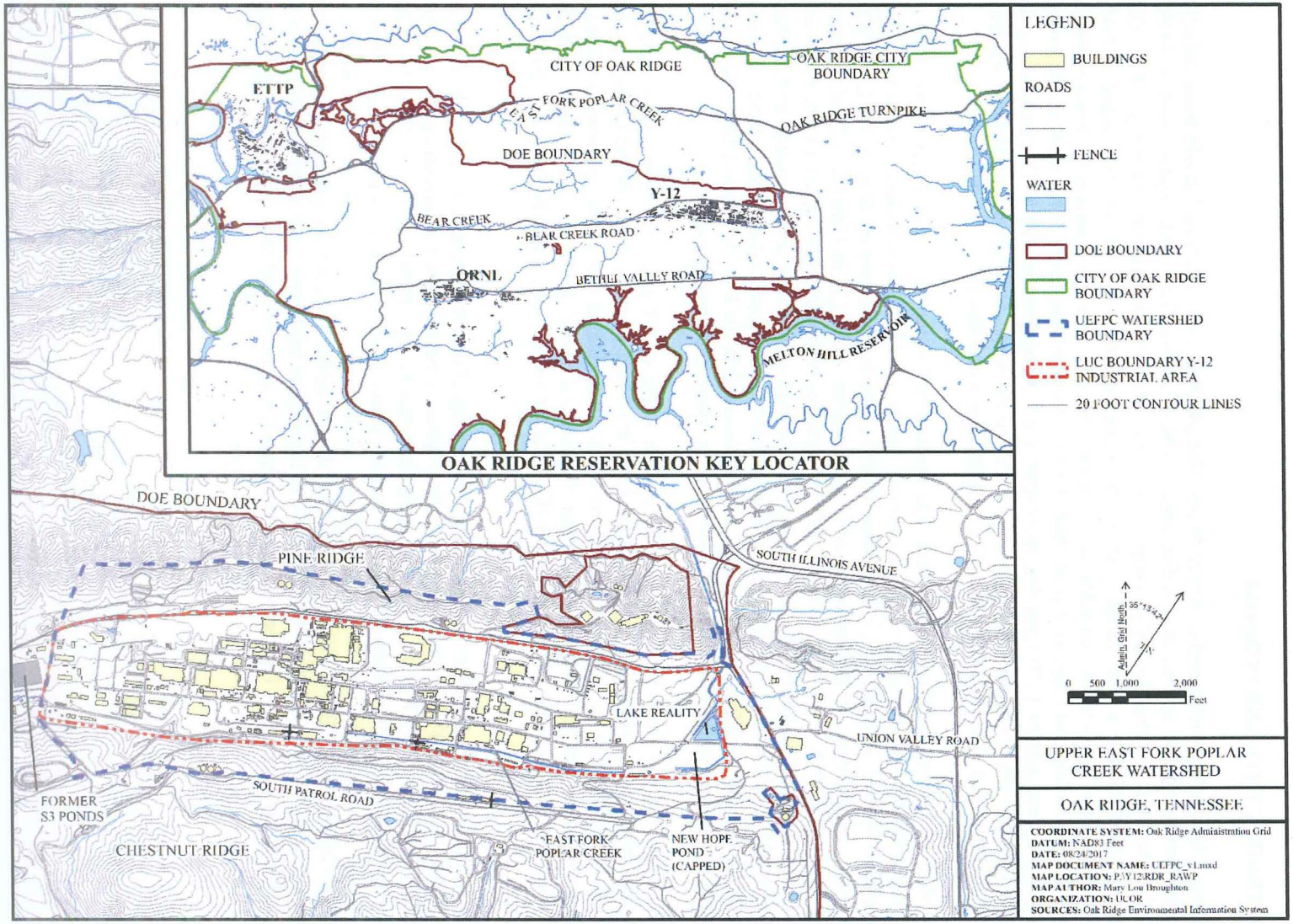

Fig. 1. Location of the UEFPC watershed.

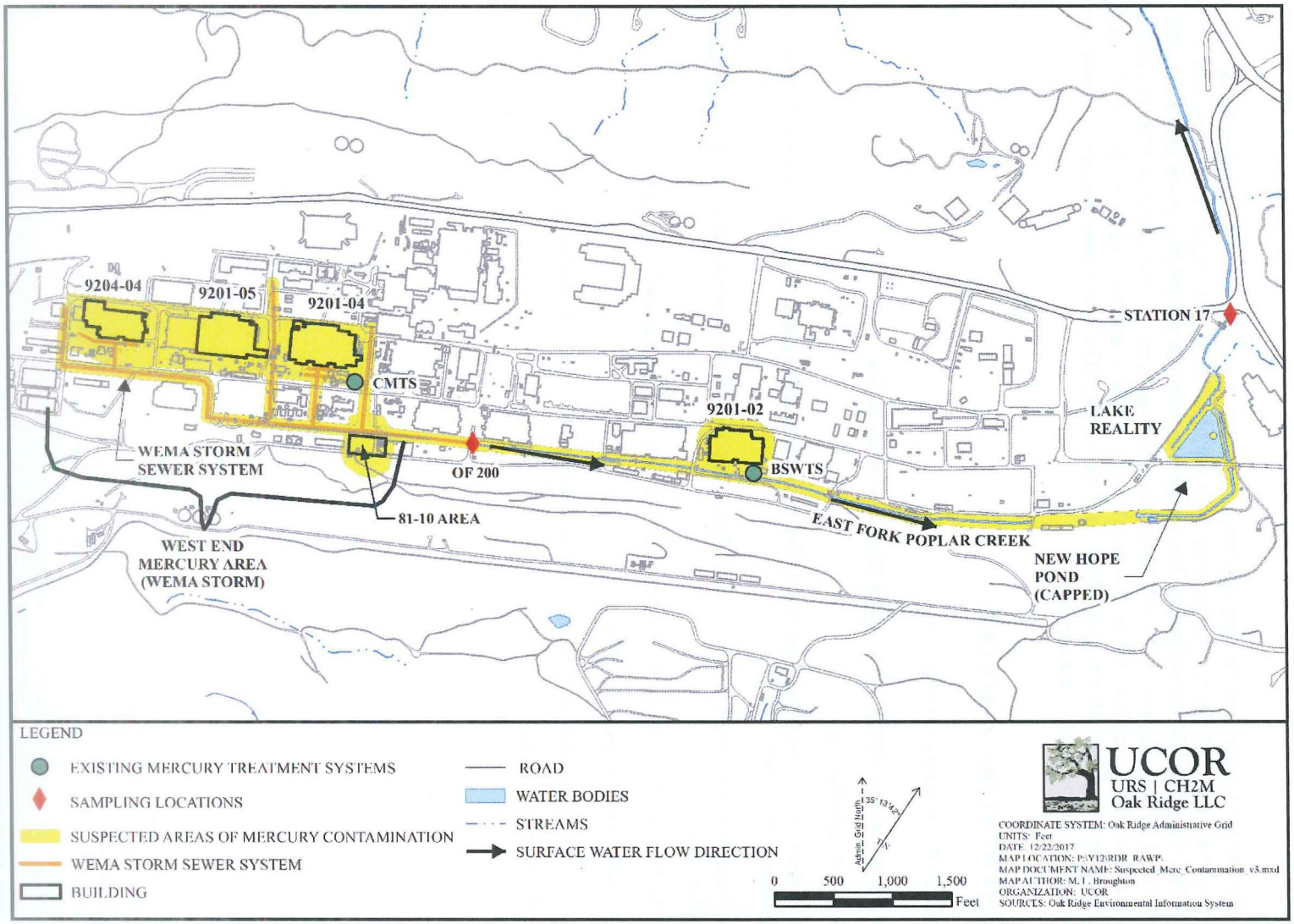

Fig. 2. Suspected areas of mercury contamination in the UEFPC watershed.

1.2 SCOPE

The new OF200 MTF is designed to treat discharges from the storm sewer system adjacent to the former mercury-use buildings in WEMA, which currently constitutes the largest source of mercury releases to EFPC (UEFPC Phase 1 ROD Amendment). The integration point for the WEMA storm sewer network is at the location of OF200. The new MTF will have a treatment capacity of 3000 gpm or 4.3 Mgd of influent surface water and storage capacity for stormwater flows in excess of treatment capacity up to 2 million gal to manage stream flows up to 40,000 gpm. The goal of the OF200 MTF is to reduce mercury concentrations in the treated effluent to 51 ng/L total mercury.

1.3 DOCUMENT ORGANIZATION

This RDR/RAWP is organized as follows:

- Sect. 1 provides the purpose and overall objectives of the action.
- Sect. 2 describes the site.
- Sect. 3 describes the project scope, applicable or relevant and appropriate requirements (ARAR), and performance objectives.
- Sect. 4 addresses the details of the remedial design and includes engineering documents, drawings, and specifications.
- Sect. 5 addresses the plans that will be prepared as part of the design and construction.
- Sect. 6 addresses the land use controls.
- Sect. 7 provides information regarding project organization, schedule, and key milestone dates.
- Sect. 8 lists the references.

2. SITE DESCRIPTION

2.1 SITE DESCRIPTION

The ~34,000-acre ORR is located within and adjacent to the corporate limits of the city of Oak Ridge, Tennessee, in Roane and Anderson Counties. The ORR is bounded to the east and north by the developed portion of the city of Oak Ridge. The ORR hosts three major industrial research and production facilities originally constructed as part of the World War II-era Manhattan Project, East Tennessee Technology Park, Oak Ridge National Laboratory, and Y-12.

The boundaries of the UEFPC watershed, which includes approximately 1170 acres that encompasses the industrialized area of Y-12, extend along the top of Pine Ridge to the north, the top of Chestnut Ridge to the south, the eastern boundary of the Bear Creek Valley watershed to the west, and the DOE property line to the east (Fig. 1).

Y-12 was built by the U.S. Army Corps of Engineers in 1943 as part of the World War II-era Manhattan Project and remains an active manufacturing and developmental engineering facility. It occupies approximately 600 acres within Bear Creek Valley near the northeastern corner of the ORR, adjacent to the city of Oak Ridge. The original mission of the facility was to chemically separate and produce fissile uranium (U)-235 from U-238 using an electromagnetic separation process (alpha process) and to manufacture weapons components as part of the national effort to produce the atomic bomb. As other uranium enrichment processes were developed and implemented at other installations, the role of Y-12 expanded to include weapon components manufacturing and precision machining, research and development, lithium isotope separation, and special nuclear material (SNM) storage and management. The current mission of the facility is multi-faceted and includes National Nuclear Security Administration (NNSA) assignments such as manufacturing and reworking nuclear weapons components, dismantling nuclear weapons components, serving as the nation's stockpile for SNM, and providing special production support to other programs.

Historic manufacturing processes, programs, and waste management practices associated with the Y-12 mission have resulted in the contamination of soil, surface water, sediment, building structures, biota, and groundwater. These processes, which included chemical separation techniques; weapons manufacturing; research and development; waste storage, management, and disposal; and physical plant maintenance activities, resulted in the release of large quantities of mercury to the environment. Because of the contaminant releases at Y-12 and other DOE facilities, the ORR was placed on the EPA National Priorities List that was established under CERCLA (54 *Federal Register* 48184, November 21, 1989).

2.2 SOILS/GEOLOGY/HYDROGEOLOGY

Y-12 is situated in the east Tennessee valley and ridge physiographic province, which is underlain by southeast-dipping sedimentary rocks of Cambrian through Mississippian age. Unconsolidated materials overlying bedrock in the UEFPC watershed include alluvium (stream-laid deposits), colluvium (material transported downslope), residuum (in situ residual material left after weathering of bedrock), weathered bedrock, and fill. Fill material consists of reworked natural materials mixed with construction debris. The unconsolidated materials are predominately clayey silts and silty clays. Very few areas within the watershed have a sequence of natural soil horizons because extensive cut-and-fill grading during construction of Y-12 reworked much of the preexisting unconsolidated material. In addition, the tributary system to EFPC and a portion of the main channel in the central and western portions of the complex were captured in an extensive storm drain system. The thickness of fill material placed along former EFPC tributaries is quite variable,

ranging from a few feet to nearly 30 ft in the north-central portion of the complex. In most areas of the watershed, the water table lies within the unconsolidated zone or just beneath the bedrock-unconsolidated zone interface at depths ranging from less than 10 ft in the southern portion of the complex to more than 30 ft in the northern portion of the complex. Portions of the storm drain system flow continuously due to capture of groundwater base flow as well as storm runoff.

The UEFPC watershed utility and infrastructure system includes an extensive network of sumps, storm drains, pipes, and outfalls. These features strongly influence the movement and discharge of shallow groundwater. In several large buildings (e.g., 9201-4, 9201-5, 9204-4, and 9201-2), basement dewatering sumps collect shallow groundwater for discharge through outfalls to EFPC, depressing the water table in some areas. The subsurface drainage system installed within the unconsolidated material influences groundwater flow and the water table. Within Y-12, infiltrating rainfall percolates through permeable zones in the unconsolidated materials to recharge groundwater where the ground surface is not covered by buildings or paving. Infiltrating groundwater can move downward and laterally quite rapidly within the unconsolidated zone through permeable zones to recharge the bedrock units beneath or until intercepting a storm sewer or utility trace and discharging to EFPC.

Underlying the unconsolidated zone are two fundamentally different hydrogeologic units within the UEFPC watershed: (1) shale-dominated (clastic) formations of the Conasauga Group that do not readily transmit groundwater (aquitard), and (2) Maynardville Limestone and lowermost portions of the Copper Ridge Dolomite (Knox Group), which are fractured limestone and dolostone formations that readily transmit groundwater (aquifer). Groundwater flow within the aquitard formations is comparatively slow in relation to the aquifer formations and occurs primarily at shallow depths (< approximately 60 ft) via fractures and fracture zones. The general direction of groundwater flow within the aquitard formations is to the south-southeast toward EFPC and the Maynardville Limestone. Vertical hydraulic gradients are predominantly upward within the aquitard formations.

The Maynardville Limestone is the primary groundwater exit pathway for the UEFPC watershed. Groundwater flow within the Maynardville Limestone is toward the east along the strike of the valley. In addition, downward hydraulic gradients predominate within the Maynardville Limestone. In the upper 100 ft of the Maynardville Limestone, rapid groundwater flow occurs through an interconnected solution cavity network. The conduit network is connected to EFPC, promoting a high degree of groundwater/surface water interaction along the length of the watershed. At depths from about 100-500 ft in the Maynardville Limestone, groundwater flow occurs mostly through fractures and fracture zones that are, in part, isolated from the dilution and attenuation effects present in the upper 100 ft of the formation.

The high flow rates within active karst features and the degree of groundwater-surface water interaction between the upper portions of the Maynardville Limestone and the open channel of EFPC serve to dilute contaminant concentrations relative to the deeper portions of the aquifer. The groundwater-surface water connections provide a route for mass transfer of contaminants from shallow groundwater to EFPC and vice versa. The lack of dilution in the deeper intervals of the Maynardville Limestone results in contaminant concentrations that are typically higher than in the shallower interval and are sustained for longer distances. In addition, dissolved-phase contaminant concentrations indicate the presence of dense nonaqueous-phase liquid (DNAPL) in the Maynardville Limestone (tetrachloroethene and trichloroethene) at depths of 100-300 ft below ground surface in the eastern portion of the watershed (carbon tetrachloride). These DNAPL sources also contribute to higher dissolved-phase volatile organic compound concentrations in the deeper intervals of the aquifer relative to the shallower intervals. In the eastern portion of Y-12 near Lake Reality, shallow groundwater flow deviates to the north following the surface water drainage pattern of EFPC. A highly permeable underdrain system beneath the EFPC distribution channel to Lake Reality captures shallow groundwater and functions to enhance the deviation of shallow groundwater flow to the north. Deeper groundwater flow in the Maynardville Limestone continues to the east through fracture flow

zones along a regional strike off the ORR until discharging as seeps, springs, and base flow in the headwaters of Scarboro Creek in Union Valley.

2.3 SITE ECOLOGY

The ecology of the UEFPC watershed has been and continues to be strongly influenced by anthropogenic structures and industrial activities. Most of the UEFPC watershed is covered with concrete, gravel, asphalt, industrial structures, or grass. The EFPC provides very little habitat for terrestrial vertebrate animals; woodchuck, opossum, raccoon, and striped skunk are among the largest and most abundant mammals. Although surveys of protected vertebrates inhabiting the ORR are not comprehensive, the likelihood of federally or state-listed species is very low. Various birds nest and forage in the UEFPC watershed, including the belted kingfisher.

There are two dominant aquatic features in the watershed, EFPC and Lake Reality. The EFPC channel has been extensively modified over the years by the installation of structures such as road crossings and weirs and through significant use of riprap and erosion controls. Much of the channel lacks riparian vegetation. Historically, mostly for security reasons, trees have not been permitted. The EFPC channel aquatic habitat differs substantially from creeks in more natural settings, lacking the "pool and riffle" morphology often associated with creeks in such settings. Lake Reality is a plastic-lined, flat-bottomed, steep-sided settling and spill control basin that is home to turtles and fish, but does not support much vegetation.

Y-12 contains no designated habitat that could support threatened or endangered species of plants, however, most of the area has not been directly surveyed. In 1997, a small wetland was identified just outside the complex in an area between New Hope Cemetery and Bear Creek Road. The area is dominated by jewelweed, cardinal flower, and microstegium as groundcover species and sycamore, red maple, ironwood, and green ash as woody species, none of which are threatened, endangered, or in need of special protection.

Several species of submersed macrophytes and emergent aquatic plants previously grew in and near the edge of the former New Hope Pond. None of these are considered to be rare or endangered.

2.4 PREVIOUS ACTIONS

Remediation of the UEFPC watershed is being conducted in stages using a phased approach. The UEFPC Phase I ROD constitutes the initial phase and addresses the interim actions for remediation of principal-threat, mercury-contaminated soil, sediment, and point groundwater discharges that contribute contamination to the surface water. The *Record of Decision for Phase II Interim Remedial Actions for Contaminated Soils and Scrapyard in Upper East Fork Poplar Creek, Oak Ridge, Tennessee* (DOE/OR/01-2229&D3) was issued for the remediation of the balance of contaminated soil, scrap, and buried materials at Y-12. Decisions regarding final land use and final goals for surface water, groundwater, and soil for the watershed will be addressed in future decision documents.

As shown in Fig. 2, EFPC flows directly from Y-12 into the city of Oak Ridge. The storm sewer network servicing the former mercury processing buildings in WEMA has become contaminated from mercury in soil and groundwater. This contaminated storm drain network discharges through a series of outfalls into EFPC surface water. Current and historical contaminant releases from the UEFPC watershed exit the ORR via surface water (EFPC at Station 17) and groundwater (east into Union Valley).

The UEFPC Phase I ROD selected Alternative 3a, Source Control, as the response action that best met the CERCLA evaluation criteria to achieve the remedial action objective (RAO): "restore surface water to

human health recreational risk-based values at Station 17." The selected alternative focused on a series of interim source control actions designed to reduce the release of mercury to the offsite environment. These actions were designed to address the most significant sources of mercury contamination in EFPC for which sufficient data existed at that time to support appropriate remedy selection decisions through the CERLCA process. The selected interim source control actions contained in the UEFPC Phase I ROD include the following:

- Hydraulic isolation of contaminated soils and cleanout/relining of contaminated sewer lines in WEMA
- Excavation of contaminated sediments from EFPC and Lake Reality
- Construction and operation of a water treatment system at Bldg. 9201-2 to treat discharge from OF51
- Continued operation of previously existing water treatment systems (i.e., Central Mercury Treatment System [CMTS] and East End Mercury Treatment System [EEMTS]) as needed
- Land use controls to prevent fish consumption and to restrict access to contaminated areas
- Surface water monitoring to evaluate reductions in contaminant concentrations

In addition to these source control actions, the selected remedy discussed in the UEFPC Phase I ROD contained three short-term studies and two long-term studies to evaluate potential additional response actions, including the following:

- Technical feasibility of a horizontal groundwater capture well as an additional component of hydraulic isolation of WEMA
- Depth and mobility of contamination and alternative technologies for in situ treatment of mercury-contaminated soil at the Bldg. 81-10 site
- Treatment and disposal options for soil and sediment that fail to meet the waste acceptance criteria for the Environmental Management Waste Management Facility
- Evaluation of the viability of large-scale treatment of mercury-contaminated surface water in EFPC
- Groundwater studies to facilitate a better understanding of the dynamics of the groundwater plumes underlying the UEFPC watershed

Modifications to the UEFPC Phase I ROD are discussed below:

- A non-significant change was documented in 2006 (DOE 2006) to modify the EFPC surface water monitoring requirements to upgrade sampling equipment at Station 200A6 for the collection of continuous mercury flux samples as 7-day composites and discontinue sampling at OF150, OF160, OF163, and OF169 until 1 year prior to the WEMA remedial actions.
- A non-significant change was documented in 2007 (DOE 2007) to discontinue treatment of water collected in sumps at Bldg. 9201-5 (Alpha 5) at CMTS due to the leakage of brine solution from cooling systems into the building sumps. Methanol in the brine solution was found to contribute to enhanced bacterial growth at CMTS, which negatively impacted the system treatment efficiency. Water is being allowed to accumulate in the basement of Bldg. 9201-5.
- A non-significant change was documented in 2014 (DOE 2014) to clarify that monitoring requirements and sampling protocols for EFPC will be documented in the *East Fork Poplar Creek and Chestnut Ridge Administrative Watersheds Remedial Action Report Comprehensive Monitoring Plan* (DOE/OR/01-2466&D3) rather than the UEFPC Remedial Design Work Plan (DOE/OR/01-2599&D2) as stated in the UEFPC Phase I ROD.

- The *Explanation of Significant Differences for the Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area* (DOE/OR/01-2539&D2) (ESD) was approved in 2012 to modify components of the selected remedy that included the following:

  1. Elimination of the construction of interim asphalt caps over approximately 3.5 acres of unpaved areas at WEMA (this component of hydraulic isolation for WEMA soils was determined not to be needed due to the acceleration of the schedule for demolition of the WEMA former mercury-use buildings, making contaminated soils in these areas accessible for excavation, where appropriate, under the Phase II ROD
  2. Revision of the schedule for excavation of contaminated sediments from EFPC and Lake Reality to be consistent with the overall remediation strategy to conduct remedial action for the UEFPC watershed in a generally upgradient-to-downgradient sequence
  3. Elimination of two treatability studies that were no longer considered useful (evaluations of horizontal groundwater capture well and in situ treatment of soils at the 81-10 area)

- The UEFPC Phase I ROD amendment modified the selected remedy to include construction and operation of a new water treatment facility to treat discharges from the storm sewer system adjacent to the former mercury-use buildings in WEMA, which currently constitutes the largest source of mercury releases to EFPC under base flow conditions. The integration point for the WEMA storm sewer network is OF200.

Although some of the response actions selected in the UEFPC Phase I ROD have been successfully completed, other actions are scheduled for future implementation. The following response actions selected in the UEFPC Phase I ROD have been completed or are currently in operation:

- Water treatment at OF51 – The Big Spring Water Treatment System (BSWTS) was constructed in Fiscal Year (FY) 2005 to treat mercury-contaminated discharge from OF51 (including the large-volume spring designated Big Spring located near the southeast corner of Bldg. 9201-2) and water from the Bldg. 9201-2 sumps. Completion of this action is documented in the *Phased Construction Completion Report for the Big Spring Water Treatment System at the Y-12 National Security Complex, Oak Ridge, Tennessee* (DOE/OR/01-2218&D1).
- Hydraulic isolation actions in WEMA – Cleaning and repair of the storm sewer network in WEMA was initiated in FY 2009. More than 20,000 LFT of storm sewer lines were inspected using videotape. During FY 2011, more than 8000 LFT of these sewer lines were cleaned and approximately 1200 LFT were relined. Completion of these actions is documented in the *Phased Construction Completion Report for the West End Mercury Area (WEMA) Storm Sewer Remediation Project at the Y-12 National Security Complex, Oak Ridge, Tennessee* (DOE/OR/01-2526&D2). The construction of temporary asphalt caps over approximately 3.5 acres of unpaved areas in WEMA was eliminated under the ESD (DOE/OR/01-2539&D2).
- Continued operation of previously existing water treatment systems – The selected remedy included the continued operation of previously existing treatment systems for treatment of mercury-contaminated waters as needed. These included the EEMTS, which continued operation only until the new BSWTS was constructed and is no longer in operation, and the CMTS, which continues operation.
- Surface water monitoring – Surface water monitoring is conducted to evaluate reductions in contaminant concentrations and flux, to assess the reduction of mercury in fish, and to assess the effectiveness of individual actions.

Remediation of the UEFPC watershed will be conducted in a phased approach. The remedial actions presented in the UEFPC Phase I ROD and modified in the UEFPC Phase 1 ROD amendment constitute an initial phase, focusing on interim source control actions for remediation of mercury-contaminated soils, sediments, and groundwater that contribute contamination to surface water. These actions are expected to reduce the mercury releases to EFPC and attain the interim goal for surface water quality, and to make substantial progress toward attainment of the long-term water quality goal. Subsequent phases of remediation will address additional contaminated soils and sediments, groundwater, and buildings.

The UEFPC Phase I ROD Amendment is one component of an integrated multi-part strategy to reduce mercury contamination at Y-12. The *Strategic Plan for Mercury Remediation at the Y-12 National Security Center* (DOE/OR/01-2605&D2) (Strategic Plan) describes DOE's integrated plan to remediate mercury contamination at Y-12 and impact surface water downstream from Y-12 using an adaptive management approach. Adaptive management is an approach for natural resource management that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Adaptive management acknowledges uncertainty about how ecological and natural resource systems function and how they respond to management actions, and makes use of management interventions and follow-up monitoring to promote understanding and improve subsequent decision making through an iterative process. The Strategic Plan recognizes that the cleanup of mercury contamination and sources at Y-12 is a complex, multi-faceted problem that requires an equally multi-layered remediation approach. As an adaptive plan, the Strategic Plan is expected to evolve as the results of implemented actions are obtained and evaluated and receive modifications proposed as necessary.

2.5 OF200 MERCURY TREATMENT FACILITY BOUNDARIES

The Treatment Plant site is bounded by 2nd Street to the north, 3rd Street to the south, B Road to the west, and A Road to the east (Fig. 3). This site provides the space necessary for the OF200 water treatment facilities (about 2.3 acres) and can accommodate future expansion (Fig. 3). Additional space to the east may be available in areas formerly occupied by Bldgs. 9720-7 and 9720-4 if additional expansion and/or construction support footprint is required in the future.

The Headworks site, including the grit removal and stormwater storage facilities, is located on approximately 1 acre adjacent to OF200 and south of EFPC. This footprint is bounded by E Road to the west, EFPC to the north, and 3rd Street to the south. The site provides the space necessary for diversion, grit processing, pumping, and stormwater storage. Limited future expansion could be accommodated at the east end of the site without significant rerouting of existing roads and infrastructure.

The Headworks and Treatment Plant sites are joined by an interconnecting transfer pipeline and fiber optic data cable. This pipeline and fiber optic connection is generally located along a narrow corridor on the south side of EFPC, north of 3rd Street. The pipeline and fiber optic cable cross to the east side of 3rd Street via an underground road crossing and to the north side of EFPC via an above-grade pipe bridge near the Treatment Plant site.

2.6 Y-12 INTERFACES

As the landlord for Y-12, the NNSA Production Office (NPO) provides and maintains the site infrastructure that will support the OF200 water treatment facility. Memoranda of understanding for interfaces and integration have been established by the DOE Oak Ridge Office of Environmental Management and NPO with Y-12. Additional documents will be developed as required to address the OF200 MTF as design, construction, and operations progress.

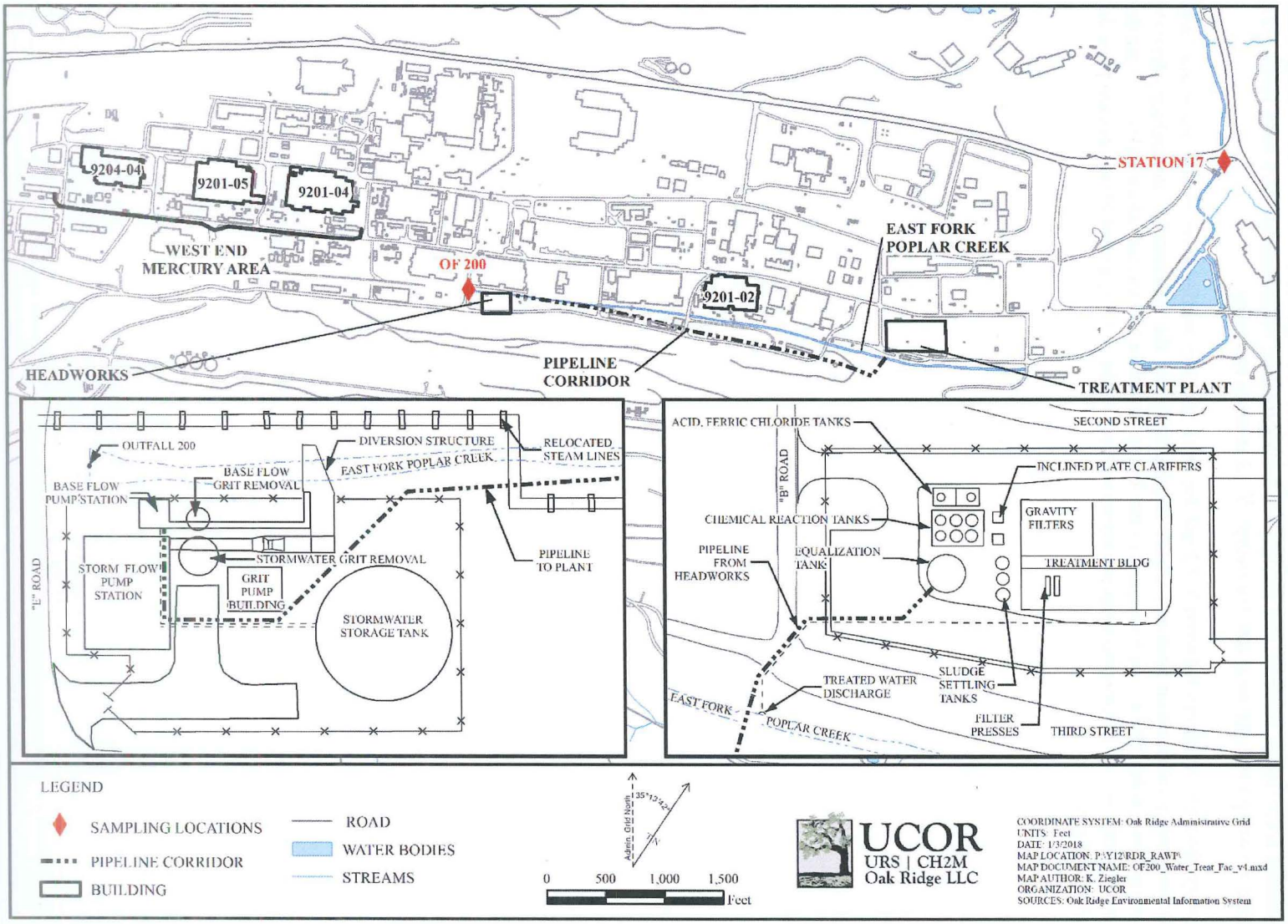

Fig. 3. OF200 MTF site location.

The location for MTF has been coordinated with NPO and Consolidated Nuclear Security, LLC (CNS), their prime operating contractor. CNS engineering, project management, construction management, environmental compliance, security, and facilities and infrastructure organizations have been involved in integrating the design and planning into the overall Y-12 mission and plans.

The primary physical interfaces between Y-12 and the MTF include utilities services and integration with sitewide emergency notification systems. Utility requirements for the Headworks site include electrical power and potable water. Utility requirements for the Treatment Plant site include electrical power, potable water, and sanitary sewer. Interconnections between the Headworks and Treatment Plant sites are provided as part of the project.

3. PROJECT DESCRIPTION

3.1 PROJECT GOALS

The RAOs are as follows:

- UEFPC Phase I ROD
  - — Restore surface water to human health recreational risk-based values at Station 17.
- UEFPC Phase 1 ROD Amendment
  - — Capture discharges from the WEMA storm sewer system to EFPC for treatment and/or storage under base flow and storm flow conditions to mitigate uncontrolled releases of mercury (and other hazardous substances) into EFPC surface water. Stormwater capture would be targeted to maximize mercury flux reduction.
  - — Store captured wastewater with sufficient capacity to minimize mercury flux bypassing the facility without treatment (i.e., the mercury flux contained in stream-flow discharged at OF200 that exceeds treatment capacity and stormwater storage capacity that would bypass the facility without treatment) to the extent practicable.
  - — Treat collected water to achieve reductions in mercury concentrations to meet the ambient water quality criteria standard of 51 ng/L total mercury in the treated effluent.
  - — Discharge treated effluent in compliance with ARARs and at levels that are protective of the receiving water.
  - — Minimize the total mercury flux discharged to EFPC from OF200. Mercury concentrations in EFPC surface water, including any water bypassing the treatment facility, must meet a daily maximum concentration of 2000 ng/L total mercury and an annual rolling flux of 1 kg/year total mercury. To prevent acute toxicity to fish and aquatic life, mercury concentrations in EFPC stream-flow, including any water bypassing the treatment facility, must not exceed 1400 ng/L dissolved mercury.

The OF200 MTF is designed to capture discharges from the WEMA storm sewer system to EFPC under base flow and storm flow conditions to mitigate uncontrolled releases of mercury into EFPC surface water. Stormwater storage capacity will allow the collection of flow exceeding treatment capacity for future treatment and will reduce the frequency that OF200 discharges will bypass the facility without treatment. Stormwater capture is targeted to maximize mercury flux reduction. Collected water will be treated to meet a goal of 51 ng/L total mercury in the treated effluent for discharge to EFPC. Treated effluent from the OF200 MTF will be discharged in compliance with ARARs and at levels that are protective of the receiving water. Appendix A contains a summary table of ARARs, including a crosswalk, that shows how each is met. Discharges from OF200 that exceed the facility's treatment capacity and stormwater storage capacity will bypass the OF200 water treatment facility. To limit the total mercury flux to EFPC from OF200, mercury concentrations in EFPC surface water, including any water bypassing the OF200 MTF, will be limited to a daily maximum concentration of 2000 ng/L total mercury and an annual rolling flux of 1 kg/year total mercury.

3.2 PERFORMANCE MONITORING

Performance monitoring will determine if the concentration goal of 51 ng/l total mercury is being achieved. Additionally, the effluent will be monitored for temperature, pH, oxidation reduction potential (ORP),

dissolved oxygen, turbidity, total suspended solids, and other parameters necessary to comply with water quality standards.

The new water treatment system is expected to reduce mercury concentrations to 51 ng/L or less in the treated effluent. Actual system performance will be evaluated following facility construction and 2 years of operation. If the actual performance does not attain this target level, the Federal Facility Agreement (FFA) (DOE/OR-1014) parties will collaborate on the selection and implementation of follow-on actions, which could include modifications of the facility to improve performance or waiver of this action-specific ARAR. The new water treatment facility will be constructed using a modular design that will be conducive to any future modifications that might be needed.

Water bypassing the OF200 MTF will be measured, sampled, analyzed, and limited to a daily maximum concentration of 2000 ng/L total mercury and an annual rolling flux of 1 kg/year total mercury. To prevent acute toxicity to fish and aquatic life, mercury concentrations in the EFPC stream flow, including any bypass water, will be limited not to exceed 1400 ng/L dissolved mercury.

Performance monitoring requirements also will be described in the post-construction completion report. Performance monitoring to support operation and maintenance (O&M) will be described in the O&M plan that will be prepared in the future by the implementing contractor. The O&M plan will include the applicable sampling and analysis plan (SAP) and quality assurance project plan (QAPP).

3.3 PROJECT SCOPE

The project scope is to construct and operate a water treatment facility that will capture and remove mercury-contaminated water entering EFPC from OF200. The process flow of the OF200 MTF is shown in Fig. 4 and in Appendix B as drawings J941001-F-0001 and J941001-F-0002. The layout of the Headworks is shown in Appendix B as drawing C941001-F-0013 and the layout of the Treatment Plant is shown in drawing C941002-F-0005. A water diversion system will be constructed just downstream of OF200. In addition to stormwater from OF200, the diversion structure will be downstream of OF135. The stormwater from this outfall also will be captured and treated. Due to site constraints near OF200, the treatment facility will be constructed in two different areas, the Headworks site and the Treatment Plant site, joined by a transfer pipeline corridor.

The Headworks will be constructed adjacent to the outfall on the south side of EFPC. This location will permit in-stream diversion along with collection and transfer components. Locating the diversion structure near the outfall optimizes the capture of flow from WEMA without treating the large volumes of additional, relatively clean water that flows into EFPC downstream. The Headworks will be constructed to divert flows up to 40,000 gpm for collection and treatment while allowing excess storm flow to bypass. The design includes grit separation prior to transfer of the collected water via a pipeline to the Treatment Plant site. For diverted stormwater in excess of the treatment capacity, grit separation is followed by pumping to a 2-million-gal stormwater storage tank. Stormwater collected in the storage tank will be fed into the water treatment facility as treatment capacity allows. The grit removal system design also includes solids dewatering and loading into solid waste containers for disposal. The Headworks layout is shown in Fig. 5.

The Treatment Plant will be constructed at the site of the former Bldg. 9720-8 near the east end of Y-12. The Treatment Plant consists of outdoor tanks, treatment equipment, and a metal building that houses weather-sensitive and labor-intensive equipment. The outdoor equipment includes an equalization tank, clarifier/thickeners, sludge settling tanks, bulk chemical tanks, and process reaction tanks. Weather-sensitive equipment and equipment requiring higher frequency for manned operation are indoors

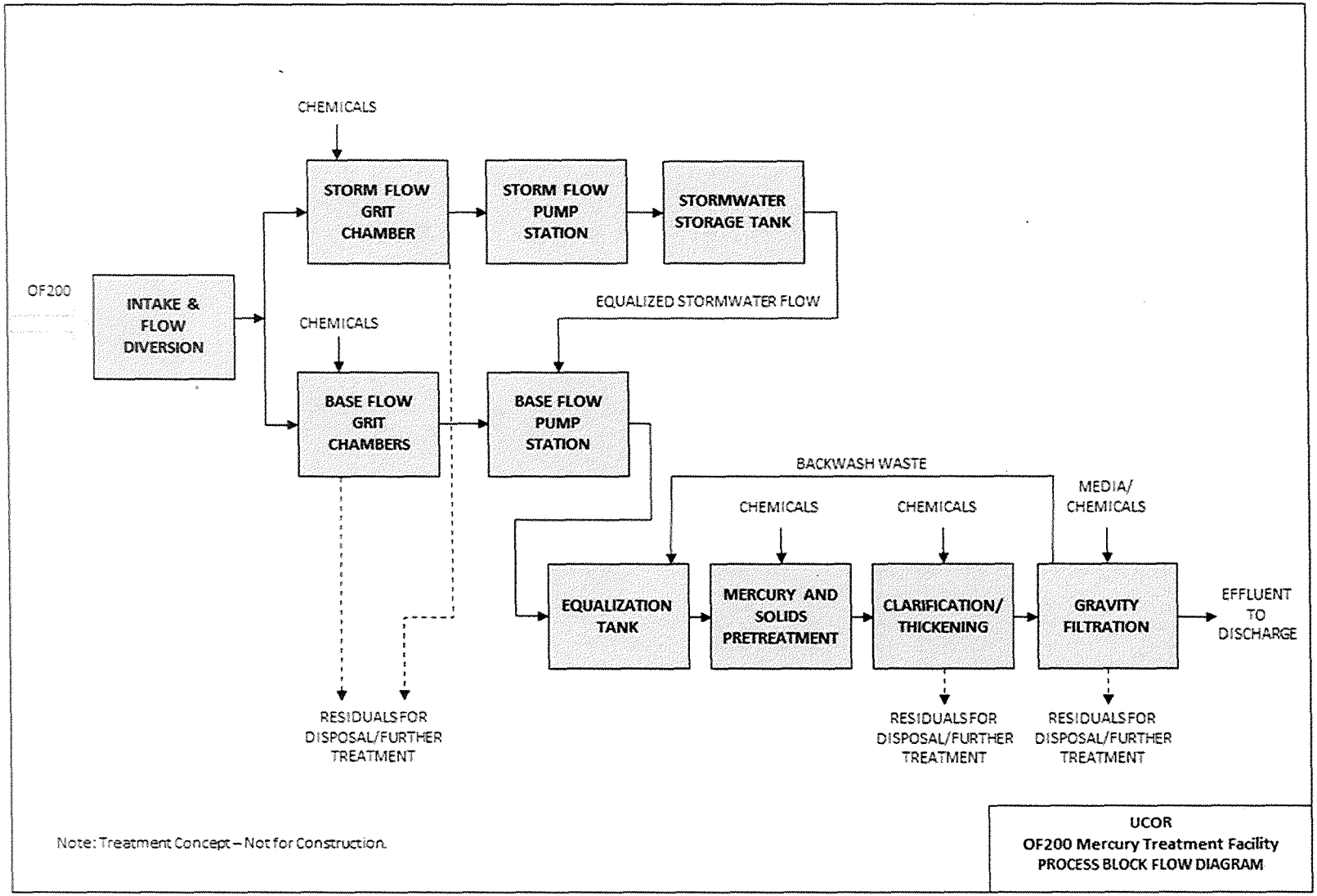

Fig. 4. OF200 MTF process flow diagram.

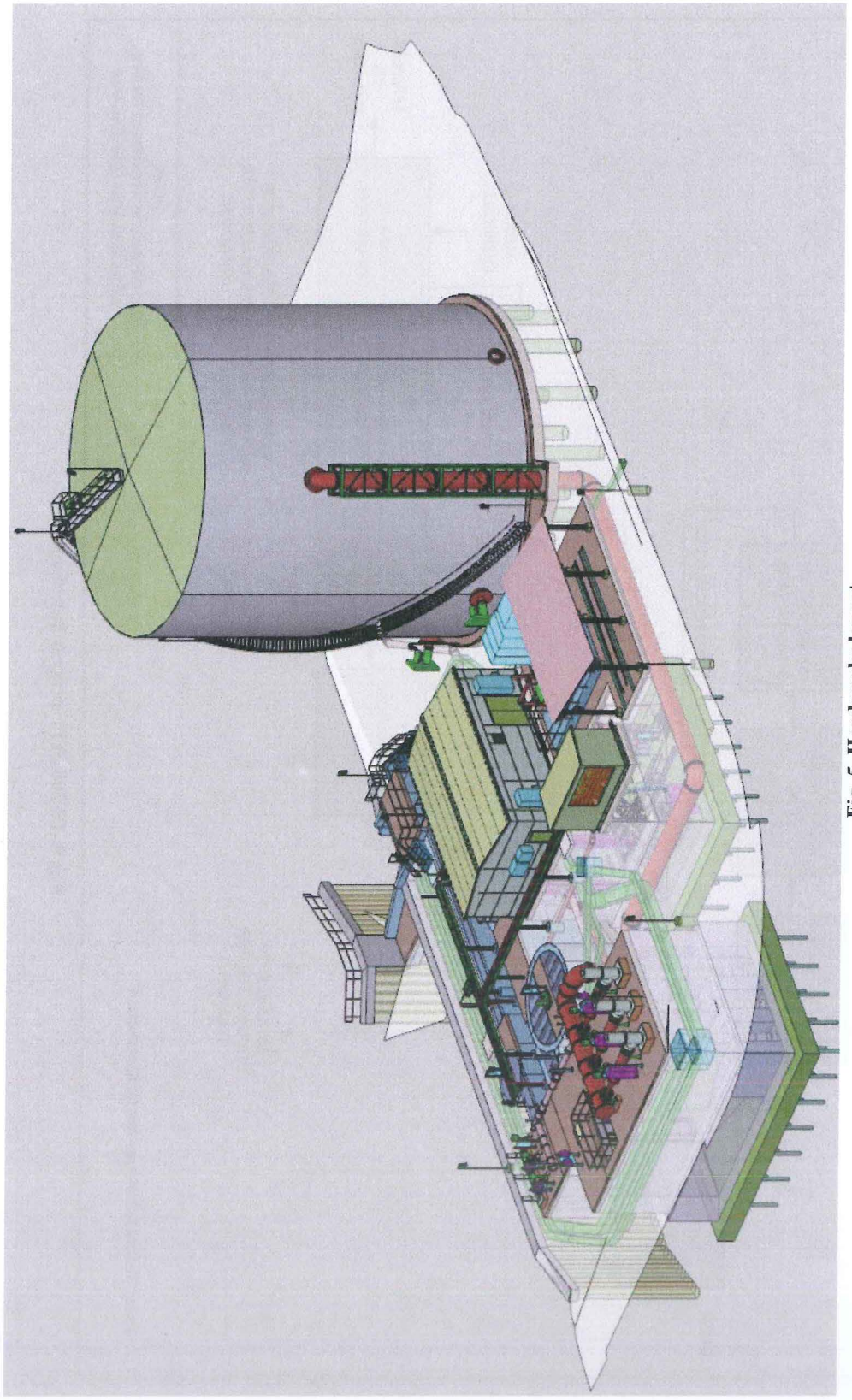

Fig. 5. Headworks layout.

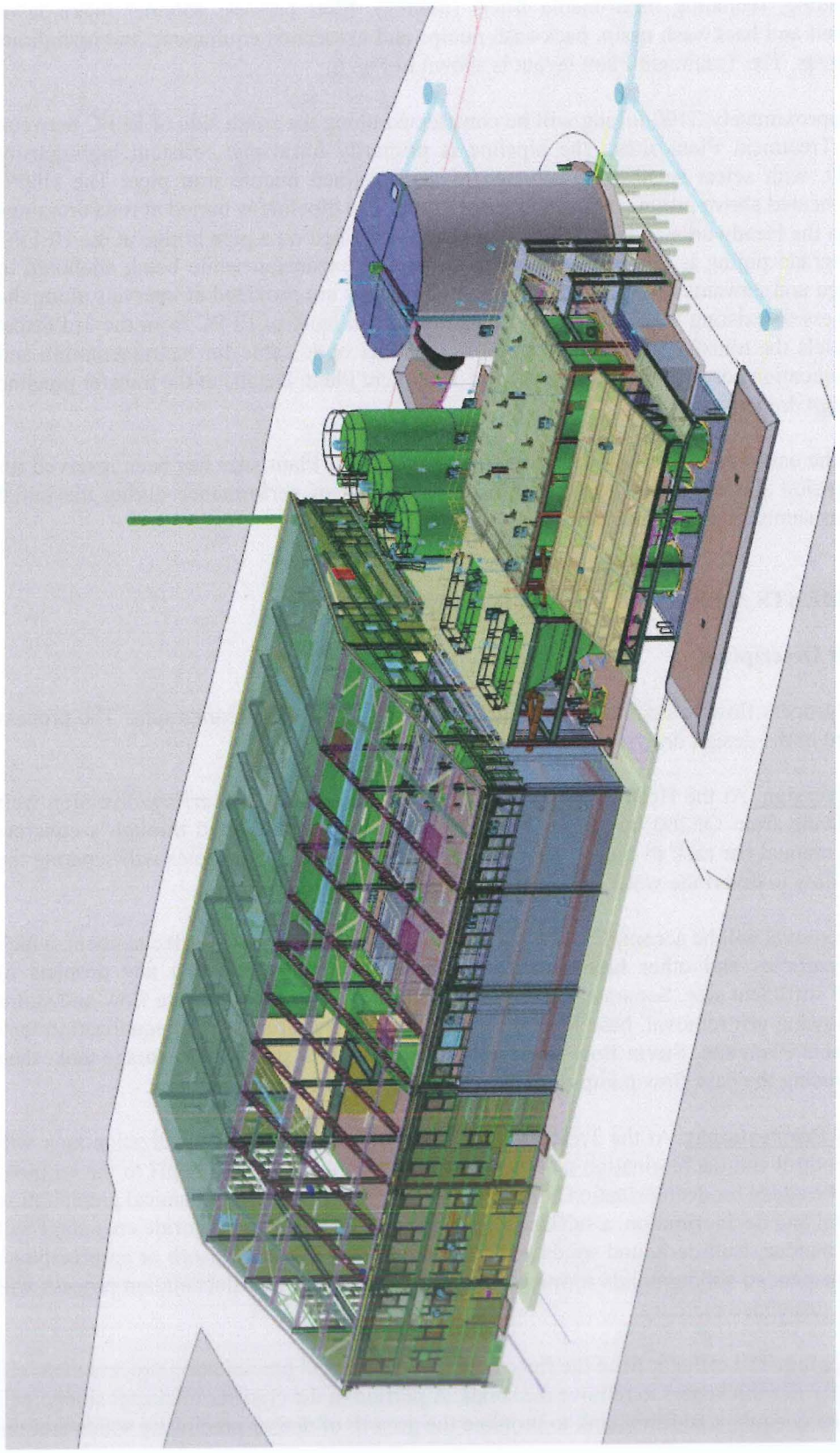

Fig. 6. Treatment Plant layout.

in the treatment building, including multi-media filters (MMFs), filter presses, polymer make-down systems, filter clearwell and backwash basin, backwash pumps and associated equipment, and operations support and control areas. The Treatment Plant layout is shown in Fig. 6.

A transfer pipeline approximately 3100 ft long will be constructed along the south side of EFPC between the Headworks and Treatment Plant sites. The pipeline is primarily ultraviolet resistant high-density polyethylene (HDPE), with select sections constructed of cement-lined ductile iron pipe. The HDPE pipeline is generally located above ground and supported at grade. The pipeline is buried at road crossings and the entrances into the Headworks and Treatment Plant and is elevated on a pipe bridge at the UEFPC crossing. The above-grade piping is allowed to move with thermal expansion while being anchored to protect against damage and unwanted movement. Pedestrian crossings are provided at intervals along the route to facilitate access to existing Y-12 infrastructure and the south bank of EFPC from the 3rd Street area. A conduit parallels the transfer pipeline and contains the fiber optic cable for instrumentation and control (I&C) communication between the Headworks and Treatment Plant. Details of the transfer pipeline are shown on the design drawings.

Additional space on the east side of both the Headworks and Treatment Plant sites has been reserved for potential future expansion should it be required following evaluation of performance during the initial period of operations as summarized in Sect. 4.

3.4 WORK ELEMENTS AND PLANNED ACTIVITIES

3.4.1 Process Flow Description

A description of the process flow is summarized on Fig. 4 and in the following paragraphs. The process flow is further defined in the design drawings in Appendix B.

Intake and Flow Diversion. At the Headworks site, an intake structure with an overflow/diversion weir will divert water flowing from OF200 by gravity flow. The water will be diverted through a concrete channel fitted with a manual bar rack to protect from any oversize debris. Control gates will separate the base flow and storm flow to divert the water into their respective grit chambers.

Grit Removal. Grit removal will be accomplished at the Headworks site using vortex-grit chambers, which will remove larger particles and other high-density materials, potentially including any droplets of elemental mercury of sufficient size. Separate grit removal systems will be used for base flow and storm flow conditions. Following grit removal, base flow water will be pumped directly to an equalization tank located at the Treatment Plant site. Storm flow water will be pumped to a stormwater storage tank, then gradually withdrawn using the base flow pumps to pump the water to the equalization tank.

Mercury and Solids Pretreatment. At the Treatment Plant site, effluent from the equalization tank will be pumped to a pH control and dechlorination tank where acid can be added to adjust pH to the required range and agents will be added for dechlorination before the effluent is released to the chemical precipitation tanks. After pH control and dechlorination, a sulfide-functional polymer and ferric chloride coagulant will be added to produce mercury-sulfide-bound solids and ferric oxyhydroxides that adsorb or co-precipitate mercury with other suspended solids. Solids formed during the coagulation and flocculation process will include colloidal and suspended mercury.

Clarification/Thickening. The effluent from the flocculation and chemical precipitation process then will go to inclined-plate clarifier/thickeners to remove the solids. A portion of the clarifier/thickener sludge will be recycled back to the coagulant addition tank to promote the growth of denser precipitate solids and the

remaining clarifier sludge will be pumped to sludge settling tanks. Thickened solids from the sludge settling tanks will be pumped to a filter press for dewatering and the filter cake generated from the filter press will be sent for disposal, while the filtrate will be recycled back into the treatment process.

Gravity Filtration. Clarifier effluent will flow to a multi-media filtration process for additional solids removal. This filtration process will consist of a series of gravity filters containing filter media that will be operated in parallel, with individual units being backwashed or taken offline as needed. Filter effluent will flow to a treated water clear well prior to discharge back to EFPC.

Monitoring will include the effluent stream following treatment to evaluate the effectiveness of the treatment operations in attaining the performance objective of 51 ng/L as described previously.

Operation of the OF200 MTF will continue until mercury levels in discharges from OF200 have declined to levels that no longer require treatment (i.e., planned remediation of mercury source areas at WEMA may result in reduction of mercury releases to EFPC to levels that no longer require treatment). For planning purposes, a 30-year period of operation is assumed. An O&M plan will be prepared in the future by the implementing O&M contractor prior to operations.

3.4.2 Early Site Preparation

To provide documentation under CERCLA, Appendix C contains a copy of the work plan that provided a description of the early site preparation activities and the controls and actions implemented to meet the ARARs. This work plan was reviewed and concurred by TDEC and EPA prior to start of early site preparation.

Early site preparation at the Treatment Plant site primarily included rerouting and tying in an overhead steam condensate return line from the Headworks site to the north side of UEFPC; removing the portion of steam condensate return line within the Headworks site; removing existing overhead power and communication lines and utility poles; routing electrical service to the site; removing existing above-ground piping, conduits, and associated pipe supports; removing the existing flow augmentation structure and existing concrete slab/foundations; clearing vegetation and trees along the creek; installing the secant pile walls; and routing potable water to the site. The demolition for early site preparation at the Headworks site is shown in Appendix B as drawing C941001-F-0010.

Early site preparation at the Treatment Plant site primarily included routing electrical service, potable water, storm drains, and sanitary sewer to the site, and removing existing overhead area lighting power lines.

Early site preparation along the transfer pipeline route primarily included installing culverts and below-grade transfer piping at three roads (C Road, 3rd Street, and B Road) and the intersection of 3rd Street and B Road), relocating existing utility pole guy wires and guy wire anchors along the transfer pipeline route, and clearing vegetation and trees along EFPC at the transfer pipe bridge crossing.

3.4.3 Construction Mobilization and Readiness

Project startup includes hiring or assigning all support personnel (management, project controls, procurement, environmental compliance, health and safety, engineering, quality, training, and construction supervision) as well as initial craft employees and orientation training (work training is below).

Site construction facilities (trailers, support buildings, laydown areas, and parking) will be prepared, placed, and connected to the necessary utilities. This includes a support trailer for the construction management and oversight and support personnel. Site boundaries and initial erosion control measures will be

established. Construction debris, litter, and construction chemicals will be managed throughout the construction to prevent run-off to EFPC. Additionally, appropriate controls such as berms, dikes, and containers will be installed to prevent equipment fuel or oil products from entering EFPC.

A waste management plan and stormwater pollution prevention plan (SWPPP) will be prepared in the future by the implementing contractors prior to construction.

3.4.4 Construction of Headworks

The intake and grit removal structures and equipment will be constructed in and immediately adjacent to OF200. The intake and grit removal structures are below-grade structures constructed in close proximity to the outfall. Clearing or other disturbance of areas immediately adjacent to EFPC will be minimized to install the intake structures. Disturbed areas will be stabilized and/or revegetated, as specified in the design. No dredged or fill material will be discharged to EFPC during construction of the Headworks. Temporary flow diversion and dewatering of the excavation are included due to work in and around EFPC. The current EFPC channel downstream of the Headworks will not be permanently altered during construction, however, during operations water exiting OF200 under most flow conditions will be routed to the Treatment Plant and discharged downstream of the treatment facility. A weir will be installed to allow flows above the design capacity to bypass the facility and continue into the existing creek channel.

Approximately 16,000 cy of soils and rock are estimated to be excavated for construction. All excavation materials are expected to be disposed at the Y-12 sanitary/industrial landfill. Any needed backfill will be clean imported backfill as specified in the design technical specifications.

Erosion and sedimentation control throughout construction will be implemented to prevent discharge of visible solids, bottom deposits, or turbidity that impairs the usefulness of UEFPC. This will be accomplished through use of silt fences, berms, hay bales, diversion ditches, best management practices, and other measures. These measures will be in accordance with the current edition of the *Tennessee Erosion and Sediment Control Handbook* (TDEC 2012). Excavation and fill activities will be kept to a minimum and all excess material will be handled to prevent runoff. A SWPPP will be prepared in accordance with the Tennessee general National Pollutant Discharge Elimination System (NPDES) permit for discharges associated with construction activities.

Process equipment and piping for the intake structures include a manual bar screen, base flow and storm flow grit classifiers, grit pumps, three base flow pumps (two and a spare) in the base flow wet well for pumping to the treatment facility, three storm flow pumps located in the storm flow wet well for pumping to stormwater storage, and a stormwater storage tank to be installed at the Headworks. A concrete pad will be constructed for truck access and placement of grit roll-off boxes to be loaded. Reinforced concrete will be used to construct the floor and walls of the intake and grit removal intake structures. The Headworks site grading and drainage plan is shown in Appendix B as Drawing C941001-F-0013.

3.4.5 Construction of the Treatment Plant

The major water treatment and mercury removal systems will include bulk treatment chemical storage tanks in diked storage, process tanks, an equalization tank, inclined plate clarifiers, gravity media filters, sludge settling tanks, and a treated water clearwell. These systems are shown in Appendix B as Drawing C961002-F-0005. These systems include the following:

- Sizing and redundancy for key process equipment, including reactor tanks, clarifiers, filter presses, and sludge settling tanks allows for potential future system expansion and equipment changeout or retrofitting if future facility modifications are required

- Equalization tank, dechlorination tanks, chemical addition tanks, and flocculation tanks capable of handling 3000 gpm throughput
- Two inclined plate clarifier/thickeners capable of handling 3000 gpm throughput plus process side streams.
- Three sludge settling tanks and associated pumps

The treatment building structure will be a metal building with concrete cast-in-place footings, stem walls, slab, and equipment pads. The building will include operations and field support rooms, pedestrian and vehicle access doors, and windows and louvers for passive lighting and ventilation and will house additional process equipment.

The fire sprinkler and fire alarm systems design will be completed by a company licensed by the State of Tennessee Fire Marshall.

Clearing or other disturbance of areas immediately adjacent EFPC will be minimized during installation of the treated water discharge line and disturbed areas will be stabilized and revegetated as specified in the design. No dredged or fill material will be discharged to EFPC during construction of the Treatment facility. Excavation for the tanks and building footers will include existing soil and rock removal. Placement of structural backfill will take place after foundation slabs and walls have been placed and cured.

Process piping will be installed to connect the treatment process components. Outside piping will be insulated and, if needed, will be heat traced.

Heating and ventilation will be installed for the process area of the treatment building and heating, ventilation, and air conditioning (HVAC) will be provided for the control room, process support room, and restroom.

Electrical to be installed includes the building, building lighting, electrical service outside the building to the outdoor processing area, outdoor lighting, grounding systems, lightning protection system, and an emergency notification system.

Instrumentation includes a facility-wide, distributed-type process control system of programmable logic controllers (PLCs) and human-machine interface (HMI) computers (i.e., Supervisory Control and Data Acquisition [SCADA] system) to continuously and reliably control and monitor all facility processes. The I&C system will monitor package systems; provide continuous closed-loop control, sequential/logic control, alarm and event annunciation, and status monitoring; and perform historical data collection, storage, retrieval, and display. Process pumps will have adjustable-speed drive systems where appropriate. Field instrumentation, such as level transmitters, flow elements, ORP elements, pH elements, turbidity elements, activated pressure switches, and pressure gauges, are included as required for monitoring and control of the treatment systems. A treatment facility-wide fiber optic network will be installed for SCADA and will serve the HVAC and fire alarm systems.

As with construction of the Headworks, erosion and sedimentation control throughout construction will be implemented to prevent the discharge of visible solids, bottom deposits, or turbidity to impair the usefulness of EFPC. This control will be through the use of silt fences, berms, hay bales, diversion ditches, best management practices, and other measures. These measures will be in accordance with the *Tennessee Erosion and Sediment Control Handbook* (TDEC 2012). Excavation and fill activities will be kept to a minimum and all excess material will be managed to prevent runoff.

The Treatment Plant grading and drainage plan is shown in Appendix B as drawing C941002-F-0006.

3.4.6 Installation of Transfer Piping

The Headworks and Treatment Plant sites are joined by an interconnecting transfer pipeline and fiber optic data cable. This pipeline and fiber optic connection is generally located in a narrow corridor along the south side of EFPC and north of 3rd Street. The pipeline and fiber optic cable cross to the east side of 3rd Street and then cross to the north side of EFPC near the Treatment Plant site.

The pipeline connecting the Headworks and Treatment Plant sites will be constructed primarily of ultraviolet resistant HDPE, with select sections constructed of lined ductile iron pipe. The HDPE pipeline will be generally located above ground and supported at grade. The pipeline will be buried at road crossings and elevated on a pipe bridge at the EFPC crossing. The above-grade piping will be anchored to protect against damage and unwanted movement, with pipe anchors and appropriate restraints provided at key locations. Pedestrian crossings will be provided at intervals along the route to facilitate access to existing infrastructure and the south bank of EFPC from the 3rd Street area.

Minimal clearing or other disturbance of areas near EFPC is expected for the transfer line. Disturbed areas will be stabilized and revegetated. No dredged or fill material will be discharged to EFPC during construction of the transfer pipeline.

3.4.7 Demobilization

The construction site will be cleaned up and the equipment will be removed. After demobilization is complete, the disturbed soil will be stabilized by grading, seeding, mulching, or other similar methods, and by replacing damaged vegetation to minimize soil and sediment runoff. Demobilization from the site will not be complete until field acceptance testing has been satisfactorily completed.

3.4.8 Construction Acceptance and Startup Testing

Final component and systems construction acceptance will be performed to assure all systems are constructed as designed and fit to function as intended. Some component testing (rotation, leak testing, correct phasing, continuity, weld certification, etc.) will occur during initial installation and checkout. Final system construction acceptance test plans will be prepared to assure construction completion and provide evidence of readiness for the transition plan to operations.

The test plans will verify equipment, piping, and instrumentation integrity and may include testing with surrogate materials to assure proper operation of equipment, monitoring instrumentation, and control instrumentation. During construction acceptance, measurements will be performed or recorded to assure treatment components and systems perform as designed. This also will include verification of the systems' ability to respond correctly to primary failure mechanisms (electrical or pump failures, failure of limit switches, etc.).

A transition package that includes clear and comprehensive documentation of the construction will be prepared. This will include technical, operations, and maintenance manuals for all equipment, manufacturer's data sheets, a complete set of as-built drawings, any construction drawings (fire protection, field run piping, electrical, or instrumentation), and completed test plans with results. It also will include listings and locations of all spare parts and equipment obtained during construction.

3.4.9 Facility Turnover for Operations

The operator will receive the construction transition package and accept ownership of the facility upon final construction demobilization (turnover).

The operator will begin operational planning, which includes developing the Transition to Operations Plan and Operational Test Procedures, performing Operational Acceptance Testing, developing staffing and training plans, and hiring O&M personnel. Staff will be trained and O&M procedures will be developed. Staff who will be performing O&M of the OF200 MTF will participate in procedure verification.

The facility operator will establish safety documentation for facility operations, establish support contracts for materials and services necessary, and order the initial inventory of treatment chemicals, waste containers, and all other materials or equipment necessary for O&M of the facility.

Some of these activities will commence during construction acceptance testing.

3.4.10 Operational Readiness

Upon completion of the above activities, the operator will undergo a readiness to operate review in accordance with beginning operations of a non-nuclear facility.

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4. REMEDIAL DESIGN REPORT

This section summarizes the OF200 water treatment process and information for supporting remedial action. It includes process descriptions, engineering drawings, and specifications of the OF200 MTF needed to meet the remedy goal. Process descriptions for each process step are presented in the following sections.

4.1 PROCESS DESCRIPTION

The OF200 MTF will consist of the following major process components:

- Intake structure, including bar screen, with overflow diversion to EFPC
- Vortex grit chambers
- Grit classifier/washer
- Stormwater tank
- Equalization tank
- Dechlorination system with reaction tank
- Chemical addition systems with reaction tank
- Inclined plate clarifier/thickeners
- Gravity MMFs, including backwash storage and backwashing equipment
- Sludge thickening and dewatering system

A block flow diagram of the OF200 MTF is shown in Fig. 4. The average operating conditions for process base flow and storm flow scenarios are presented in Appendix D.

4.1.1 Headworks

An intake structure with an overflow/diversion weir diverts water by gravity flow from EFPC downstream of OF200 into wet wells through a concrete channel fitted with a manual bar rack to protect from any oversize debris. Each inlet channel includes a Parshall flume. The Headworks control system operates in three stages. Stage 1 is for flows of less than 3000 gpm, with water only flowing to the base flow wet well side. Stage 2 is for flows between 3000-40,500 gpm, with water flowing to both the base and storm flow wet well sides. Weir gates are used to control the flow rates into the base and storm sides. During times of high flow, where the EFPC flow is greater than the total Headworks flow capacity of approximately 40,500 gpm, the level in EFPC will increase to the point where excess water will overflow the weir, bypassing and continuing to flow down the existing creek channel. The control system then enters Stage 3 to limit flow to 3000-37,500 gpm for the base and storm sides, respectively. Both weir gates operate to control these flow rates, with any excess flow from OF200 bypassing the facility and continuing downstream in EFPC. If the stormwater storage tank reaches capacity, the storm side flow is stopped and any flow in excess of 3000 gpm is bypassed downstream.

Two vortex-grit chambers remove large solids and grit that can interfere with treatment processes or cause undue mechanical wear and increased maintenance on pumps and treatment equipment. The grit chambers separate grit by inducing a vortex in the chamber's upper compartment. The influent wastewater flows into the chamber tangentially, where baffles and a paddle-mixer cause the water to flow through the upper

compartment in a circular manner. This flow pattern creates a vortex so that high density grit particles greater than approximately 50 micron diameter, including any free mercury droplets of sufficient size, gravitate downward into the lower compartment of the chamber. Grit that collects in the lower compartment is periodically removed using a grit pump. The grit pumps are located on the lower level of the grit pump building, along with associated valving and piping. The grit slurry is pumped to a grit washer/dewatering screw that is located outdoors near the grit pump building. This dewatered grit is discharged to a solid waste container, located under a covered area, for disposal as solid waste. The wash water from the grit dewatering operation is returned to the inlet channel and combined with the incoming base flow for treatment.

During periods that do not exceed the Treatment Plant capacity, the base side grit chamber will accommodate the full flow from OF200. After flowing through the base side grit chamber, the water will be pumped to the Treatment Plant by the base side pumps in the base flow wet well. The pumps operate based on the water level in the wet well.

4.1.2 Stormwater Storage

Storm flow that exceeds the base side grit chamber capacity flows to the storm side grit chamber and is pumped from the wet well to the stormwater storage tank, which is co-located at the Headworks. The storm side wet well pumps also operate based on the water level in the storm flow wet well, along with the sump pumps provided to dewater the wet well into the base side once the wet well level falls below the minimum stormflow pump operating level and EFPC flow recedes.

The stormwater storage tank is a 2-million-gal-capacity coated carbon-steel tank with a concrete bottom. The tank is vented to the atmosphere and mixed to minimize potential solids settling and/or anaerobic conditions that could lead to the formation of organic methyl mercury compounds. The tank is equipped with level instrumentation and associated valving, piping, and controls. The tank is also equipped with a passive overflow. When flow diverted to the facility from OF200 recedes below the Treatment Plant capacity, stored stormwater will be returned to the base side wet well and combine with the base flow for treatment.

4.1.3 Transfer Pipeline

The pipeline connecting the Headworks and Treatment Plant sites will be constructed primarily of ultraviolet resistant HDPE, with select sections constructed of cement-lined ductile iron pipe. The HDPE pipeline has a diameter of 20 in. and is generally located above ground and supported at grade. The pipeline is buried at road crossings and the entrances into the Headworks and Treatment Plant, and is elevated on a pipe bridge at the EFPC crossing. While the terrain over which the pipeline will run is slightly downhill overall, the base flow wet well pumps provide the necessary head to transfer water to the treatment facility. The above-grade piping is allowed to move with thermal expansion while being anchored to protect against damage and unwanted movement, with thrust blocks and appropriate restraints provided at key locations. Pedestrian crossings are provided at intervals along the route to facilitate access to existing Y-12 infrastructure and the south bank of EFPC from the 3rd Street area. Conduits parallel the transfer pipeline and contain the fiber optic cable for I&C communication between the Headworks and Treatment Plant.

4.1.4 Treatment Plant

The Treatment Plant includes an equalization and precipitation process, primarily located outdoors. This process is followed by a filtration process that is mainly located indoors in the treatment building.

4.1.4.1 Equalization and precipitation

The 500,000-gal equalization tank provided at the front end of the treatment system is a coated carbon-steel tank with a concrete bottom. The equalization tank provides adequate storage capacity to stabilize flow and accommodate the filter backwash basin discharge. The tank is equipped with an atmospheric vent, a side-entry mixer, discharge pumps, instrumentation, and a passive overflow. The equalization tank is fed from the Headworks by the base flow pump station and receives influent from the Treatment Plant backwash waste basin.

Equalization tank effluent is pumped to one of two dechlorination tanks. These open-top baffled tanks are equipped with top-mounted mixers and a dechlorination chemical feed system, which include chemical tote bins and metering pumps located inside the treatment building, to provide for dechlorination.

The dechlorination tank effluent overflows by gravity into one of two parallel sulfide polymer/iron coprecipitation reaction tanks. For the chemical precipitation process, colloids and mercury associated with suspended solids become enmeshed with solids formed through coagulation and flocculation using ferric iron and organic polymers. Ferric chloride will be used as the coagulant with a sulfide functional polymer to produce mercury-sulfide-bound solids and ferric oxyhydroxide that either adsorb or coprecipitate mercury with other suspended solids. Dissolved mercury is generally precipitated to low concentrations by the sulfide groups on the sulfide functional polymer and is adsorbed onto other species formed during the precipitation process, achieving very low residual dissolved mercury concentrations in the effluent. After initial precipitation, the resulting precipitate is flocculated with an organic flocculant (polymer) using mixing for initial polymer dispersion followed by slower mixing to build floc. The iron coprecipitation process for mercury removal is pH dependent, with the pH adjusted by adding sulfuric acid. Sludge recycle from the clarifier/thickeners is provided to promote the growth of denser precipitate solids to drive the precipitation process closer to equilibrium and enhance mercury sulfide flocculation.

A polymer make-down system, including chemical tote bins and metering pumps located inside the treatment building, is provided for polymer addition. Ferric chloride is added from a chemical storage tank using metering pumps. The pH adjustment includes an adjacent storage tank and metering pumps for sulfuric acid. These bulk chemical tanks are located in diked and covered containment areas with sumps and a tanker truck unloading area for chemical receiving. The open-top, baffled coprecipitation reaction tanks are equipped with top-mount, low-shear vertical hyperboloid mixers, chemical feed addition, sludge recycle inlet, and an internal dip tube outlet pipe.

The effluent from the coprecipitation reaction tanks overflows by gravity to two parallel flocculation tanks. A flocculation aid polymer can be added to the flocculation influent in the dip tube from the coprecipitation reaction tanks. A polymer make-down system, including chemical tote bins and metering pump blending units located inside the treatment building, is provided for this polymer addition. The open-top baffled flocculation tanks are equipped with internal dip tubes and are provided with top-mount, low-shear vertical hyperboloid mixers. The low-shear mixers promote the formation of floc to enhance the mercury removal process.

The flocculation tank effluent flows by gravity to two parallel, inclined plate clarifiers/thickeners. The clarifiers remove the solids generated during the coprecipitation process. The inclined plate clarifiers include a thickener chamber with a rake to settle and thicken solids. Clarifier effluent overflows by gravity to the MMF units. A fraction of the sludge from the bottom of the thickener chamber is recycled back into the coprecipitation reaction tanks by the sludge recycle pumps to aid the precipitation and flocculation process. The remaining sludge is diverted to the sludge settling tanks, described below, for further processing and disposal.

4.1.4.2 Filtration

The MMF downstream of the clarifiers will remove flocculated solids carryover to further reduce mercury prior to discharge of the effluent back into EFPC. The MMF is widely used in water treatment for the removal of suspended solids and will comprise the filtration portion of the overall mercury removal process. Filter media in the basins is stratified vertically with the smallest media at the bottom of the bed. The media in this application includes a layer of garnet sand topped by silica sand and finished by a layer of anthracite coal. This media is widely used in water treatment filtration applications, with the bed depth for each layer in the facility based on expected loading from process modeling and mass balance calculations.

The influent water flows in a top-down pattern via gravity. The coarser layers at the top of the bed allow particles to penetrate into the bed rather than form a plugging layer on top of the bed. This configuration increases the run time of the bed between backwash cycles compared to a uniform bed of fine particles. The MMF units require periodic backwashing at a higher loading rate than normal influent sufficient to adequately lift and loosen the bed. Backwashing generally includes air scour to loosen packed solids in the media bed, using blowers to provide the air scour.

The clarifier effluent flows by gravity to an inlet channel for the gravity flow MMF system. The MMF system consists of gravity filtration units, where the media is held in open-air concrete basins and the water flows through the bed in a top-down flow pattern. The MMF units will normally operate in parallel, except when a unit is offline or in backwash. The design includes the capability for addition of a filter aid polymer, using chemical tote bins and metering pump blending units located indoors, upstream of the MMF in the clarifier effluent for enhanced removal of fine solids.

The MMF effluent is collected from the underdrain in a concrete clearwell located under the filter complex. From the clearwell, treated water passes over a weir into a channel containing a Parshall flume for flow measurement. The design includes the capability to add sodium hydroxide for pH adjustment in the discharge channel using chemical tote bins and metering pumps located indoors. Provisions are included for the addition of online sampling of the effluent if applicable. From there, the effluent water will pass through an outfall pipe to be returned by gravity flow to EFPC.

Pumps in the clearwell provide filter backwash water. Since the backwash rate exceeds the MMF flow rate, the clearwell will be drawn down during backwashing, periodically interrupting the effluent from the facility. Following backwashing, the water level will again rise and overflow the clearwell weir to the outfall.

A second concrete basin located under the filter complex collects backwash wastewater, including filter-to-waste flows from MMFs following backwashing, and the discharge from the sump pump system in the filter press room. The backwash waste basin contents will be periodically pumped back to the equalization tank. Provisions are included for diverting the backwash waste basin discharge to the sludge settling tanks for disposal in the event returning the backwash waste to the equalization tank is not suitable. Pumps are located in the basin.

4.1.4.3 Solids dewatering

Clarifier sludge will be pumped from the sludge recycle line using the sludge waste pumps to settling tanks. The three cone-bottomed sludge settling tanks are located outdoors adjacent to the treatment equipment. The decant supernatant from the tanks is discharged to the filter press filtrate sump. A polymer make-down system, including chemical tote bins and metering pump blending units, is located indoors and provides for the addition of a thickening aid polymer to help concentrate the sludge in the feed to the filter press from the settling tanks. The sludge settling tanks also have the capability to receive waste from a tanker unloading station located adjacent to the tanks, which can be diverted to the tanks or to the backwash waste basin.

Two recessed plate and frame filter press units are located indoors and are provided to dewater the settled solids. The cake solids generated at the filter press will be containerized for disposal and the filter press filtrate will be sent to the filtrate sump and periodically pumped to the backwash waste basin described above. Filter press feed pumps are located outdoors at the sludge settling tanks and the filtrate sump contains sump pumps.

4.2 OPERATION AND MAINTENANCE

The current plans are for the OF200 MTF to run continuously 24 hours per day, 7 days per week. Operators will monitor system performance from the control room, perform daily checks of operating equipment, and handle routine delivery of chemicals. The OF200 MTF is designed to run on a continuous basis, with routine procedures and maintenance conducted with minimal impact to system operations.

The operator will perform routine preventive and corrective maintenance for treatment equipment, including routine calibrations and repair/replacement of broken and failed equipment. As required, the operators will remove sludge from the filter press and remove grit from the grit chamber.

Other than storm events that exceed the design capacity, water treatment bypass will only be done to prevent loss of life, personal injury, or property damage, and there are no feasible alternatives to the bypass.

4.2.1 Process Monitoring

Monitoring of OF200 MTF components will be necessary to maintain proper operation and treatment performance. The anticipated monitoring based on the process design will include a combination of influent and effluent sampling and analysis, in-process sampling and analysis, and online instrumentation. Chemical weights and tank levels will be monitored to track and maintain onsite treatment chemical supplies.

Performance monitoring to support O&M will be described in the O&M plan that will be prepared in the future by the implementing contractor. The O&M plan will include the applicable SAP and QAPP.

4.2.2 Chemical Supply

Table 1 provides a list of the chemical consumables for the OF200 MTF, which includes chemicals for pH adjustment, dechlorination, chemical precipitation, coagulation, flocculation, and solids dewatering.

Table 1. Anticipated treatment chemical list

Chemical
Sulfuric acid (93%)
Sodium bisulfite (40%)
Ferric chloride (35%)
Sulfide functional polymer (Nalmet 1691 or equal)
Flocculant aid polymer (Nalclear 7763 or equal)
Filter aid polymer
Sludge thickening aid polymer
Sodium hydroxide

4.2.3 Redundancy and Availability

Using the *Design Criteria for Sewage Works* (TDEC 2016) as a guideline, the OF200 water treatment facility will have a high overall system availability goal without providing complete redundancy of systems and components. Based on the TDEC Reliability Class II criteria (Chap. I, 1.3.11) (TDEC 2016), transfer pumps have redundant online spares. The stormwater collection equipment (e.g., pumps, storage tank, etc.) are not subject to the same installed spare capacity since the process treatment facility availability is not impacted by stormwater storage.

4.3 PROCESS PIPING AND MECHANICAL

Generally, piping is maintained above ground where possible through the use of pipe supports. Above-ground process piping requires insulation of either fiberglass or calcium silicate and heat trace for smaller diameter pipes. In areas where below-ground piping is required, such as road or driveway crossings and work areas requiring frequent access for O&M activities, process piping is typically placed in a secondary containment trench with traffic-rated grating.

4.4 CIVIL

The Headworks site lies within the 100-year floodplain with a flood elevation of 936 ft. There is no practicable alternative to locating the OF200 MTF outside the floodplain. There are no sensitive ecological resources in the Headworks construction area. During construction, measures such as berms, swales, or other methods will be used to minimize adverse effects. The Headworks site grading and drainage plan is shown in Appendix B as drawing C941001-F-0014.

4.4.1 Erosion and Dust Control

As described in Sect. 3.4.3, erosion and sedimentation control throughout construction will be implemented to prevent discharges of visible solids, bottom deposits, or turbidity that impairs the usefulness of EFPC. This control will be through the use of silt fences, berms, hay bales, diversion ditches, best management practices, and other measures. These measures will be in accordance with the current edition of the *Tennessee Erosion and Sediment Control Handbook* (TDEC 2012). Excavation and fill activities will be kept to a minimum and all excess material will be handled to prevent runoff. A SWPPP will be prepared in the future by the implementing contractor in accordance with the Tennessee General NPDES permit for discharges associated with construction activities.

During construction, precautions will be taken to minimize fugitive dust. Water or chemicals will be applied to roads, soil, or disturbed areas to minimize fugitive dust and prevent movement beyond the Y--2 boundary. A dust management plan will be prepared in the future by the implementing contractor.

4.4.2 Roads, Access, and Parking

Access to the Headworks and Treatment Plant facility will be from existing roads able to accommodate semi-tractor trailers or single-unit trucks (i.e., American Association of State Highway and Transportation Officials). All roads, curbs, road bases, and subgrades will be consistent with Tennessee Department of Transportation (TDOT) design standards and will comply with Y-12 pavement design requirements. A traffic control plan will be prepared in the future by the implementing contractor for control of construction traffic.

The Headworks site access will be through a primary driveway off E Road. This driveway is designed to accommodate trucks capable of transporting a 22-ft-long roll-off dumpster. There will be one loading area for the Headworks, which is designed to handle roll-off trucks and chemical tote deliveries.

The Treatment Plant site access will be through a primary driveway located off B Road to provide primary access to both the outdoor process area and treatment building. Primary egress for the site will be provided back onto B Road. Secondary driveways on the east will provide pull-through and emergency access from both 2nd and 3rd Street. The driveways are designed to accommodate semi-tractor trailers.

There will be three loading areas for the Treatment Plant site. Two loading areas will be at the outdoor process area, one for deliveries of chemicals (i.e., sulfuric acid and ferric chloride) and the other near the sludge settling tanks at the southwest corner of the treatment building, both paved with concrete to provide additional protection against minor drips and spills. The third outdoor process loading area will provide access to the filter presses inside the treatment building and is designed to handle roll-off trucks.

4.4.3 Earthwork and Retaining Walls

A retaining wall will be located at the Headworks structures along EFPC. The retaining wall will be a combination secant pile wall with poured concrete cap and mechanically stabilized earth block retaining wall installed along the southern bank of EFPC at the Headworks. In addition to providing support for the ultimate fill at the site, the secant pile wall will provide separation from EFPC during excavation for the structures at the Headworks.

4.4.4 Utilities

Utilities to be relocated or demolished include overhead steam condensate return piping, overhead electric power lines, and overhead communication lines. Service connections for potable water, storm drains, sanitary sewers, and communication lines will be provided from existing Y-12 utilities infrastructure.

As part of early site preparation, the overhead steam condensate return piping will be rerouted on a new support system similar to the existing system.

4.4.5 Stormwater Transfer Pipe

Stormwater management for the OF200 MTF will consist primarily of conveying onsite stormwater runoff flow through the use of existing storm drain systems to EFPC. All pipes and swales are designed in accordance with the *TDOT Design Division Drainage Manual* (TDOT 2012).

4.4.6 Fencing and Landscaping

A chain-link fence will be installed around both the Headworks and Treatment Plant sites. A manual swing gate will be used for the Headworks driveway to control vehicle access, with a manual pedestrian gate to allow access to the pipeline corridor. An automated cantilever sliding gate will be used at the Treatment Plant access, with manual swing gates at the secondary access.

Disturbed areas that are not either paved or have gravel surfacing will be hydroseeded or sodded. No trees or shrubs are planned.

4.5 GEOTECHNICAL

A two-phased geotechnical field investigation was performed to identify soil and rock conditions at the site to support the structural and foundation design of the OF200 MTF. The investigations consisted of the collection and testing of soil and rock samples from the Headworks, transfer pipeline, and Treatment Plant areas. Phase I results are documented in the *Report of Limited Geotechnical Exploration, Outfall 200 Mercury Treatment Facility, Y-12 National Security Complex, Oak Ridge, Tennessee* (GEOServices LLC). Phase II results are documented in the *Geotechnical Report for Data Gap Characterization at the Proposed Outfall 200 Mercury Treatment Facility Sites* (DOE-EMCHAR-012).

4.5.1 General Excavation and Trench Excavation

The base slabs of the Headworks wet wells, grit pump chambers, and grit pump building are founded about between 10-30 ft below existing ground surface.

4.5.2 Fill and Backfill

Structural fill will be placed beneath slabs, footings, and pavements. Structural fill will consist of sand, silty sand, or gravelly sand classified as SP, SM, or SW in accordance with the Unified Soil Classification System per American Society for Testing and Materials (ASTM) D2487. The fill material is to be placed in 8-in. maximum loose lifts, with each lift compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557.

4.5.3 Groundwater Control

The groundwater table is anticipated to be at or near existing ground surface (i.e., at elevations from 930-940 ft), although groundwater can be expected to perch at the OF200 MTF during heavy rain events. Flow rates and groundwater control will depend on the depth and nature of the materials overlying the bedrock. The highly irregular nature of the bedrock surface and the possibility of large materials in the channelized banks preclude the use of sheet piles or similar methods to provide an effective cutoff. The overburden is expected to consist of fine-grained materials that are not conducive to dewatering with well points.

A secant pile wall along the creek will be installed as part of early site preparation to serve as excavation support along the north side of the Headworks and to provide shallow groundwater cutoff. The secant wall then will be used for retaining the final structures and site grade.

If encountered, groundwater that accumulates in the bottom of excavations can be diverted to a low sump and pumped out with a sump pump. Any groundwater removed from the excavations will meet applicable ARARs prior to discharge. Stormwater runoff will be diverted away from open excavations by appropriate controls such as building temporary diversion berms or ditches.

4.6 ARCHITECTURAL

The architectural design goal was to provide Treatment Plant and Headworks buildings that efficiently protect process equipment and staff from the elements and facilitate operation of the treatment process. The buildings provide space for storage of supplies, maintenance of equipment, safe handling and removal of waste, and facilities for sampling untreated and treated water.

The treatment building will be a cross-braced steel frame building with lateral support from the filter tanks, girts and purlins, secondary framing, and metal panels. This building will have an expected lifetime of at least 30 years; will provide a low-maintenance, weatherproof shelter; and will be well insulated to moderate summer and winter weather extremes. The Headworks electrical building will be a pre-engineered metal building, with rigid frames, girts and purlins, and roof and wall panels provided by a building manufacturer. Major components for both buildings will include the following:

- The metal roof will consist of heavy-gauge steel panels with factory-applied finish. Vapor barriers and batt insulation will be installed below the roof at underlying ceilings to reduce the volume of the heating envelope. There will be a gable roof, shedding water to gutters and downspouts. The treatment building overhang at the eaves will provide some protection to the walls and to people at entrances. The electrical building will have minimal overhangs.
- The metal walls will consist of heavy-gauge steel panels with factory-applied finish. Batt insulation with a vapor barrier will be installed inside the wall panels. Metal liner panels will protect the vapor barrier on the interior of perimeter walls.
- Insulated glazing unit windows will be installed at the treatment building to provide optimum daylighting inside.
- Personnel doors will be insulated steel with thermally broken steel frames, factory primed and finish coated in the field.
- Overhead doors will be insulated steel panels with a factory finish.
- Louvers will be aluminum with a factory finish.

The treatment building process area coiling doors will facilitate installation and eventual replacement of process equipment. The building will have a continuous curb for spill containment.

The upper level MMF operating gallery will have moisture-resistant ceiling and wall assemblies. The lower level process support room, control room, and restroom will have resilient floor tile finishes. Other spaces will typically have concrete floors.

4.6.1 High Performance and Sustainable Building

Consistent with Executive Order 13693, *Planning for Federal Sustainability in the Next Decade*, the project will comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Building and incorporate environmentally aware features wherever practicable.

The 2016 Guiding Principles for Sustainable Federal Buildings consists of the following six categories, with a total of 20 metrics applicable to new construction identified with *italics*. Federal agencies are encouraged to meet as many elements and sub-elements as practical, with campus- or installation-wide protocols and policies used to demonstrate compliance where applicable. For evaluation purposes, guiding principles, elements, or sub-elements may be 'not applicable' where the buildings inherent function, mission, safety, or designation prevents compliance.

1. Employ integrated design principles.

   Integrated Design. Consider the environmental impact of siting decisions and use an integrated project team.

   Commissioning. Recommission at least every 4 years to optimize building performance using commissioning agents who are independent of the design and construction or operating team.

2. Optimize energy performance.

   Energy Efficiency. For new construction, energy efficiency is 30 percent better than current American Society of Heating, Refrigerating and Air Conditioning (ASHRAE) 90.1 standard. Energy efficient products are to be used as required by statute.

   Renewable and Clean Energy. Evaluate and implement life-cycle cost-effective renewable energy projects; consider long-term off-site renewable sources and Renewable Energy Certificates; and utilize clean and alternative energy where possible.

   Metering. Install building-level meters for electricity, natural gas, and steam, and install advanced or standard meters as appropriate.

   Benchmarking. Benchmark building performance at least annually, preferably using ENERGY STAR Portfolio Manager and regularly monitor building energy performance against historic performance data and peer buildings.

3. Protect and conserve water.

   Indoor Water Use. Build to ASHRAE standard 189.1-2014 Sect. 6.3.2, 6.4.2, and 6.4.3, or to current comparable standards; use water-efficient products; install building-level water meters; and optimize cooling tower operations and eliminate single-pass cooling.

   Outdoor Water Use. Separately meter water for irrigation systems, use water efficient landscapes, and limit potable water use for irrigation below conventional practices.

   Alternative Water. Consider alternative sources of water where cost effective and permitted.

   Stormwater Management. Meet or exceed U.S. Energy Independence and Security Act of 2007 438 stormwater management requirements.

4. Enhance indoor environmental quality.

   Ventilation and Thermal Comfort. Meet the current ASHRAE 55 and either 62.1 or 62.2 standards.

   Daylighting and Lighting Controls. Maximize opportunities for daylighting in regularly occupied space, automatic dimming controls or accessible manual controls, task lighting, and shade and glare control.

   Indoor Air Quality. Develop and implement an indoor air quality policy.

   Occupant Health and Wellness. Promote opportunities for voluntary increased physical movement of building occupants.

5. Reduce environmental impact of materials.

   Material Content and Performance. Procure products that meet applicable identified requirements, including avoiding ozone depleting compounds and high global warming potential chemicals.

   Waste Diversion. Where markets exist, provide reuse and recycling services for building occupants and divert at least 50 percent of non-hazardous, non-construction-related materials from landfills.

   Materials Management. Where markets exist, divert at least 50 percent of construction and demolition materials from landfills.

6. Assess and consider climate change and risks.

   Mission Criticality. Determine the long-term mission criticality of the physical asset and operations to be housed in the facility to inform the design of new construction and modernization to increase climate resilience.

   Floodplain Considerations. Avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and avoid floodplain development whenever there is a practical alternative.

   Facility Design. For new construction, balance options to address predicted climate change impacts against mission criticality, cost, and security to determine design parameters, and at a minimum, include low and no cost resilience measures to address predicted climate conditions.

4.7 STRUCTURAL

Loads are based on the most stringent applicable codes and standards. Building foundations, tank foundations, backfilled water-holding basin walls, and retaining walls are designed to resist seismic loads caused by lateral earth pressures. Water-holding basin walls, tanks, and tank foundations are designed for the effects of seismic sloshing loads in accordance with American Concrete Institute and American Society of Civil Engineers.

4.8 BUILDING SERVICES

Outdoor climatic conditions and indoor design conditions are used as the basis for the design of the Headworks electrical building and OF200 water treatment facility HVAC systems. The process areas will be served by industrial-grade, heavy-duty equipment, while office areas will be served by commercial-grade equipment. Maintenance access is considered in the design of all systems and equipment.

Ventilation systems are designed to maintain human comfort for temperature, humidity, noise, and air quality factors. Air distribution systems are designed to circulate air to improve the work environment for the operators. The ventilation systems and rates comply with the following standards and requirements:

- All applicable building, fire, and mechanical codes
- ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality, for cases not specifically covered by codes
- Specific zone design requirements for additional criteria

4.8.1 Noise and Pressurization Control

Although equipment noise is inevitable, the HVAC systems serving occupied areas have been designed to meet the average noise criteria levels recommended by ASHRAE. Duct velocities will be maintained in accordance with the *ASHRAE Handbook—HVAC Applications* (latest edition) recommendations.

Pressurization is not required in the treatment building, which will generally operate at a slightly negative pressure. Pressure control in process spaces will routinely move air from spaces with higher air quality to those with lower air quality.

For air conditioned spaces, adequate ventilation air quantities will be provided to ensure a slightly positive air pressure. This will minimize infiltration of humid air during the summer and control indoor relative humidity within acceptable limits.

4.8.2 Backup Systems

Most building spaces do not contain equipment or processes that would be measurably harmed upon temporary loss of HVAC. Therefore, no deliberate HVAC system backup is planned, except for the electrical rooms that will be served with at least two cooling units such that failure of one item of the air handling or cooling system equipment will not result in the loss of room cooling.

4.8.3 Process Support Fume Hood

The process support area will have a small fume hood that will have a built-in exhaust fan and controls. It will be compact and designed for use in a small process support space.

The HVAC system will be sized to accommodate the air flow required for the hood. The exhaust will be ducted to the outside of the treatment building.

4.9 FIRE PROTECTION

This section summarizes the fire protection systems for the treatment facility as well as the overall fire protection design approach. The systems described herein include the following:

- Fire suppression system water supply
- Fire suppression systems
- Fire department access
- Fire extinguishers
- Fire alarm and mass notification system (MNS)

4.9.1 Fire Suppression System Water Supply

The Y-12 fire main will be routed into the OF200 water treatment facility. The water service/system riser will be located near a door with immediate outside access.

A post-indicator valve will be provided on the new fire service main. A tamper switch will be provided on the valve and connected to the building fire alarm system. The post-indicator valve will be provided with a padlock keyed to match the Y-12 site standards. A double-check backflow preventer will be installed near the system riser where the fire service enters the OF200 water treatment facility building.

4.9.2 Fire Alarm and Mass Notification System

A combined fire alarm and MNS will be provided that will include a fire alarm control panel, mass notification control panel, fire alarm remote annunciator, local operating console, autonomous control unit, annunciator, alarm initiating devices, alarm notification appliances, signaling devices, wiring, and testing. The fire alarm system will be Underwriter's Laboratory (UL) listed, addressable, zoned, and noncoded with full control, supervisory, alarm, signal, display, and battery backup features in compliance with National Fire Protection Association (NFPA) requirements.

A weatherproof horn or bell with a strobe light will be located on the exterior of the building at the fire protection fire sprinkler riser per NFPA requirements.

4.9.3 Fire Department Access

Fire Department access is provided around the perimeter of the building per NFPA and International Fire Code requirements. The new Fire Department connections for the facility will be freestanding types located at hard surface areas for fire apparatus and within 150 ft of a fire hydrant accessible to a fire apparatus vehicle.

4.9.4 Fire Extinguishers

Fire extinguishers will be provided throughout the facility per NFPA requirements. Fire extinguishers will be wall mounted near exterior egress from the facility, with appropriate additional locations as specified in NFPA.

4.10 ELECTRICAL

This section summarizes the electrical design and overall electrical design approach. New overhead 13.8-kV, three-phase electrical lines will provide power to the Headworks and OF200 water treatment facility areas.

The project facilities have lightning protection systems designed in accordance with NFPA and UL standards. Lightning/surge arresters will be provided in each phase of the incoming overhead lines and at the high voltage terminals of the outdoor unit substation transformers.

4.10.1 Low-voltage Motor Control Center

Electrical protection for the low-voltage distribution system meets the applicable guidelines of the Institute of Electrical and Electronics Engineers as follows:

- Starters and adjustable frequency drives (AFDs) for motors will typically be equipped with molded case, magnetic-only circuit breakers (motor circuit protectors) for motor short-circuit protection.
- Motors controlled by full-voltage starters will generally utilize microprocessor-based overload relays for overload protection. Motors controlled by AFDs will take advantage of the programming internal to the drive for overload protection.
- Non-motor feeders will be equipped with molded case breakers with thermal and magnetic trip elements for overload and short circuit protection.
- Motor-operated valves will be protected by appropriate thermal overload devices.

Panelboards will be in accordance with National Electrical Manufacturing Association (NEMA) standards. Panelboards located indoors will typically be equipped with NEMA Type 12 enclosures and those located outdoors will typically have Type 3R enclosures with threaded hubs for conduits. Panelboards in wash down areas will be equipped Type 4 enclosures.

4.10.2 Listed and Labeled Equipment

Electrical equipment, components, materials, and services will have an attached label, symbol, or other identifying mark of an organization that is concerned with product evaluation, compliance with appropriate standards, and performance of the equipment. Typically, this is the UL label or listing, but can be any accepted Nationally Recognized Testing Laboratories.

4.11 INSTRUMENTATION AND CONTROL

The I&C system is intended to continuously and reliably control and monitor all facility processes. Major functions of the I&C system include the following:

- Package systems monitoring
- Continuous closed-loop control (analog proportional integral derivative control)
- Sequential/logic control (discrete equipment control)
- Alarm and event annunciation and status monitoring
- Historical data collection, storage, retrieval, and display

Instrumentation includes a facility-wide, distributed-type process control system of PLCs and HMI computers, referred to as a SCADA system, to continuously and reliably control and monitor all facility processes. Process pumps will have adjustable-speed drive systems when applicable. Field instrumentation will be provided as appropriate and may include level transmitters, flow elements, ORP elements, pH elements, turbidity elements, activated pressure switches, and pressure gauges required for treatment systems. A treatment facility-wide fiber optic network installed for the SCADA can also serve the HVAC and fire alarm, and will have spare capacity to serve other systems as required.

5. PLANS

5.1 WASTE MANAGEMENT PLAN

The areas impacted by early site preparation and construction of the OF200 MTF have been characterized for the potential of contamination prior to construction in accordance with the approved *Sampling and Analysis Plan/Quality Assurance Project Plan for Geotechnical and Waste Characterization of the Outfall 200 Mercury Treatment Facility Area at the Y-12 National Security Complex, Oak Ridge, Tennessee* (DOE/OR/01-2657&D0, Rev. 1).

Based on the characterization results, waste generated during early site preparation and facility construction is expected to include non-contaminated construction debris (concrete, soil, rock, metal, piping, etc.), and asbestos-contaminated debris. The asbestos-containing waste generated during the early site preparation steam line removal will be properly packaged, labeled, segregated, stored, and disposed as soon as practicable at the Y-12 landfill or other facility that can accept asbestos-containing waste. The waste generated during early site preparation has been described in the *Work Plan for Early Site Preparation, OF200 Water Treatment Facility, Y-12 Nuclear Security Complex, Oak Ridge, Tennessee* (DOE/01/OR-2737&D0) located in Appendix A. A waste management plan will be prepared in the future by the implementing contractor prior to construction.

Waste streams generated during treatment operations will include coarse debris from the bar screen, grit material from the grit removal system, filter cake from the filter press, spent media from MMFs, laboratory sampling materials, personal protective equipment, and universal waste items. The predominant solid waste streams are expected to be grit material from the grit removal system, filter cake from the filter press, and spent media from the MMFs. Based on laboratory testing during pre-design studies, these wastes are not expected to be Resource Conservation and Recovery Act of 1976 (RCRA) or polychlorinated biphenyl (PCB) waste. The ARARs identified in the ROD Amendment were based on the assumption that RCRA hazardous waste and/or PCB waste might be generated. The ARARs included in Appendix A of this document are taken from the ROD Amendment. The RCRA hazardous waste and PCB waste ARARs are identified in the final columns of the ARAR tables as "not applicable" based on more recent laboratory testing. Once operations begin and waste streams are generated, they will be analyzed for waste determination and acceptance prior to disposal. Those waste items that exhibit a characteristic of hazardous waste will be properly packaged, labeled, segregated stored, transported, and disposed in accordance with regulatory requirements. Waste items that are determined to be RCRA universal waste will be segregated and managed as such. If the waste is to be disposed at EMWMF, a Waste Handling Plan will be prepared and approved prior to disposal. Liquid waste streams will include liquids from dewatering operations, spent laboratory chemicals, and equipment cleaning materials. These wastes will be characterized and disposed in accordance with regulatory requirements as identified in the ARAR tables. Some liquid residuals, such as those generated during backwash operations and solids handling, will be pumped back into the equalization tank and reused in treatment system operations.

If free mercury is encountered during construction or following excavation, then the mercury, along with the soil and debris in the surrounding area, will be collected, packaged and sent to an approved commercial facility for treatment and disposal. Mercury will be managed in accordance with applicable and appropriate regulations.

5.2 ENVIRONMENTAL, SAFETY, AND HEALTH PLAN

All work will be conducted in accordance with an environment, safety, and health (ES&H) plan that will address the environmental, safety and health hazards of each phase of the project and specify the requirements and procedures for ensuring the safety and health of the employees and protection of the environment. An analysis of the activity hazards are required prior to work to identify each task, identify hazards associated with each task, and identify precautions necessary to mitigate the hazards. These requirements will be integrated into the ES&H plan and work planning wherever appropriate. Implementation of the requirements of these documents will minimize the possibility and potential consequence of accidents and minimize physical and environmental hazards.

The hazards analysis will address specific hazards associated with construction activities, including hazards for each task and controls to be used, special equipment requirements, training, and any necessary monitoring. No field work will be performed until the hazards have been identified and the controls are in place. Project health and safety and radiological protection personnel will assess the need and requirements for personnel monitoring. Worker protection will be in accordance with 29 *CFR* 1926.652, *Safety and Health Regulations for Construction, Requirements for Protective Systems.*

Health and safety data and controls will be continually evaluated. Field radiological screening will be conducted using appropriate radiological instruments when applicable in accordance with 10 *CFR* 835, *Occupational Radiation Protection.*

Based on the OF200 water treatment process, operations will not cause air emissions or contribute to air pollution in violation of any state or federal ambient air quality standard.

Controls that provide a safe response to incidental and emergency situations with the intent of protecting project personnel, the public, the environment, and property will be developed. Incidental spills are those where the substance can be safely absorbed, neutralized, or otherwise controlled by employees in the immediate release area at the time of the release and are below the reportable quantity. In addition, the release does not have the potential to become an emergency within a short time frame. Spills considered incidental, but that require an immediate clean-up response, include the following:

- Gasoline, diesel, or hydraulic fluid
- Contaminated soil spills outside the controlled work zone
- Decontamination or incidental water spills inside secondary containment

Spills that result in a visible oil sheen on waters of the State are not considered incidental in nature and must be reported to the State if these occur.

5.3 STORMWATER POLLUTION PREVENTION PLAN

The *Outfall 200 Mercury Treatment Facility Early Site Preparation Activities Stormwater Pollution Prevention Plan, Oak Ridge, Tennessee* (URS | CH2M Oak Ridge LLC [UCOR]-4998) was prepared to support early site preparation construction. A separate SWPPP will be written for the balance of the project construction. The purpose of the SWPPP is to protect surface water quality by reducing pollutants associated with stormwater runoff during all phases of field activity. The SWPPP identifies areas that can reasonably be expected to contribute contaminants to surface water bodies via stormwater runoff and describes the development and implementation of stormwater management controls to reduce or eliminate the discharge of such pollutants. The plan was developed using the EPA Office of Water guidance manual,

Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-006); *Storm Water Management for Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices, Summary Guidance* (EPA 833-R-92-002); and the *Tennessee Storm Water Multi-Sector General Permit for Industrial Activities - Permit No. TNR050000* (TDEC 2015).

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6. LAND USE CONTROLS

There are no specific land use controls for the OF200 MTF beyond those already established in the UEFPC Phase I ROD. Decisions regarding final land use and final goals for surface water, groundwater, and soil for the watershed will be addressed in future decision documents.

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7. PROJECT ORGANIZATION AND SCHEDULE

The organizational relationships for this project are shown in Fig. 7. DOE is responsible for the design, construction, expansion, operation, and reporting for this project. EPA and TDEC are responsible for approving the FFA (DOE 1992) primary documents and providing oversight of design, construction, and operation.

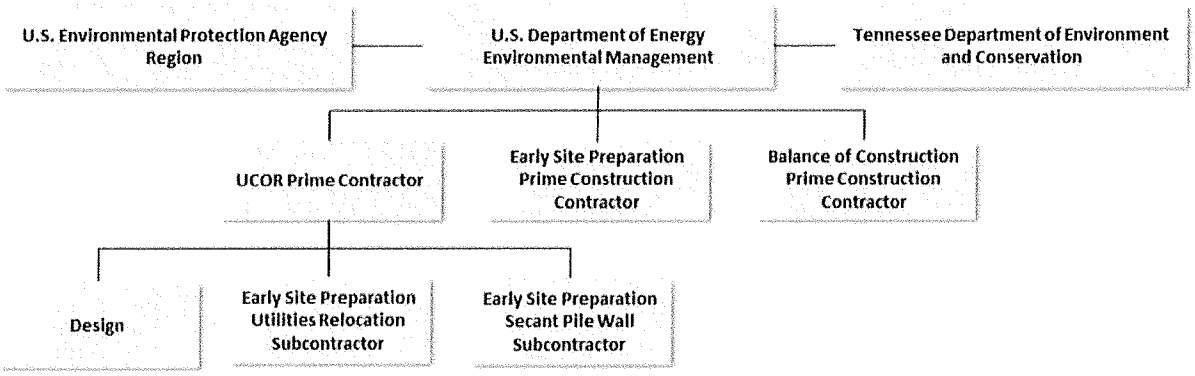

Fig. 7. Organizational relationships.

A project team that includes representatives from DOE, EPA, and TDEC routinely meet to monitor progress, approve documents required by the FFA, resolve technical issues, and raise policy issues to management for resolution. A project schedule is provided in Appendix E.

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8. REFERENCES

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APPENDIX A.
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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Table A.1. Y-12 OF200 location-specific ARARs

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
		Floodplains		
Presence of floodplain as defined in 10 *CFR* 1022.4	Design or modify selected alternatives to reduce risk of flood loss, minimize harm to or within floodplains, and restore and preserve floodplain values to extent practicable. Structures constructed in a floodplain shall meet, at a minimum, building standards pursuant to the National Flood Insurance Program.	DOE actions that involve potential impacts to, or take place within, floodplains—**applicable**	10 *CFR* 1022.3(a)(1) through (4)	Sect. 4.4 Civil
	Undertake a careful evaluation of the potential effects of any new construction in floodplains. Identify, evaluate, and, as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on floodplains.		10 *CFR* 1022.3(b) and (d)	
	Avoid, to the extent possible, the long- and short-term adverse effects associated with occupancy and modification of floodplains.		10 *CFR* 1022.3(c)	
	Measures to take to mitigate adverse effects of actions in floodplains include, but are not limited to, minimum grading requirements, runoff controls, design and construction constraints, and protection of ecology-sensitive areas.		10 *CFR* 1022.13(a)(3)	
	If no practicable alternative to locating or conducting the action in the floodplain is available, then before taking action design or modify the action in order to minimize potential harm to or within the floodplain, consistent with the policies set forth in Executive Order 11990.		10 *CFR* 1022.14(a)	
		Aquatic Resources		
Within area impacting stream or any other body of water -and- presence of wildlife resources (e.g., fish)	The effects of water-related projects on fish and wildlife resources and their habitat shall be considered with a view to the conservation of fish and wildlife resources by preventing loss of and damage to such resources.	Action that impounds, modifies, diverts, or controls a stream or other body of water, except where the maximum surface area of an impoundment is less than 10 acres or for land management activities by federal agencies with respect to federal lands under their jurisdiction—**relevant and appropriate**	16 *USC* 662(a) (*Fish and Wildlife Coordination Act*)	Sect. 3.4.2 Construction Mobilization and Readiness, Sect. 3.4.3 Construction of Headworks, Sect. 3.4.4 Construction of Treatment Facility, Sect. 4.4.1 Erosion and Dust Control

Table A.1. Y-12 OF200 location-specific ARARs (cont.)

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Waters of the state as defined in TCA 69-3-103(33)	Must comply with the substantive requirements of the ARAP for erosion and sediment control to prevent pollution of waters of the state.	Action potentially altering the properties of any waters of the state—**applicable**	TCA 69-3-108(b)(1)(j)	Sect. 3.4.2 Construction Mobilization and Readiness, Sect. 3.4.3 Construction of Headworks, Sect. 3.4.4 Construction of Treatment Facility, Sect. 4.4.1 Erosion and Dust Control, Sect. 5.3 Stormwater Pollution Prevention Plan
	Pollution control requirements, as detailed in each particular General Permit, include but are not limited to, the following: Activity must not result in discharge of waste or substances that may be harmful to humans or wildlife; Material may not be placed in a location or manner so as to impair surface water flow into or out of any wetland area; • Work must be carried out in a manner that does not violate water quality criteria as stated in TDEC 0400-4-3-.03, including, but not limited to, prevention of discharges that cause a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the designated uses for that water body by TDEC 0400-4-4; • Excavation and fill activities shall be kept to a minimum, and all excess material shall be hauled upland and properly stabilized or disposed of. • Sediment shall be prevented from entering waters of the state; erosion and sediment controls shall be designed according to the size and slope of disturbed or drainage to detain runoff and trap sediment, and shall be properly selected, installed, and maintained in accordance with manufacturer's specifications and good engineering practices. • Erosion and sedimentation control shall be in place and functional before earthmoving operations begin; must be maintained throughout construction period. Temporary measures may be removed at the	Action potentially altering the properties of any waters of the state—**TBC**	TDEC ARAP Program conditions common to all General Permits	Sect. 3.4.2 Construction Mobilization and Readiness; Section 3.4.3 Construction of Headworks Section 3.4.4 Construction of Treatment Facility; Section 4.4.1 Erosion and Dust Control

Table A.1. Y-12 OF200 location-specific ARARs (cont.)

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
	beginning of work day but shall be replaced at end of work day.			
Waters of the state as defined in TCA 69-3-103(33) (cont.)	• Litter, construction debris, and construction chemicals exposed to stormwater shall be picked up prior to anticipated storm events or otherwise prevented from becoming a pollutant source for stormwater discharges. • Clearing, grubbing, or other disturbance of areas immediately adjacent to waters of the state shall be limited to the minimum necessary to accomplish the proposed activity. Unnecessary vegetation removal is prohibited, and disturbed areas shall be stabilized and revegetated as soon as practicable. • Appropriate steps shall be taken to ensure petroleum products or other chemical pollutants are prevented from entering waters of the state, including groundwater; • Adverse impacts to T&E species or cultural, historical, or archeological features or sites are prohibited.			Sect. 2.3 Site Ecology, Sect. 3.4.2 Construction Mobilization and Readiness, Sect. 3.4.3 Construction of Headworks, Sect. 3.4.4 Construction of Treatment Facility
Loss of net resource value of state waters (ARAP program)	No activity can be authorized by the Commissioner unless any lost resource value associated with the proposed impact is offset by mitigation sufficient to result in no net loss of resource value.	Activity that would result in an appreciable permanent loss of resource value of a state water —**applicable**	TDEC Rule 0400-40-07-.04(6)(c)	
Mitigation of state waters other than wetlands (ARAP program)	Must provide mitigation that results in no overall net loss of resource values for any activity that would result in appreciable permanent loss of resource value of a state water. For any mitigation involving relocation or re-creation of a stream segment, to extent practicable must complete mitigation before any impact occurs to existing state waters. Mitigation measures include but are not limited to: restoration of degraded stream reaches and/or riparian zones; new (relocated) stream channels; removal of pollutants from and hydrologic buffering of stormwater runoff; and other measures which have a reasonable likelihood of increasing the resource value of a state water. Mitigation measures or actions should be prioritized in the following order: restoration, enhancement, re-creation, and protection.	Activity that would result in an appreciable permanent loss of resource value of a state water —**applicable**	TDEC 0400-40-07-.04(7)(a)	

Table A.1. Y-12 OF200 location-specific ARARs (cont.)

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Location encompassing aquatic ecosystem as defined in 40 *CFR* 230.3(c)	The discharge of dredged or fill material into waters of the United States is prohibited if there is a practical alternative that would have less adverse impact. No discharge shall be permitted that results in violation of state water quality standards, violates any toxic effluent standard, and/or jeopardizes an endangered species or its critical habitat. No discharge will be permitted that will cause significant degradation of waters of the United States. No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps in accordance with 40 *CFR* 230.70 et. seq. are taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Action that involves the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands—**applicable**	40 *CFR* 230.10(a), (b), (c), and (d) 40 *CFR* 230 Subpart H	Sect. 2.3 Site Ecology, Sect. 3.4.2 Construction Mobilization and Readiness, Sect. 3.4.3 Construction of Headworks, Sect. 3.4.4 Construction of Treatment Facility

ARAP = Aquatic Resource Alteration Permit
ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
DOE = U.S. Department of Energy
OF = Outfall
T&E = threatened and endangered
TCA = Tennessee Code Annotated
TBC = To Be Considered
TDEC = Tennessee Department of Environment and Conservation
USC = United States Code
Y-12 = Y-12 Nuclear Security Complex

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
General Construction Standards—All Remediation Activities				
Activities causing fugitive dust emissions	Shall take reasonable precautions to prevent particulate matter from becoming airborne; reasonable precautions shall include, but are not limited to, the following:	Fugitive emissions from demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land —**applicable**	TDEC 1200-03-08-.01(1)	Sect. 4.4.1 Erosion and Dust Control
	• use, where possible, of water or chemicals for control of dust, and		TDEC 1200-03-08-.01(1)(a)	
	• application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stock piles, and other surfaces which can create airborne dusts;		TDEC 1200-03-08-.01(1)(b)	
	Shall not cause or allow fugitive dust to be emitted in such a manner as to exceed 5 minute/hour or 20 minute/day beyond property boundary lines on which emission originates.		TDEC 1200-03-08-.01(2)	
Activities causing radionuclide emissions	Shall not exceed those amounts that would cause any member of the public to receive an EDE of 10 mrem per year	Radionuclide emissions from point sources, as well as diffuse or fugitive emissions, at a DOE facility—**applicable**	40 *CFR* 61.92 TDEC 1200-03-11-.08(6)	Sect. 5.2 ES&H Plan
Activities causing stormwater runoff (e.g., clearing, grading, excavation)	Implement good construction management techniques (including sediment and erosion controls, vegetative controls, and structural controls) in accordance with the substantive requirements of General Permit No. TNR10-0000 ("General Permit for Stormwater Discharges Associated with Construction Activities") to ensure that stormwater discharge:	Dewatering or stormwater runoff discharges from land disturbed by construction activity—disturbance of ≥ 1 acres total—**applicable**	TCA 69-3-108(l) TDEC 0400-40-10-.03(2)(a); General Permit No. TNR10-0000 (effective September 30, 2016) (**TBC** guidance)	Sect. 3.4.2 Construction Mobilization and Readiness, Sect. 3.4.3 Construction of Headworks, Sect. 3.4.4 Construction of Treatment Facility, Sect. 4.4.1 Erosion and Dust Control, Sect. 4.4.6 Fencing and Landscaping, Sect. 5.3 Stormwater Pollution Prevention Plan
	• does not violate water quality criteria as stated in TDEC 0400-40-03-.03 including but not limited to prevention of discharges that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the designated uses for that water body by TDEC 0400-40-04;	Stormwater discharges from construction activities—**TBC**	General Permit No. TNR10-0000, Sect. 5.3.2	
	• does not contain distinctly visible floating scum, oil, or other matter;			
	• does not cause an objectionable color contrast in the receiving stream; and			

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Activities causing stormwater runoff (e.g., clearing, grading, excavation) (cont.)	• results in no materials in concentrations sufficient to be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream.			
	Water Treatment			
Construction or modification of intake and outfall structures for effluents	Construction, maintenance, repair, rehabilitation, or replacement of intake or outfall structures shall be carried out in such a way that work: Does not violate water quality criteria as stated in TDEC 0400-40-03-.03, including, but not limited to, prevention of discharges that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the designated uses for that water body by TDEC 0400-40-04. Activities in non-navigable streams shall be conducted in the dry; in navigable streams, where impracticable to work in the dry, work may be conducted within the water column. Shall be located and oriented so as to avoid permanent alteration or damage to the integrity of the stream channel, including the opposite stream bank. Alignment of the structure (except for diffusers) should be as parallel to the stream flow as is practicable, with the discharge pointed downstream. Diffusers may be placed perpendicular to stream flow for more complex mixing. Intake and outfall structures shall be designed to minimize harm and prevent impoundment of normal or base flows. Velocity dissipation devices shall be placed as needed at discharge locations to provide a non-erosive velocity from the structure. Activity may not be conducted in a manner that would permanently disrupt the movement of fish and aquatic life. Material may not be placed in a location or manner so as to impair surface water flow into or out of any wetland area.	Construction of intake and outfall structures in waters of the state—**applicable**	TCA 69-3-108(l) TDEC 0400-40-07-.01 TDEC General Permit for Construction of Intake and Outfall Structures (effective April 7, 2015) **(TBC)**	Sect. 3.4.3 Construction of Headworks, Sect. 3.4.4 Construction of Treatment Facility, Sect. 4.4.1 Erosion and Dust Control

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Construction or modification of intake and outfall structures for effluents (cont.)	Backfill activities must be accomplished in a manner that stabilizes the stream bed and banks to prevent erosion. All contours must be returned to pre-project conditions to the extent practicable and completed activities may not disrupt or impound stream flow. Stream beds must not be used as transportation routes for construction equipment; Temporary stream crossings shall be limited to one point in the construction area and erosion control measures shall be utilized where stream banks are disturbed. Crossing shall be constructed so that stream flow is not obstructed. Following work, all materials used for temporary crossing must be removed and disturbed stream banks restored and stabilized. Materials used in intake and outfall structures must be free of contaminants and wastes as defined by TCA 69-3-103(18). Clearing, grubbing and other disturbances to riparian vegetation shall be kept to a minimum necessary for slope construction and equipment operations. Unnecessary tree removal is prohibited. Sediment shall be prevented from entering waters of the state. Erosion and sediment control measures shall be properly selected, installed, and maintained and must be in place and functional before earth moving operations begin. Litter, construction debris, and construction chemicals exposed to stormwater shall be picked up prior to anticipated storm events or otherwise prevented from becoming a pollutant source during storms. Excavated materials, removed vegetation, construction debris, and other wastes shall be removed to an upland location and properly stabilized or disposed of to prevent reentry into the waterway. Take appropriate steps to ensure petroleum products or other chemical pollutants are prevented from entering waters of the state. In the event of a spill, take immediate measures to prevent pollution of waters of the state.			Sect. 3.4.3 Construction of Headworks, Sect. 3.4.4 Construction of Treatment Facility, Sect. 3.4.5 Installation of Transfer Piping, Sect. 4.4.1 Erosion and Dust Control, Sect. 5.3 Stormwater Pollution Prevention Plan

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Collection/treatment of surface water	Onsite wastewater treatment units that are part of a wastewater treatment facility subject to regulation under Sect. 402 or Section 307(b) of the CWA are exempt from the requirements of RCRA Subtitle C for all tank systems, conveyance systems (whether piped or trucked), and ancillary equipment used to store or transport RCRA contaminated water.	Onsite wastewater treatment units that are subject to regulation under Sect. 402 or Sect. 307(b) of CWA (NPDES permitted) —**applicable**	40 *CFR* 270.1(c)(2)(v) TDEC 0400-12-01-.07(1)(b)(4)(iv) 40 *CFR* 264.1(g)(6) 40 *CFR* 260.10 53 *FR* 34079, September 2, 1988	Not applicable (water not expected to be hazardous)
	Industrial wastewater discharges that are point source discharges subject to regulation under § 402 of the CWA, as amended, are not solid wastes for the purpose of hazardous waste management.	Generation of industrial wastewater for discharge—**applicable**	40 *CFR* 261.4(a)(2) TDEC 0400-12-01-.02(1)(d)(1)(ii)	
	Discharge is not prohibited, unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 268.40 or are D003 reactive cyanide.	Restricted RCRA characteristic hazardous wastes managed in a CWA wastewater treatment system—**applicable**	40 *CFR* 268.1(c)(4)(iv); TDEC 0400-12-01-10(1)(a)(3)(iv)(IV)	
Discharge of treated water into UEFPC	All discharges of industrial waste or other waste shall receive, prior to discharge, the degree of treatment or effluent reduction necessary to comply with water quality standards, or state or federal laws and regulations pursuant thereto, and where appropriate will comply with the standards of performance as required by the Tennessee Water Quality Control Act (TCA §§69-3-101, et. seq.)	Point source discharge(s) of pollutants into surface waters of the state as defined in TCA 69-3-103(33)—**applicable**	TDEC 0400-40-03-.05(6) TDEC 0400-40-05-.08(g) 40 *CFR* 122.44	Sect. 3.1 Project Goals, Sect. 3.2 Performance Monitoring
Point source effluent limitations and standards – technology based	For industrial discharges without applicable federal effluent guidelines, best professional judgment should be employed to determine appropriate effluent limitations and standards.	Industrial point source discharges without applicable federal effluent guidelines—**applicable**	TDEC 0400-40-05-.09(1)(b)(2)	Sect. 3.2 Performance Monitoring
Point source effluent limitations and standards – water-quality based	Effluent limitations on toxic substances will be required in accordance with TDEC's General Water Quality Criteria using the LC_{50} and/or IC_{25} criteria and appropriate application factor for each toxic parameter.	Point source discharge(s) of pollutants into waters of the U.S.—**applicable**	TDEC 0400-40-05-.10(1)	Sect. 3.2 Performance Monitoring
	Appropriate limitations on organic related and other oxygen demanding parameters will be required to ensure adequate dissolved oxygen in the state's waters in accordance with TDEC's General Water Quality Criteria.		TDEC 0400-40-05-.10(2)	
	Effluent limitations may be required to insure compliance with the Antidegradation Statement in TDEC 0400-40-03-.06.		TDEC 0400-40-05-.10(4)	

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Antidegradation requirements	New or increased discharges that would cause measurable degradation of the parameter that is unavailable shall not be authorized. Nor will discharges be authorized if they cause additional loadings of unavailable parameters that are bioaccumulative or that have criteria below current method detection levels.	Waters with "unavailable parameters" [as defined in TDEC 0400-40-03-.06(2)]—**applicable**	TDEC 0400-40-03-.06(2)(a)	Sect. 3.2 Performance Monitoring
	No new or expanded water withdrawals that will cause additional measurable degradation of the unavailable parameter shall be authorized.		TDEC 0400-40-03-.06(2)(b)	
	Where one or more of the parameters comprising the habitat criterion are unavailable, activities that cause additional degradation of the unavailable parameter or parameters above the level of de minimis shall not be authorized.		TDEC 0400-40-03-.06(2)(c)	
Bypass of untreated water	Bypass, as defined in Rule 0400-40-05-.02, is prohibited unless: • bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; • there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and • for anticipated bypass, prior notice is given, if possible, at least ten days before the date of the bypass; or • for unanticipated bypass, notice is submitted of an unanticipated bypass within 24 hours from the time that the operator becomes aware of the bypass.	Point source discharge(s) of pollutants into waters of the U.S.—**applicable**	TDEC 0400-40-05-.07(2)(l)	Sect. 3.1 Project Goals, Sect. 3.2 Performance Monitoring, Sect. 4.1.1 Headworks, Sect. 4.2 Operations and Maintenance
	A bypass that does not cause effluent limitations to be exceeded may be allowed only if the bypass is necessary for essential maintenance to assure efficient operation.		TDEC 0400-40-05-.07(2)(m)	

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Emissions from water treatment off-gas system	Discharge of air contaminants must be in accordance with the appropriate provisions of Rules of the TDEC Chap. 1200-03 et. seq., any applicable measures of control strategy, and provisions of the Tennessee Air Quality Act.	Emissions of air pollutants from new air contaminant sources—**applicable**	TDEC 1200-03-09-.01(1)(d)	Sect. 5.2 ES&H
	Source impact analysis shall demonstrate that allowable emission increases would not cause or contribute to air pollution in violation of any ambient air quality standard in Chap. 1200-03-03, of any national ambient air quality standard, or any applicable maximum allowable increase as defined in TDEC 1200-03-09-.01(4) (i.e., maximum increase in pollutant over baseline concentrations).		TDEC 1200-03-09-.01(1)(f)	
	Radionuclide emission measurements in conformance with 40 CFR 61.93(b) shall be made. Shall measure all radionuclides which could contribute greater than 10 percent of the potential EDE for a release point.	Release points which have the potential to discharge radionuclides into the air in quantities which could cause an EDE in excess of 1 percent of 10 mrem/year to any member of the public—**applicable**	40 *CFR* 61.93(b)(4)(i) TDEC 1200-3-11-.08(6)	
	Periodic confirmatory measurements shall be made to verify low emissions.	Other release points which have the potential to release radionuclides into the air—**applicable**		
Waste Generation, Characterization, Segregation, and Storage				
Characterization of solid waste	Must determine if solid waste is hazardous waste or if waste is excluded under 40 *CFR* 261.4(b); and	Generation of solid waste as defined in 40 *CFR* 261.2 and which is not excluded under 40 *CFR* 261.4(a)—**applicable**	40 *CFR* 262.11(a) TDEC 0400-12-01-.03(1)(b)(1)	Sect. 5.1 Waste Management Plan
	Must determine if waste is listed under 40 *CFR* Part 261; or		40 *CFR* 262.11(b) TDEC 0400-12-01-.03(1)(b)(2)	
	Must determine whether the waste is identified in Subpart C of 40 *CFR* 261, characterizing the waste by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used.		40 *CFR* 262.11(c) TDEC 0400-12-01-.03(1)(b)(3)	
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chap. 40 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste which is determined to be hazardous—**applicable**	40 *CFR* 262.11(d); TDEC 0400-12-01-.03(1)(b)(4)	

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Characterization of hazardous waste	Must obtain a detailed chemical and physical analysis on a representative sample of the waste(s), which at a minimum contains all the information that must be known to treat, store, or dispose of the waste in accordance with pertinent sections of 40 *CFR* 264 and 268.	Generation of RCRA-hazardous waste for storage, treatment or disposal—**applicable**	40 *CFR* 264.13(a)(1) TDEC 0400-12-01-.06(2)(d)(1)	Not applicable (no RCRA/ waste is expected)
	Must determine if the waste meets the treatment standards in 40 *CFR* 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge of waste.		40 *CFR* 268.7(a) TDEC 0400-12-01-.10(1)(g)(1)(i)	
	Must determine the underlying hazardous constituents (as defined in 40 *CFR* 268.2[i]) in the waste.	Generation of RCRA characteristic hazardous waste (and is not D001 non-waste waters treated by CMBST, RORGS, or POLYM of Sect. 268.42 Table 1) for storage, treatment or disposal — **applicable**	40 *CFR* 268.9(a) TDEC 0400-12-01-.10(1)(i)(1)	
	Must determine if the waste is restricted from land disposal under 40 *CFR* 268 et. seq. by testing in accordance with prescribed methods or use of generator knowledge of waste.		40 *CFR* 268.7 TDEC 0400-12-01-.10(1)(g)(1)(i)	
	Must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 *CFR* 268.40 et. seq.		40 *CFR* 268.9(a) TDEC 0400-12-01-.10(1)(i)(1)	
Temporary storage of hazardous waste in containers onsite – "Satellite Accumulation Area"	A generator may accumulate as much as 55 gal of hazardous waste at or near any point of generation where wastes initially accumulate which is under the control of the operator of the process generating waste provided that he: • complies with 40 *CFR* 265.171, 265.172 and 265.173(a); and	Accumulation of 55 gal or less of RCRA hazardous waste at or near any point of generation—**applicable**	40 *CFR* 262.34(c)(1)(i) TDEC 0400-12-01-.03(4)(e)(5)(i)(I)	Not applicable (no RCRA/ waste is expected)
	• container is marked with the words "Hazardous Waste" or with other words that identify contents.		40 *CFR* 262.34(c)(1)(ii) TDEC 0400-12-01-.03(4)(e)(5)(i)(II)	
Temporary storage of hazardous waste in containers onsite – "90-Day Storage Area"	A generator may accumulate hazardous waste at the facility provided that: • the waste is placed in containers that comply with Subparts I, AA, BB, and CC of 40 *CFR* 265; and	Accumulation of RCRA hazardous waste onsite as defined in 40 *CFR* 260.10—**applicable**	40 *CFR* 262.34(a)(1)(i) TDEC 0400-12-01-.03(4)(e)(2)(i)(I)	Not applicable (no RCRA/ waste is expected)

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Temporary storage of hazardous waste in containers onsite – "90-Day Storage Area" (cont.)	• container is marked with the date upon which each period of accumulation begins; and		40 *CFR* 262.34(a)(2) TDEC 0400-12-01-.03(4)(e)(2)(ii)	
	• container is marked with the words "Hazardous Waste"		40 *CFR* 262.34(a)(3) TDEC 0400-12-01-.03(4)(e)(2)(iii)	
Use and management of hazardous waste in containers	If container is not in good condition (e.g., severe rusting, structural defects) or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers—**applicable**	40 *CFR* 265.171 TDEC 0400-12-01-.05(9)(b)	Not applicable (no RCRA/ waste is expected)
	Use container made or lined with materials compatible with waste to be stored so that the ability of the container is not impaired.		40 *CFR* 265.172 TDEC 0400-12-01-.05(9)(c)	
	Keep containers closed during storage, except to add/remove waste.		40 *CFR* 265.173(a) TDEC 0400-12-01-.05(9)(d)(1)	
	Open, handle and store containers in a manner that will not cause containers to rupture or leak.		40 *CFR* 265.173(b) TDEC 0400-12-01-.05(9)(d)(2)	
Storage of hazardous waste in container area	Area must have a containment system designed and operated in accordance with 40 *CFR* 264.175(b).	Storage of RCRA-hazardous waste in containers with free liquids—**applicable**	40 *CFR* 264.175(a) TDEC 0400-12-01-.06(9)(f)(1)	Not applicable (no RCRA/ waste is expected)
	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or Containers must be elevated or otherwise protected from contact with accumulated liquid.	Storage of RCRA-hazardous waste in containers that do not contain free liquids — **applicable**	40 *CFR* 264.175(c) TDEC 0400-12-01-.06(9)(f)(3)	

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Management of PCB waste	Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* 761, Subpart D.	Generation of waste containing PCBs at concentrations 50 ppm—**applicable**	40 *CFR* 761.50(a)	Not applicable (no PCB waste is expected)
	Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Generation of PCB remediation waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.61	
Management of PCB/radioactive waste	Any person storing such waste must do so taking into account both its PCB concentration and radioactive properties, except as provided in 40 *CFR* 761.65(a)(1), (b)(1)(ii) and (c)(6)(i).	Generation for disposal of PCB/ radioactive waste with ≥ 50 ppm PCBs —**applicable**	40 *CFR* 761.50(b)(7)(i)	Not applicable (no PCB/radioactive waste is expected)
	Any person disposing of such waste must do so taking into account both its PCB concentration and its radioactive properties.		40 *CFR* 761.50(b)(7)(ii)	
	If, after taking into account only the PCB properties in the waste, the waste meets the requirements for disposal in a facility permitted, licensed, or registered by a state as a municipal or non-municipal nonhazardous waste landfill (e.g., PCB bulk product waste under 40 *CFR* 761.62[b][1]), the person may dispose of such waste without regard to the PCBs, based on its radioactive properties alone in accordance with applicable requirements.			
Temporary storage of PCB waste in containers	Container(s) shall be marked as illustrated in 40 *CFR* 761.45(a).	Storage of PCBs and PCB items at concentrations ≥50 ppm for disposal —**applicable**	40 *CFR* 761.65(c)(1)	Not applicable (no PCB waste is expected)
	A notation must be attached to the PCB container indicating the date the item was removed from service.		40 *CFR* 761.65(c)(1)	
	Storage area must be properly marked as required by 40 *CFR* 761.40(a)(10).		40 *CFR* 761.65(c)(3)	
	Any leaking PCB Items and their contents shall be transferred immediately to a properly marked non-leaking container(s).		40 *CFR* 761.65(c)(5)	
	Except as provided in 40 *CFR* 761.65(c)(6)(i) and (ii), container(s) shall be in accordance with requirements set forth in DOT HMR at 49 *CFR* 171-180.		40 CFR 761.65(c)(6)	

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Storage of PCB/ radioactive waste in containers	For liquid wastes, containers must be non-leaking.	Storage of PCB/radioactive waste in containers other than those meeting DOT HMR performance standards—**applicable**	40 *CFR* 761.65(c)(6)(i)(A)	Not applicable (no PCB/radioactive waste is expected)
	For non-liquid wastes, containers must be designed to prevent buildup of liquids if such containers are stored in an area meeting the containment requirements of 40 *CFR* 761.65(b)(1)(ii).		40 *CFR* 761.65(c)(6)(i)(B)	
	For both liquid and nonliquid wastes, containers must meet all regulations and requirements pertaining to nuclear criticality safety.		40 *CFR* 761.65(c)(6)(i)(C)	
Storage of PCB waste and/or PCB/radioactive waste in a RCRA-regulated container storage area	Does not have to meet storage unit requirements in 40 *CFR* 761.65(b)(1) provided unit:	Storage of PCBs and PCB items designated for disposal—**applicable**	40 *CFR* 761.65(b)(2)	Not applicable (no PCB/radioactive waste is expected)
	• is permitted by EPA under RCRA Sect. 3004, or		40 *CFR* 761.65(b)(2)(i)	
	• qualifies for interim status under RCRA Sect. 3005, or		40 *CFR* 761.65(b)(2)(ii)	
	• is permitted by an authorized state under RCRA Sect. 3006, and		40 *CFR* 761.65(b)(2)(iii)	
	• PCB spills cleaned up in accordance with Subpart G of 40 *CFR* 761.		40 *CFR* 761.65(c)(1)(iv)	
Treatment/Disposal of Waste				
Disposal of RCRA-hazardous waste in a land-based unit	May be land disposed only if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 *CFR* 268.40 before land disposal. The table lists either "total waste" standards, "waste-extract" standards, or "technology-specific" standards (as detailed further in 40 *CFR* 268.42).	Land disposal, as defined in 40 *CFR* 268.2, of restricted RCRA waste—**applicable**	40 *CFR* 268.40(a) TDEC 0400-12-01-.10(3)(a)	Not applicable (no RCRA/ waste is expected)
	For characteristic wastes (D001–D043) that are subject to the treatment standards, all underlying hazardous constituents must meet the UTSs specified in 40 *CFR* 268.48.	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment unit that is regulated under the CWA, that is CWA equivalent, or that is injected into a Class I nonhazardous injection well—**applicable**	40 *CFR* 268.40(e) TDEC 0400-12-01-.10(3)(a)(5)	Not applicable (no RCRA/ waste is expected)

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Disposal of RCRA-hazardous waste in a land-based unit (cont.)	Soils may be land disposed if treated prior to disposal according to the alternative treatment standards of 40 *CFR* 268.49(c) or according to the UTS specified in 40 *CFR* 268.48 applicable to the listed hazardous waste and/or applicable characteristic of hazardous waste if the soil is characteristic.	Land disposal, as defined in 40 *CFR* 268.2, of restricted hazardous soils —**applicable**	40 *CFR* 268.49(b) TDEC 0400-12-01-.10(3)(j)(2)	Not applicable (no RCRA/ waste is expected)
Variance from a treatment standard for RCRA restricted hazardous wastes	A variance from a treatment standard may be approved if it is: • not physically possible to treat the waste to the level specified in the treatment standard, or by the method specified as the standard; or • inappropriate to require the waste to be treated to the level specified in the treatment standard or by the method specified as the treatment standard even though such treatment is technically possible.	Generation of a RCRA hazardous waste requiring treatment prior to land disposal—**applicable**	40 *CFR* 268.44 TDEC 0400-12-01-.10(3)(e)	Not applicable (no RCRA/ waste is expected)
Disposal of RCRA wastewaters in a CWA wastewater treatment unit	Are not prohibited, unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 268.40, or are D003 reactive cyanide.	Restricted RCRA characteristic hazardous wastewaters managed in a wastewater treatment system which is NPDES permitted—**applicable**	40 *CFR* 268.1(c)(4)(iv) TDEC 0400-12-01-.10(1)(a)(3)(iv)(IV)	Not applicable (no RCRA/ waste is expected)
Disposal of PCB decontamination waste and residues	Shall be disposed of at their existing PCB concentration unless otherwise specified in 40 *CFR* 761.79(g).	PCB decontamination waste and residues for disposal—**applicable**	40 *CFR* 761.79(g)	Not applicable (no PCB waste is expected)
Disposal of PCB cleanup wastes	Shall be disposed of either: • in a facility permitted, licensed or registered by a state to manage municipal solid waste under 40 *CFR* 258 or non-municipal, nonhazardous waste subject to 40 *CFR* 257.5 thru 257.30; or • in a RCRA Subtitle C landfill permitted by a state to accept PCB waste; or • in an approved PCB disposal facility; or • through decontamination under 40 *CFR* 761.79(b) or (c).	Generation of non-liquid PCBs at any concentration during and from the cleanup of PCB remediation waste—**applicable**	40 *CFR* 761.61(a)(5)(v)(A)	Not applicable (no PCB waste is expected)

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Disposal of PCB cleaning solvents, abrasives, and equipment	May be reused after decontamination in accordance with 40 *CFR* 761.79. For liquids, disposed of in accordance with 40 *CFR* 761.60(a).	Generation of PCB wastes from the cleanup of PCB remediation waste—**applicable**	40 *CFR* 761.61(a)(5)(v)(B)	Not applicable (no PCB waste is expected)
Performance-based disposal of liquid PCB remediation waste	Shall be disposed of according to 40 *CFR* 761.60(a) or (e), or decontaminate in accordance with 40 *CFR* 761.79.	Disposal of liquid PCB remediation waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.61(b)(1)	Not applicable (no PCB waste is expected)
Performance-based disposal of PCB remediation waste	May dispose by one of the following methods: • in a high-temperature incinerator approved under 40 *CFR* 761.70(b), • by an alternate disposal method approved under 40 *CFR* 761.60(e), • in a chemical waste landfill approved under 40 *CFR* 761.75, • in a facility with a coordinated approval issued under 40 *CFR* 761.77, or • through decontamination in accordance with under 40 *CFR* 761.79	Disposal of non-liquid PCB remediation waste as defined in 40 *CFR* 761.3 —**applicable**	40 *CFR* 761.61(b)(2) 40 *CFR* 761.61(b)(2)(i) and (ii)	Not applicable(no PCB waste is expected)
Risk-based disposal of PCB remediation waste	May be disposed of in a manner other than prescribed in 40 *CFR* 761.61 (a) or (b) if approved in writing by EPA and method will not pose an unreasonable risk of injury to human health or the environment.	Disposal of PCB remediation waste —**applicable**	40 *CFR* 761.61(c)	Not applicable (no PCB waste is expected)
Disposal of universal waste	The generator of the universal waste must determine whether the waste exhibits a characteristic of hazardous waste. If it is determined to exhibit such a characteristic, it must be managed in accordance with TDEC 0400-12-01-.01 through .10. If the waste is not hazardous, the generator may manage and dispose of the waste in any way that is in compliance with applicable federal, state, and local solid waste regulations.	Generation of universal waste (as defined in 40 *CFR* 273) for disposal—**applicable**	40 *CFR* 273.33 TDEC 0400-12-01-.12(3)(d)	Sect. 5.1 Waste Management Plan
Disposal of asbestos-containing waste material (e.g., pipe lagging, insulation, ceiling tiles)	All asbestos-containing waste material must be deposited as soon as practicable at a waste disposal site operated in accordance with Section 61.154 or a site that converts RACM and asbestos-containing waste material into non-asbestos (asbestos free) material according to the provisions of 40 *CFR* 61.155.	Removal and disposal of RACM except Category I nonfriable asbestos containing material—**applicable**	40 *CFR* 61.150(b)(1) and (2) TDEC 1200-03-11-.02(2)(j)(2)(i) and (ii)	Sect. 5.1 Waste Management Plan

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
		Transportation		
Transportation of hazardous materials	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material shall be subject to and must comply with all applicable provisions of the HMTA and HMR at 49 *CFR* 171–180.	Transportation of hazardous materials offsite "in commerce"—**applicable**	49 *CFR* 171.1(c)	Sect. 5.1 Waste Management Plan
Transportation of PCB wastes	Must comply with the manifesting provisions at 40 *CFR* 761.207 through 40 *CFR* 761.218.	Relinquishment of control over PCB wastes by transporting, or offering for transport—**applicable**	40 *CFR* 761.207 (a)	Not applicable (no PCB waste is expected)
Transportation of universal waste offsite	Offsite shipments of universal waste by a large quantity handler of universal waste shall be made in accordance with 40 *CFR* 273-38 (TDEC 0400-12-01-.12[3][i]).	Offsite shipment of universal waste by a large quantity generator of universal waste—**applicable**	40 *CFR* 273.38 TDEC 0400-12-01-.12(3)(i)	Sect. 5.1 Waste Management Plan
Transportation of used oil offsite	Except as provided in paragraphs (a) to (c) of this rule, generators must ensure that their used oil is transported by transporters who have obtained EPA ID numbers.	Offsite shipment of used oil by generators of used oil—**applicable**	40 *CFR* 279.24 TDEC 0400-12-01-.11(3)(e)	Sect. 5.1 Waste Management Plan
Transportation of hazardous waste offsite	Must comply with the generator requirements of 40 *CFR* 262.20–23 for manifesting, Sect. 262.30 for packaging, Sect. 262.31 for labeling, Sect. 262.32 for marking, Sect. 262.33 for placarding, Sect. 262.40, 262.41(a) for record keeping requirements, and Sect. 262.12 to obtain EPA ID number.	Offsite transportation of RCRA hazardous waste—**applicable**	40 *CFR* 262.10(h) TDEC 0400-12-01-.03(1)(a)(8)	Not applicable (no RCRA/ waste is expected)
	Must comply with the requirements of 40 *CFR* 263.11-263.31.	Transportation of hazardous waste within the United States requiring a manifest—**applicable**	40 *CFR* 263.10(a) TDEC 0400-12-01-.04(1)(a)(1)	Not applicable (no RCRA/ waste is expected)
	A transporter who meets all applicable requirements of 49 *CFR* 171-179 and the requirements of 40 *CFR* 263.11 and 263.31 will be deemed in compliance with 40 *CFR* 263.			Not applicable (no RCRA/ waste is expected)

Table A.2. Y-12 OF200 action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
	The generator manifesting requirements of 40 *CFR* 262.20–262.32(b) do not apply. Generator or transporter must comply with the requirements set forth in 40 *CFR* 263.30 and 263.31 in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way—**applicable**	40 *CFR* 262.20(f) TDEC 0400-12-01-.03(3)(a)(6)	Not applicable (no RCRA/ waste is expected)

ARAR = applicable or relevant and appropriate requirement
CFR = Code of Federal Regulations
CMBST = Combustion
CWA = Clean Water Act of 1972
DEACT = deactivation
DOE = U.S. Department Energy
DOT = U.S. Department of Transportation
EDE = effective dose equivalent
EPA = U.S. Environmental Protection Agency
ES&H = environment, safety, and health
FR = Federal Register
HMR = Hazardous Materials Regulations
HMTA = Hazardous Materials Transportation Act
ID = identification
NPDES = National Pollutant Discharge Elimination System
OF = Outfall
PCB = polychlorinated biphenyl
POLYM = Polymerization
RACM = regulated asbestos-containing material
RCRA = Resource Conservation and Recovery Act of 1976
RORGS = Recovery of Organics
TBC = To Be Considered
TCA = Tennessee Code Annotated
TDEC = Tennessee Department of Environment and Conservation
UEFPC = Upper East Fork Poplar Creek
UTS = Universal Treatment Standard
Y-12 = Y-12 Nuclear Security Complex

Table A.3. Y-12 OF200 chemical-specific ARARs

Action/medium	Requirements	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Surface water quality criteria for release of treated water into UEFPC	Waters shall not contain substances or combination of substances including disease-causing agents which, by way of either direct exposure or indirect exposure through food chains, may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), physical deformations, or restrict or impair growth in fish or aquatic life or their offspring.	Release of wastewater or effluents into surface water—**applicable** as instream criteria beyond the mixing zone[a]	TDEC 0400-40-03-.03(3) – (6)	Sect. 3.3 Performance Monitoring, Sect. 4.4.1 Erosion and Dust Control
	Water shall not contain toxic substances that will render the water unsafe or unsuitable for water contact activities, including the capture and subsequent consumption of fish and shellfish, or will propose toxic conditions that will adversely affect man, animal, aquatic life, or wildlife.			Sect. 3.3 Performance Monitoring, Sect. 4.4.1 Erosion and Dust Control
	Water shall not contain other pollutants that will be detrimental to fish or aquatic life, or adversely affect the quality of the waters for recreation, irrigation, or livestock watering and wildlife.			Sect. 3.3 Performance Monitoring, Sect. 4.4.1 Erosion and Dust Control
Radionuclides in the environment	Exposure to individual members of the public from radiation shall not exceed a TED of 0.1 rem/year (100 mrem/year), exclusive of the dose contributions from background radiation, any medical administration the individual has received, or voluntary participation in medical/research programs.	Release of radionuclides to the environment from an active NRC-licensed operation—**relevant and appropriate**	TDEC 0400-20-05-.60(1)(a)	Sect. 5.2 ES&H Plan
	The dose in any unrestricted area from external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with 1200-02-07-.35, does not exceed 0.002 rem (0.02 mSv) in any one hour.		TDEC 0400-20-05-.60(1)(b)	Sect. 5.2 ES&H Plan
	Shall use, to the extent practicable, procedures and engineering controls based on sound radiation protection principles to achieve doses to members of the public that are ALARA.		TDEC 0400-20-05-.40(2)	Sect. 5.2 ES&H Plan

[a]The waiver approved in the UEFPC Phase I ROD under CERCLA 121(d)(4)(A) for the AWQC for mercury would not be impacted by this ROD amendment and would remain in effect.

ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate requirement
AWQC = ambient water quality criteria
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
ES&H = environment, safety, and health
NRC = Nuclear Regulatory Commission
OF = Outfall
ROD = Record of Decision
TDEC = Tennessee Department of Environment and Conservation
TED = total effective dose
UEFPC = Upper East Fork Poplar Creek
Y-12 = Y-12 Nuclear Security Complex

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APPENDIX B.
DRAWINGS

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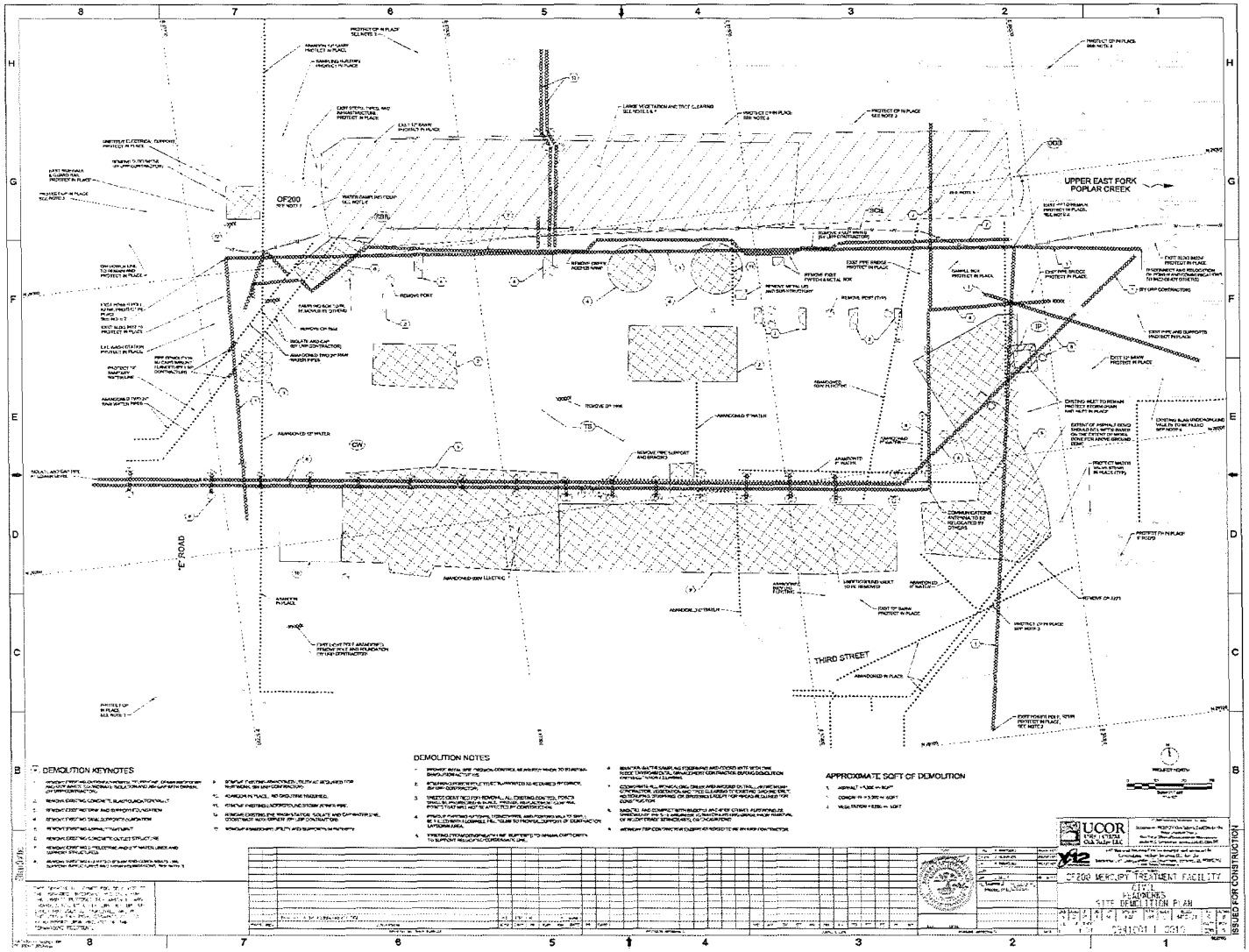
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UCOR
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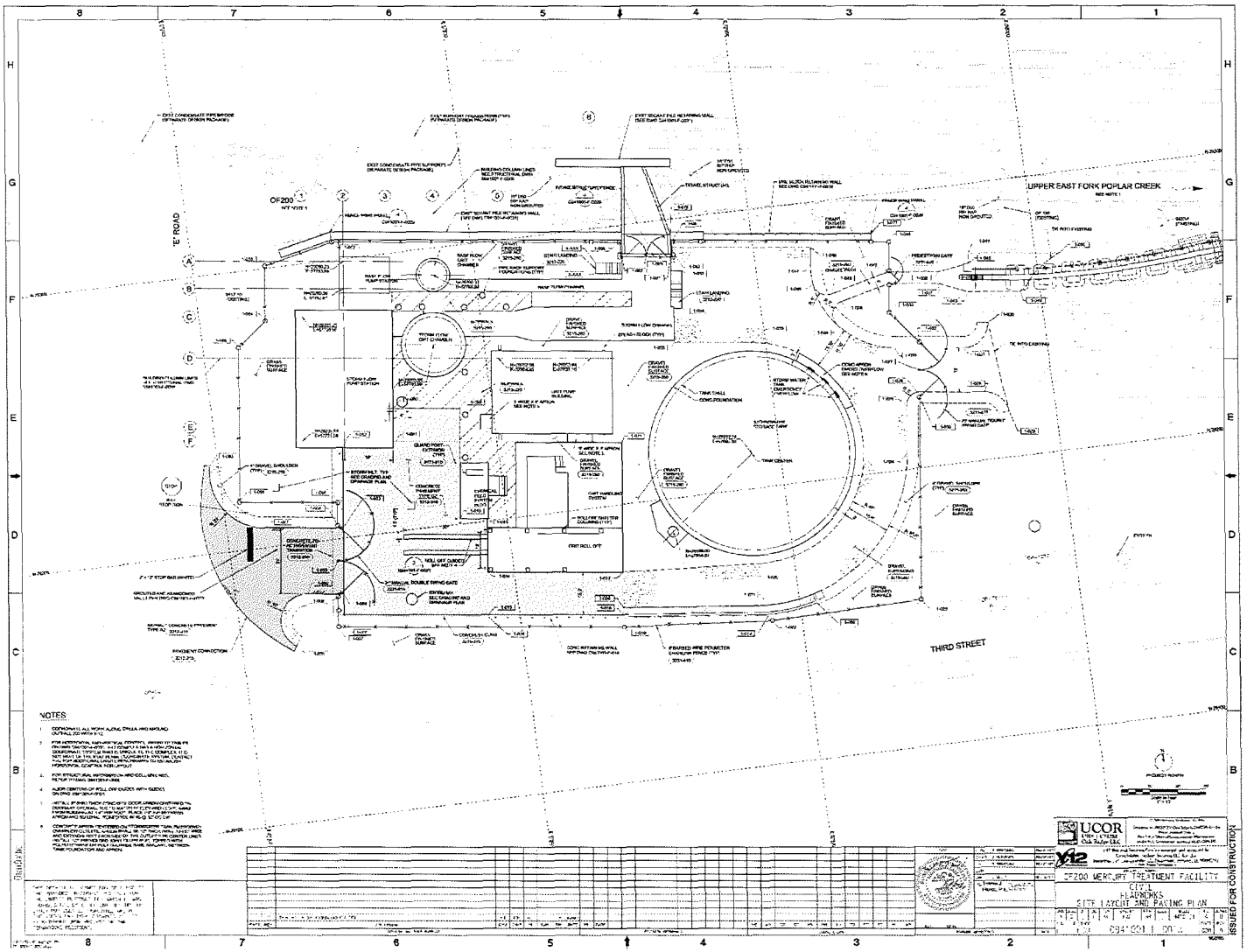
SITE DEMOLITION PLAN
ISSUED FOR CONSTRUCTION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THIRD STREET
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OF200
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UCOR
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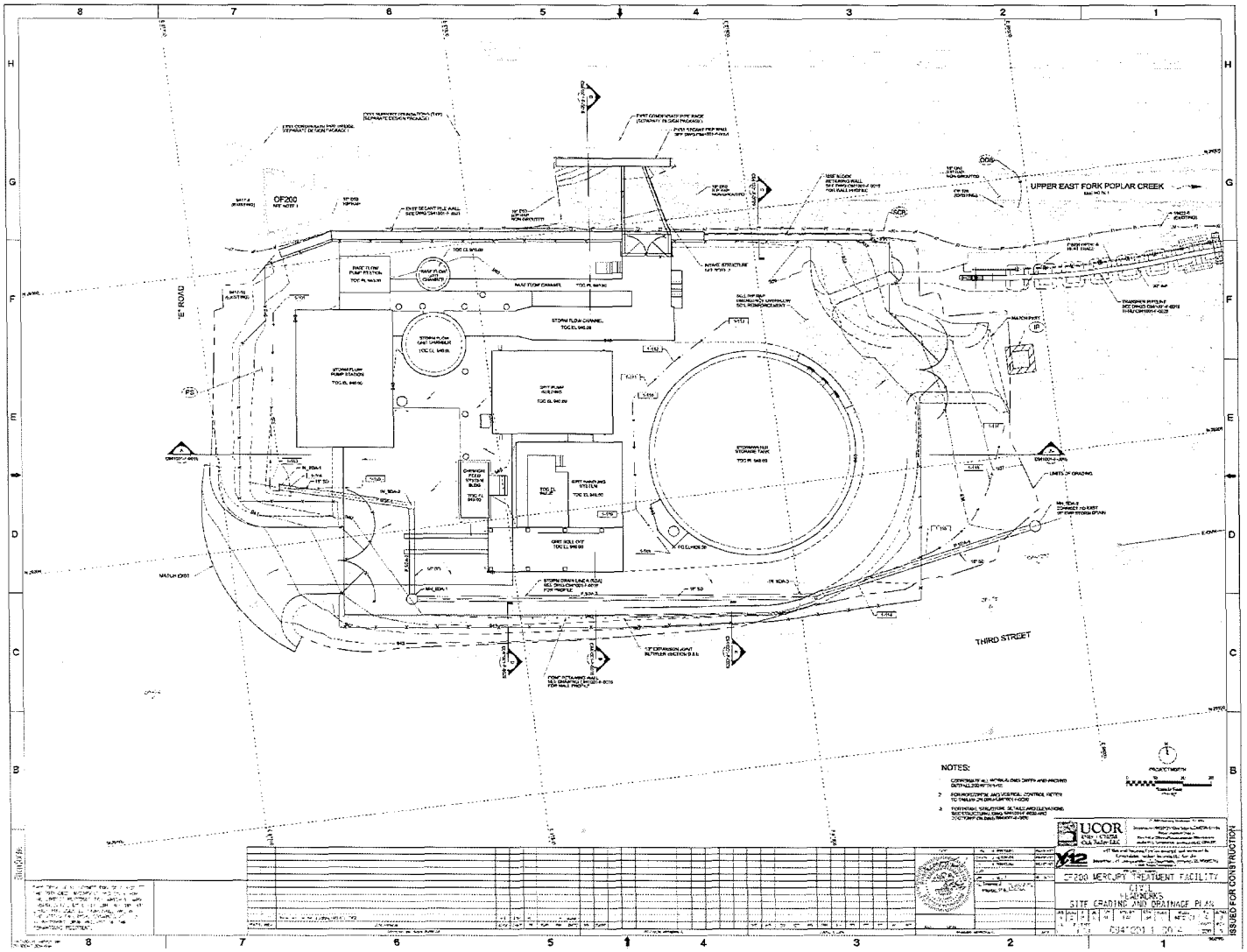
CIVIL
HEADWORKS
SITE LAYOUT AND PAVING PLAN
ISSUED FOR CONSTRUCTION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THIRD STREET
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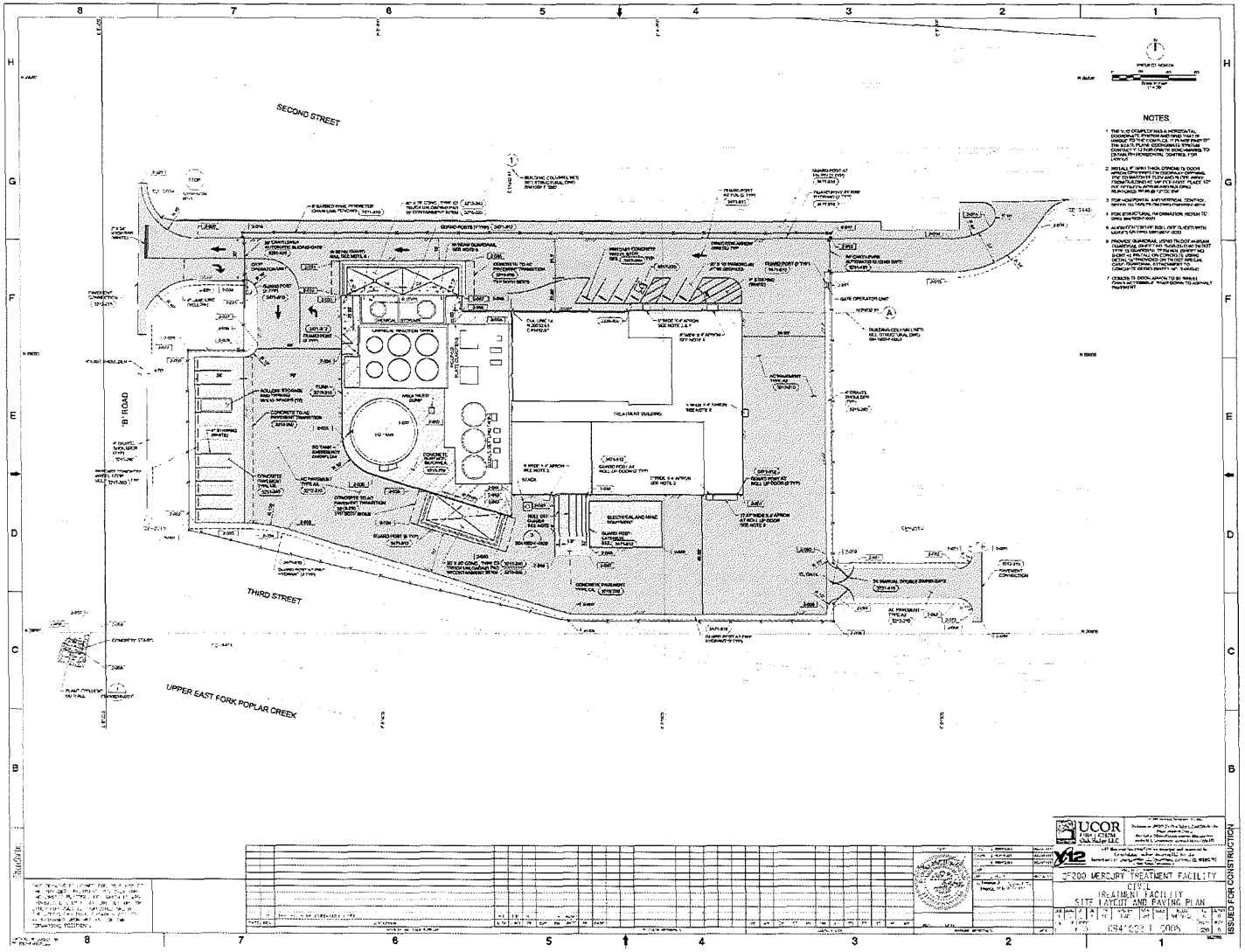
OF200 MERCURY TREATMENT FACILITY
CIVIL
LANDMARKS
SITE GRADING AND DRAINAGE PLAN
ISSUED FOR CONSTRUCTION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THIRD STREET
UPPER EAST FORK POPLAR CREEK
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Y-12
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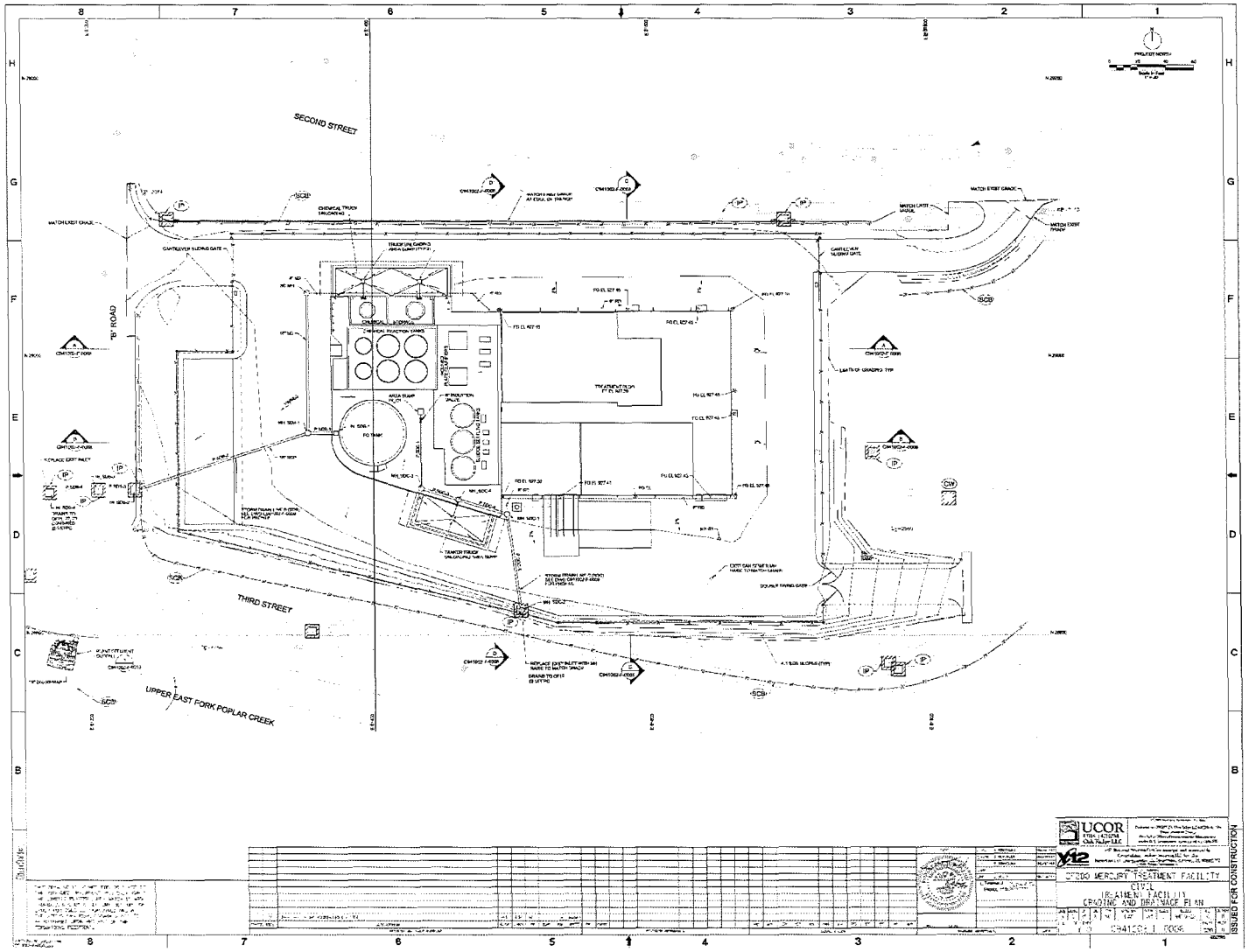
SITE LAYOUT AND PAVING PLAN
ISSUED FOR CONSTRUCTION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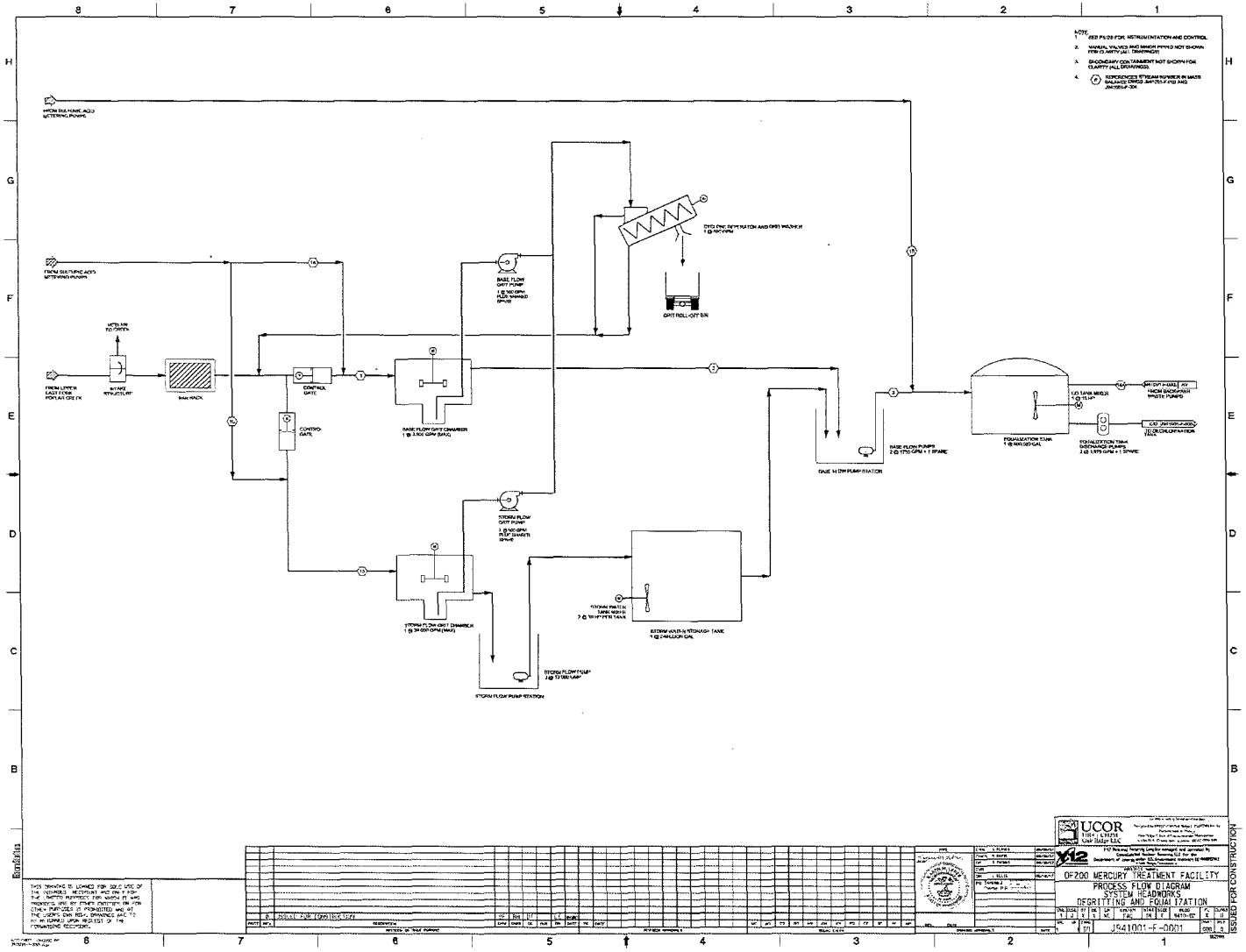
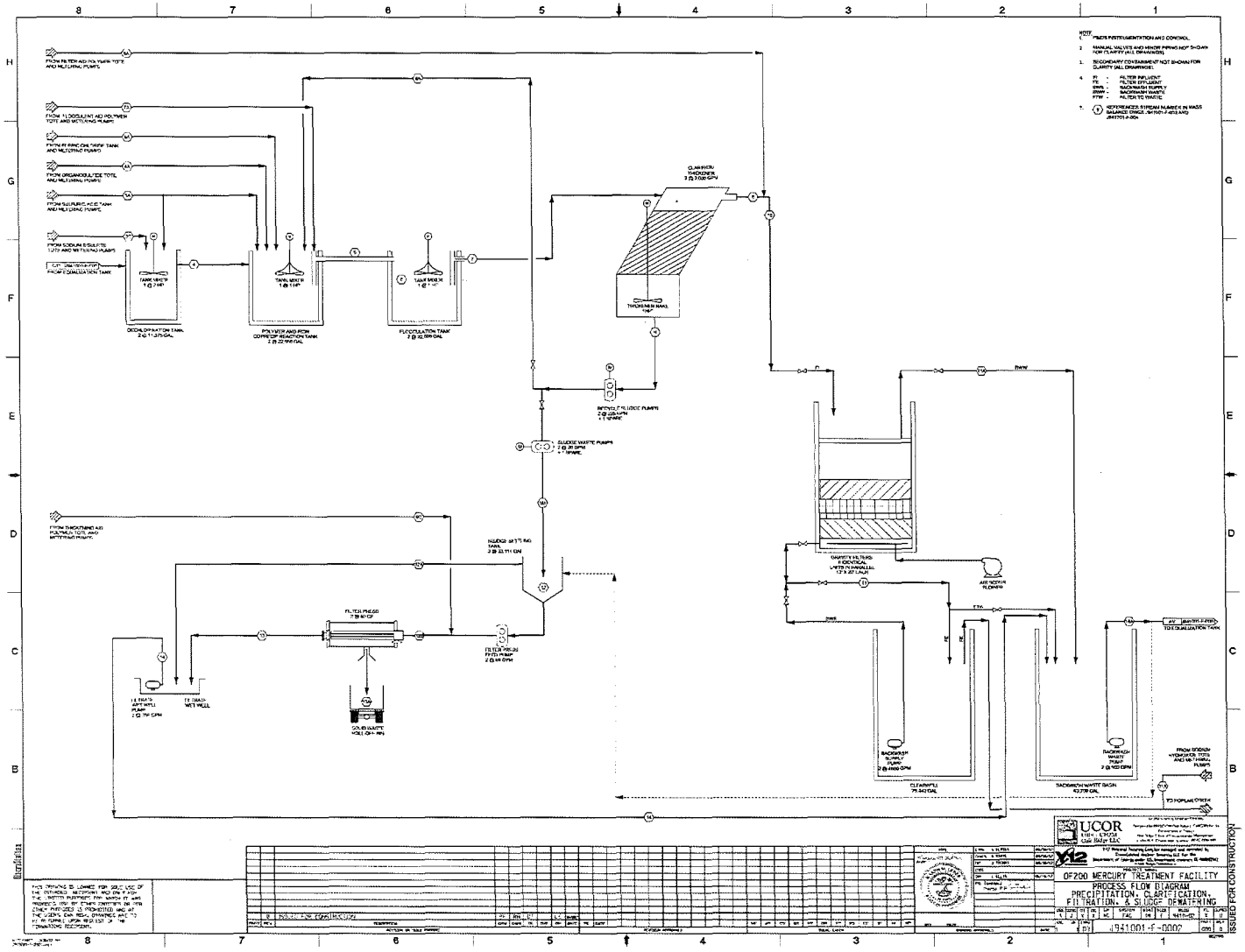
GRADING AND DRAINAGE PLAN
ISSUED FOR CONSTRUCTION


NOTE
1. SEE P&ID FOR INSTRUMENTATION AND CONTROL.
2. MANUAL VALVES AND MINOR PIPING NOT SHOWN FOR CLARITY (ALL DRAWINGS).
3. SECONDARY CONTAINMENT NOT SHOWN FOR CLARITY (ALL DRAWINGS).
4. REFERENCES STREAM NUMBER IN MASS BALANCE DWGS
FROM SULFURIC ACID METERING PUMPS
FROM SULFURIC ACID METERING PUMPS
FROM LIFT STATION
BAR RACK
CONTROL GATE
CONTROL GATE
BASE FLOW GRIT CHAMBER
BASE FLOW GRIT PUMP
GRIT ROLL-OFF BIN
BASE FLOW PUMP STATION
BASE FLOW PUMPS
EQUALIZATION TANK
EQUALIZATION TANK DISCHARGE PUMPS
STORM FLOW GRIT CHAMBER
STORM FLOW GRIT PUMP
STORM FLOW PUMP STATION
STORM WATER STORAGE TANK
UCOR
OF200 MERCURY TREATMENT FACILITY
PROCESS FLOW DIAGRAM
SYSTEM: HEADWORKS
DEGRITTING AND EQUALIZATION
J541001-F-0001
ISSUED FOR CONSTRUCTION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OF200 MERCURY TREATMENT FACILITY
PROCESS FLOW DIAGRAM
PRECIPITATION, CLARIFICATION,
FILTRATION, & SLUDGE DEWATERING
ISSUED FOR CONSTRUCTION

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This CD contains files of the entire set of drawings and specifications.

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APPENDIX C.
WORK PLAN FOR EARLY SITE PREPARATION

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SAFELY DELIVERING THE DEPARTMENT OF ENERGY'S VISION
FOR THE EAST TENNESSEE TECHNOLOGY PARK MISSION

UCOR-4995/R1

Work Plan for Early Site Preparation at the Outfall 200 Water Treatment Facility at the Y-12 National Security Complex, Oak Ridge, Tennessee

This document is approved for public release per review by:

UCOR Classification & Information Control Office

2-24-17
Date

UCOR-4995/R1

Work Plan for Early Site Preparation at the Outfall 200 Water Treatment Facility at the Y-12 National Security Complex, Oak Ridge, Tennessee

Date Issued—July 2017

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

URS | CH2M Oak Ridge LLC
Safely Delivering the Department of Energy's Vision
for the East Tennessee Technology Park Mission
under contract DE-SC-0004645

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APPROVALS

Work Plan for Early Site Preparation at the Outfall 200 Water Treatment Facility at the Y-12 National Security Complex, Oak Ridge, Tennessee	UCOR-4995/R1
	July 2017

USQD Review Determination	☐ USQD ☐ UCD ☐ CAT X ☒ Exempt (Select Criteria 1-3 below.) USQD/UCD/CAT X No.:
Exemption Criteria	☐ (1) Non-Intent Change ☐ (2) DOE-Approved Safety Basis Document ☐ (3) Chief Accounting Officer, Internal Audit, Labor Relations, General Counsel, Outreach & Public Affairs, or Project Controls Services OR ☒ (4) Document identified in USQD-MS-CX-REPORTS-1074/R6
USQD Preparer:	Name: Andrea Bowers — Date: 7/18/17
Exhibit L Mandatory Contractor Document	☐ No (No PCCB Reviewer Signature Required.) ☐ Yes (Requires review by the Proforma Change Control Board.)
PCCB Reviewer:	Name — Date

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REVISION LOG		
Revision Number	Description of Changes	Pages Affected
0	Initial issue of document.	All
1	Clarified scope and ARARs	Chapter 4, Appendix A

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CONTENTS

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FIGURES

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ACRONYMS

ACM	asbestos-containing material
ARAR	applicable or relevant and appropriate requirement
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
EFPC	East Fork Poplar Creek
EPA	U.S. Environmental Protection Agency
S&H	safety and health
ESP	early site preparation
NPDES	National Pollutant Discharge Elimination System
OF200	Outfall 200
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
RCRA	Resource Conservation and Recovery Act of 1976
RDR	Remedial Design Report
RDWP	Remedial Design Work Plan
ROD	Record of Decision
SNM	special nuclear material
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
UEFPC	Upper East Fork Poplar Creek
WEMA	West End Mercury Area
Y-12	Y-12 National Security Complex

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EXECUTIVE SUMMARY

A water treatment facility is being constructed to reduce the release of mercury from Outfall 200 (OF200) into Upper East Fork Poplar Creek at the Y-12 National Security Complex in Oak Ridge, Tennessee. The construction of the water treatment facility is an interim remedial action documented in the *Amendment to the Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee* (DOE/OR/01-2697&D2, U.S. Department of Energy, Oak Ridge, Tennessee, 2016). A Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) is being prepared for the OF200 water treatment facility. This Work Plan for Early Site Preparation (ESP) describes the work that will be performed to prepare the site for construction of the OF200 water treatment facility. This work plan will be an appendix to the RDR/RAWP to formally document the early site preparation activities. The *Federal Facility Agreement for the Oak Ridge Reservation* (DOE/OR-1014, U.S. Department of Energy, Washington, D.C., 1992) Appendix E milestone for submittal of the D1 RDR/RAWP is December 7, 2017.

The OF200 water treatment facility ESP work will be performed at the Headworks site, water transfer pipeline route, and treatment plant site. The primary ESP activities for each location include the following:

- Headworks Site
  - — Install erosion control measures and clear vegetation from the construction area
  - — Demolish/remove existing structures and utilities, concrete slabs, and asphalt pavement, including an existing water augmentation structure
  - — Fill existing tank vaults with flowable fill
  - — Relocate an existing steam condensate return line
  - — Install and tie-in new utilities to the Headworks site boundary, including communications conduit, potable water piping, sanitary sewer piping, storm drain piping, and power lines
  - — Reconfigure existing dechlorination equipment
  - — Install secant pile walls for shoring/bank stabilization
- Transfer Pipeline Route
  - — Clear vegetation at future transfer pipe bridge location
  - — Install underground culvert piping and underground piping at three road crossings
- Treatment Plant Site
  - — Demolish/remove existing structures and utilities, including inactive fire hydrant and post-indicating valves, an overhead power line and pole, and a railroad line and switches.
  - — Install and tie in new utilities to the Treatment Plant site boundary, including communications conduit, potable/fire water piping, sanitary sewer piping, storm drain piping, and a power line.

The activities identified in this report will be implemented through additional work documents such as work packages.

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1. INTRODUCTION AND PURPOSE

The Y-12 National Security Complex (Y-12) is located at the eastern boundary of the U.S. Department of Energy (DOE) Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee. It is bounded by Pine Ridge to the north, Chestnut Ridge to the south, the eastern boundary of the Bear Creek Valley watershed to the west, and the DOE property line to the east. The industrialized area of Y-12 (see Fig. 1) consists of approximately 600 acres located within the Upper East Fork Poplar Creek (UEFPC) watershed.

A water treatment facility is being constructed to reduce the release of mercury from Outfall 200 (OF200) into UEFPC at Y-12. The construction of the water treatment facility is an interim remedial action documented in the *Amendment to the Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee* (DOE/OR/01-2697&D2) (ROD). A Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) is being prepared for the OF 200 water treatment facility.

This Work Plan for Early Site Preparation (ESP) describes the work that will be performed to prepare the site for construction of the OF200 water treatment facility. This work plan will be an appendix to the RDR/RAWP to formally document the early site preparation activities. The Federal Facility Agreement (FFA) (DOE/OR-1014) Appendix E milestone for submittal of the D1 RDR/RAWP is December 7, 2017.

The activities identified in this report will be implemented through additional work documents such as work packages.

The location of the OF200 water treatment facility is shown in Fig. 2.

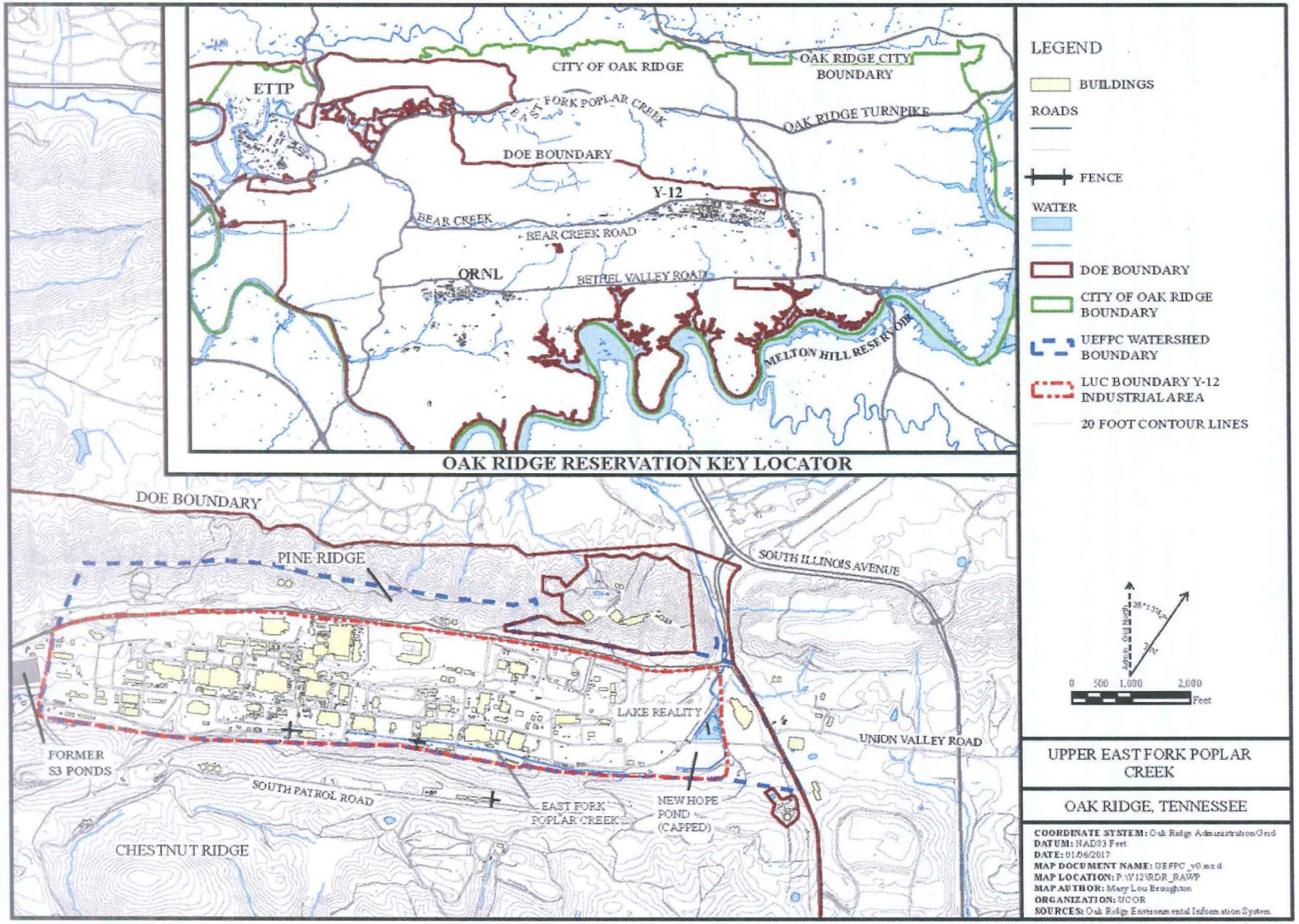

Fig. 1. Location of the UEFPC watershed.

Fig. 2. Location of the OF200 water treatment plant.

The major phases of this work for the ESP include planning and design, procurement, and field activities. The design phase includes developing the plans and specifications, designing and installing the secant pile wall, removing the existing structures, and installing the utilities. The ESP activities will include installation of utilities to be available for the OF200 water treatment facility construction contractor.

2. SITE DESCRIPTION

2.1 SITE DESCRIPTION

The ~34,000-acre ORR is located within and adjacent to the corporate limits of the city of Oak Ridge, Tennessee, in Roane and Anderson Counties. The ORR is bounded to the east and north by the developed portion of the city of Oak Ridge. The ORR hosts three major industrial research and production facilities originally constructed as part of the World War II-era Manhattan Project, East Tennessee Technology Park (ETTP), Oak Ridge National Laboratory (ORNL), and Y-12.

The boundaries of the UEFPC watershed, which includes approximately 1170 acres that encompass the industrialized area of Y-12, extend along the top of Pine Ridge to the north, the top of Chestnut Ridge to the south, the eastern boundary of the Bear Creek Valley watershed to the west, and the DOE property line to the east (Fig. 1).

Y-12 was built by the U.S. Army Corps of Engineers in 1943 as part of the World War II-era Manhattan Project and remains an active manufacturing and developmental engineering facility. It occupies approximately 600 acres within Bear Creek Valley near the northeastern corner of the ORR, adjacent to the city of Oak Ridge. The original mission of the facility was to chemically separate and produce fissile uranium (U)-235 from U-238 using an electromagnetic separation process (alpha process) and to manufacture weapons components as part of the national effort to produce the atomic bomb. As other uranium enrichment processes were developed and implemented at other installations, the role of Y-12 expanded to include weapon components manufacturing and precision machining, research and development, lithium isotope separation, and special nuclear material (SNM) storage and management. The current mission of the facility is multi-faceted and includes National Nuclear Security Administration assignments such as manufacturing and reworking nuclear weapons components, dismantling nuclear weapons components, serving as the nation's stockpile for SNM, and providing special production support to other programs.

Historic manufacturing processes, programs, and waste management practices associated with the Y-12 mission have resulted in the contamination of soil, surface water, sediment, building structures, biota, and groundwater. These processes included chemical separation techniques; weapons manufacturing; research and development; waste storage, management, and disposal; and physical plant maintenance activities that resulted in the release of large quantities of mercury to the environment. Because of the contaminant releases at Y-12 and other DOE facilities, the ORR was placed on the EPA National Priorities List that was established under Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (54 *Federal Register* 48184, November 21, 1989).

Historical missions at the Y-12 NSC resulted in the release of contaminants to the environment that created a diverse legacy of contaminated facilities, waste disposal areas, and secondarily contaminated media.

Past releases of mercury from the Y-12 NSC resulted in the contamination of soil and groundwater. The primary pathway of concern is surface water because UEFPC flows directly from Y-12 into the city of Oak Ridge. The surface water discharge contains mercury that enters the storm sewers with groundwater infiltration and from transport within the soil. Residual mercury in the storm drain infrastructure, infiltrating groundwater, and sediment-bound mercury are remobilized and transported through the storm drain network to OF200 and into the UEFPC. Over the past two decades, a series of projects have been implemented that have reduced the concentrations of mercury measured at Station 17. While the mercury concentration in water at Station 17 has declined over the years, the concentration continues to exceed the

surface water ROD and explanation of significant differences goal of less than 200 ng/L of mercury (DOE/OR/01-2539&D2).

Previous actions to reduce the quantity and/or mobilization of mercury-contaminated media in UEFPC have included the following:

- Plugging building floor drains
- Cleaning sediment and sludge from sumps, manholes, drain lines, and storm sewers
- Lining/relining storm sewers and replacing a portion of the storm sewer trunk line
- Rerouting and removing process piping
- Installing the Central Mercury Treatment Facility to capture and treat contaminated sump water
- Demolishing Bldg. 81-10 with closure of a mercury-contaminated sump
- Constructing the Big Spring Water Treatment System for the Bldg. 9201-2 spring

Despite the success of the above actions, an unknown volume of mercury remains entrapped in soils beneath and adjacent to the buildings, storm sewers, and process pipelines, which continues to be released to the storm sewer system.

The OF200 water treatment facility is designed to capture discharges from the West End Mercury Area (WEMA) storm sewer system to UEFPC under base flow and storm flow conditions to mitigate uncontrolled releases of mercury into UEFPC surface water. Stormwater storage capacity will allow the collection of flow exceeding treatment capacity for future treatment and will reduce the frequency that OF200 discharges will bypass the facility without treatment. Stormwater capture is targeted to maximize mercury flux reduction. Collected water will be treated to meet a goal of 51 ng/L total mercury in the treated effluent for discharge to UEFPC. Treated effluent from the OF200 water treatment facility will be discharged in compliance with applicable or relevant and appropriate requirements (ARARs) and at levels that are protective of the receiving water. Appendix A contains a summary table of ARARs, including a crosswalk that shows how each is met. Discharges from OF200 that exceed the facility's treatment capacity and stormwater storage capacity will bypass the OF200 water treatment facility. As described in the ROD Amendment (DOE/OR/01-2697&D2), the mercury flux to UEFPC from OF200, including any water bypassing the OF200 water treatment facility, will be limited to a daily maximum concentration of 2000 ng/L total mercury and an annual rolling flux of 1 kg/year total mercury.

2.2 SITE ECOLOGY

The ecology of the UEFPC watershed has been and continues to be strongly influenced by anthropogenic structures and industrial activities. Most of the UEFPC watershed is covered with concrete, gravel, asphalt, industrial structures, or grass. The UEFPC provides very little habitat for terrestrial vertebrate animals; woodchuck, opossum, raccoon, and striped skunk are among the largest and most abundant mammals. Although surveys of protected vertebrates inhabiting the ORR are not comprehensive, the likelihood of federally or state-listed species is very low. Various birds nest and forage in the UEFPC watershed, including the belted kingfisher.

There are two dominant aquatic features in the watershed, UEFPC and Lake Reality. The UEFPC channel has been extensively modified over the years by the installation of structures such as road crossings and weirs and through significant use of riprap and erosion controls. Much of the channel lacks riparian vegetation. Historically, mostly for security reasons, trees have not been permitted. The UEFPC channel aquatic habitat differs substantially from creeks in more natural settings, lacking the "pool and riffle"

morphology often associated with creeks in such settings. Lake Reality is a plastic-lined, flat-bottomed, steep-sided settling and spill control basin that is home to turtles and fish, but does not support much vegetation.

Y-12 contains no designated habitat that could support threatened or endangered species of plants, however, most of the area has not been directly surveyed. In 1997, a small wetland was identified just outside the complex in an area between New Hope Cemetery and Bear Creek Road. The area is dominated by jewelweed, cardinal flower, and microstegium as groundcover species and sycamore, red maple, ironwood, and green ash as woody species, none of which is threatened, endangered, or in need of special protection.

Several species of submersed macrophytes and emergent aquatic plants previously grew in and near the edge of the former New Hope Pond. None of these are considered to be rare or endangered.

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3. PROJECT DESCRIPTION

3.1 PROJECT GOALS

The OF200 water treatment facility is designed to capture discharges from the WEMA storm sewer system to UEFPC under base flow and storm flow conditions to mitigate uncontrolled releases of mercury into UEFPC surface water. Stormwater storage capacity will allow the collection of flow exceeding treatment capacity for future treatment and will reduce the frequency that OF200 discharges will bypass the facility without treatment. Stormwater capture is targeted to maximize mercury flux reduction. Collected water will be treated to meet a goal of 51 ng/L total mercury in the treated effluent for discharge to UEFPC. Treated effluent from the OF200 water treatment facility will be discharged in compliance with ARARs and at levels that are protective of the receiving water. Discharges from OF200 that exceed the facility's treatment capacity and stormwater storage capacity will bypass the OF200 water treatment facility. As described in the ROD Amendment (DOE/OR/01-2697&D2), the mercury flux to UEFPC from OF200, including any water bypassing the OF200 water treatment facility, will be limited to a daily maximum concentration of 2000 ng/L total mercury and an annual rolling flux of 1 kg/year total mercury.

The goal of early site preparation is to have the site ready for the start of construction of the OF200 water treatment facility as soon as possible after a construction contractor is selected. Appendix A contains a summary table of ARARs associated with the early site preparation, including a crosswalk that shows how each is met. No waivers from or alteration to any ARAR is expected during early site preparation activities.

3.2 PROJECT SCOPE

Early site preparation at the Headworks site primarily includes demolition/removal of existing structures and utilities, concrete slabs, and asphalt pavement, including an existing water augmentation structure; filling existing tank vaults with flowable fill; installing and tie-in of new utilities to the Headworks site boundary, including communications conduit, potable water piping, sanitary sewer piping, storm drain piping, and power lines; relocating an existing steam condensate return line; reconfiguring the dechlorination equipment; and installing the secant pile wall.

Early site preparation along the transfer pipeline route primarily includes the installation of culverts and piping at three roads (C Road, 3rd Street, and B Road.

Early site preparation at the Treatment Plant site primarily includes demolition/removal of existing structures and utilities and installation and tie-in of new utilities to the Treatment Plant site boundary, including communications conduit, potable/fire water piping, sanitary sewer piping, storm drain piping, and an overhead power line.

3.3 WORK ELEMENTS AND PLANNED ACTIVITIES

Prior to soil disturbance at the Headworks site, erosion control measures (silt fence, wattles/logs, etc.) will be installed to prevent run-off of sediments into UEFPC. The Headworks site lies within the 100-year floodplain, with a flood elevation of 936 ft. There is no practicable alternative to locating the water treatment facility outside the floodplain. There are no sensitive ecological resources in the Headworks construction area.

Erosion and sedimentation control will be performed during and throughout ESP to prevent discharges of visible solids, bottom deposits, or turbidity that impairs the usefulness of East Fork Poplar Creek (EFPC).

This control will be through the use of silt fences, berms, hay bales, diversion ditches, best management practices, and other measures. These measures will be in accordance with the current edition of the *Tennessee Erosion and Sediment Control Handbook* (Tennessee Department of Environment and Conservation [TDEC] 2012). Excavation and fill activities will be kept to a minimum and all excess material will be handled to prevent runoff. A Stormwater Pollution Prevention Plan (UCOR-4998) has been prepared in accordance with the Tennessee General National Pollutant Discharge Elimination System (NPDES) permit for discharges associated with construction activities.

Clearing or other disturbance of areas immediately adjacent to EFPC will be minimized and disturbed areas will be stabilized and/or revegetated. No dredged or fill material will be discharged to UEFPC during ESP.

During ESP, precautions will be taken to minimize fugitive dust. Water or other non-toxic chemicals will be applied to roads, soil, or disturbed areas to minimize fugitive dust and prevent movement beyond the Y-12 boundary.

ESP facilities (trailers, vehicles, support buildings, laydown areas, and parking) may be prepared, placed, and connected to the necessary utilities. This may include a support trailer for construction management, oversight, and support personnel. Site boundaries and initial erosion control measures will be established as part of mobilization.

Throughout ESP, litter, construction debris, and construction materials will be managed prior to anticipated storm events to prevent run-off to EFPC. Additionally, appropriate controls such as berms, dikes, and containers will be installed to prevent equipment fuel or oil products from entering EFPC.

4. PROJECT DESIGN

4.1 HEADWORKS

Early site preparation activities at the Headworks site include the following:

- Installation of erosion control measures (silt fence, wattles/logs, etc.) to control storm water run-on and run-off. During ESP, EFPC will not be impounded, modified, diverted, or controlled.
- Clearing vegetation and cutting trees to grade along the creek; no digging or grubbing will be performed along the creek bank during ESP.
- Demolition, removal, and disposal of existing structures and utilities, as shown in Appendix B, Civil Headworks Site Demolition Plan, drawing number C941001-F-0010, which includes the following:
  - — Demolition of five above-ground structures and seven concrete slabs/foundations, and placement of backfill to finish grade.
  - — Demolition of Building 9417-8 and a nearby eyewash station.
  - — Demolition of a flow augmentation outlet structure.
  - — Removal of metal plates covering 24 pits in an abandoned building basement east of the site and placement of flowable fill to finish grade to allow use as a laydown area during construction.
  - — Removal of a metal lid and sub-structure east of former above-ground tank foundations.
  - — Demolition of an electrical switch and metal box east of former above-ground tank foundations.
  - — Demolition of an overhead steam condensate line and supports south of the site that will be abandoned and relocated to the north side of the creek.
  - — Demolition of overhead power and telecommunication lines and two utility poles in the area of construction. Note: Utility poles will be cut at grade and not excavated or pulled from the ground.
  - — Demolition of an above-ground demineralized water main and pipe supports, concrete tank supports, and concrete slab/foundations.
  - — Removal of asphalt pavement where the 2 million gal stormwater storage tank will be constructed on the south side of the construction area.
  - — Demolition of an abandoned underground storm drain pipe.
  - — Isolation and capping of two abandoned underground raw water pipes.
- Installation and tie in of new utilities to facilitate future construction of the Headworks facility, including the following:
  - — Installation of the new (relocated) above-ground steam condensate return piping on the north side of the creek.
  - — Installation of underground communications conduit, potable water piping, sanitary sewer piping, and storm drain piping to the site boundary.
  - — Installation of an overhead power line to the site boundary and to the existing NPDES Sample Bldg. 9422-6 near the site.
- Reconfiguration of existing dechlorination equipment.

- Installation of new secant pile walls on both the north and south sides of the creek for use as future excavation shoring and creek bank stability.

4.2 TRANSFER PIPELINE

The early site preparation activities along the transfer pipeline include installing erosion control measures, clearing vegetation and trees at the future transfer pipe bridge location, installing culvert piping for two underground road crossings at C Road and 3rd Street, and installing below-grade piping at the intersection of 3rd Street and B Road.

4.3 TREATMENT PLANT SITE

The early site preparation activities at the Treatment Plant site include the following:

- Demolition, removal, and disposal of existing structures and utilities, as shown in Appendix B, Civil Treatment Facility Effluent Pipeline Prep and Profile, drawing number C941002-F-0011, which includes the following:
  - — Demolition of an inactive fire hydrant and two inactive post-indicating valves on the south side of the site.
  - — Removal of an overhead power line and utility pole.
  - — Demolition of a railroad line and switches in the southwest corner of the site.
- Installation and tie in of new utilities to facilitate future construction of the MTF facility, including the following:
  - — Installation of underground communications conduit, potable/fire water piping, sanitary sewer piping, and storm drain piping to the site boundary.
  - — Installation of an overhead power line to the site boundary.

4.4 WASTE MANAGEMENT

The areas impacted by early site preparation and construction of the OF200 water treatment facility have been characterized for potential contamination prior to construction in accordance with the approved *Sampling and Analysis Plan/Quality Assurance Project Plan for Geotechnical and Waste Characterization of the Outfall 200 Mercury Treatment Facility Area at the Y-12 National Security Complex, Oak Ridge, Tennessee* (DOE/OR/01-2657&D0, Rev. 1).

Based on the characterization results, waste generated during early site preparation and facility construction, waste is expected to be non-contaminated construction debris (concrete, asphalt, soil, metal piping, conduit, rock, metal, plastic piping, etc.). It will also include non-contaminated asbestos-containing material (ACM) from steam line insulation. All non-contaminated construction debris will be disposed at the ORR landfill or other facility that can accept non-contaminated construction debris. ACM waste generated during the early site preparation steam line move will be properly packaged, labeled, segregated, stored, and disposed as soon as practicable at the ORR landfill or other facility that can accept asbestos-containing waste. If contamination is encountered during ESP, the contaminated waste will be containerized, characterized, and disposed per applicable ARARs. If used oil is generated during ESP, it will be transported by transporters who have Environmental Protection Agency ID numbers.

The ARARs in Appendix A are taken from the ROD Amendment (DOE/OR/01-2697&D2) and are in the RDR/RAWP. Resource Conservation and Recovery Act of 1976 (RCRA) hazardous waste and

polychlorinated biphenyl (PCB) waste ARARs are identified in the ARAR's tables as "not applicable" since hazardous and PCB waste are not expected to be generated. Once operations begin and waste streams are generated, the waste classification will be verified prior to disposal. If the waste is determined to be hazardous waste or PCB waste, the appropriate requirements listed in Appendix A ARAR tables will become applicable and the waste will be stored, transported, and disposed in accordance with these regulatory requirements.

4.4.1 Erosion and Dust Control

Erosion control will be implemented throughout ESP to prevent discharges of visible solids, bottom deposits, or turbidity that impairs the usefulness of EFPC. This control will be through the use of silt fences, berms, hay bales, diversion ditches, best management practices, and other measures. These measures will be in accordance with the current edition of the *Tennessee Erosion and Sediment Control Handbook* (TDEC 2012). Excavation and fill activities will be kept to a minimum and all excess material will be handled to prevent runoff. A Stormwater Pollution Prevention Plan has been prepared in accordance with the Tennessee General NPDES permit for discharges associated with construction activities.

During ESP, precautions will be taken to minimize fugitive dust. Water or non-toxic chemicals will be applied to roads, soil, or disturbed areas to minimize fugitive dust and prevent movement beyond the Y-12 boundary.

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5. PLANS

5.1 SAFETY AND HEALTH PLAN

All work will be conducted in accordance with a safety and health (S&H) plan in meeting the requirements of the Occupational Safety and Health Act of 1970. The S&H plan will address the safety and health hazards of each phase of the project and will specify the requirements and procedures for ensuring the safety and health of employees. An analysis of the hazards associated with the work is required prior to work to identify each task, identify hazards associated with each task, and identify precautions necessary to mitigate the hazards. These requirements will be integrated into the S&H plan and work package wherever appropriate. Implementation of the requirements of these documents will minimize the possibility and potential consequence of accidents and minimize physical hazards.

The project S&H representative and radiological personnel will assess the need and requirements for personnel monitoring, which will be delineated in the S&H plan and work package.

The S&H data and controls will be continually evaluated. Field radiological screening will be conducted using radiological instruments appropriate to detect surface contamination and airborne radioactivity. As required by 10 *CFR* 835, *Occupational Radiation Protection*, all applicable implementing procedures will be followed to ensure protection of workers.

Controls that provide a safe response to incidental and emergency situations with the intent of protecting project personnel, the public, and property also will be developed. Incidental spills are those where the substance can be safely absorbed, neutralized, or otherwise controlled by employees in the immediate release area at the time of the release and are below the reportable quantity. In addition, the release does not have the potential to become an emergency within a short time frame. Spills considered incidental, but that require an immediate clean-up response, include the following:

- Gasoline, diesel, or hydraulic fluid
- Decontamination or incidental water spills inside secondary containment

Spills that result in a visible oil sheen on waters of the State are not considered incidental in nature and must be reported to the State when these occur.

5.2 STORMWATER POLLUTION PREVENTION PLAN

A Stormwater Pollution Prevention Plan (SWPPP) will be prepared to support early site preparation construction and utilities relocation construction. The purpose of the SWPPP is to protect surface water quality by reducing pollutants associated with stormwater runoff during all phases of field activity. The SWPPP will identify areas that can reasonably be expected to contribute contaminants to surface water bodies via stormwater runoff and will describe the development and implementation of stormwater management controls to reduce or eliminate the discharge of such pollutants. The plan will be developed using the U.S. Environmental Protection Agency (EPA) Office of Water guidance manual, *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006); *Storm Water Management for Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices, Summary Guidance* (EPA 833-R-92-002), the *Tennessee Storm Water Multi-Sector General Permit for Industrial Activities - Permit No. TNR050000*), and the Tennessee General Permit for Construction Activities (TN10-0000).

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6. PROJECT ORGANIZATION AND SCHEDULE

The organizational relationships for ESP are shown in Fig. 3. Through its prime contractors, DOE is responsible for the design, construction, operation, and reporting for the ESP. The EPA and TDEC are responsible for approving the *Federal Facility Agreement for the Oak Ridge Reservation* (DOE/OR-1014) primary documents and providing oversight of design, construction, and operation. The project schedule is shown in Appendix C.

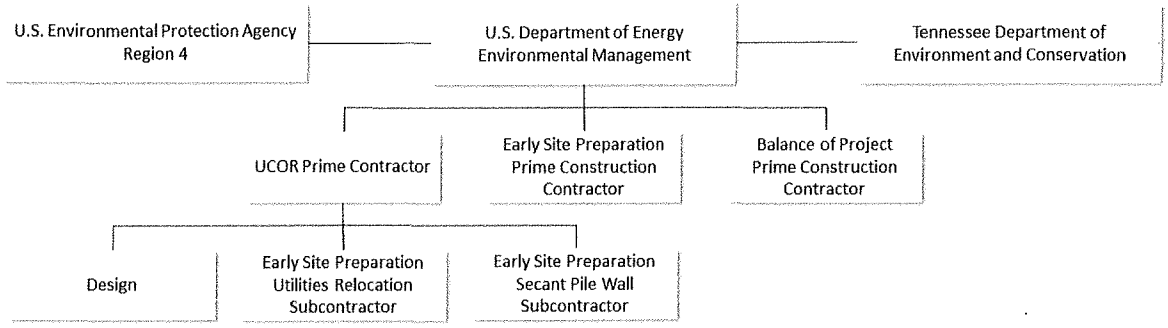

Fig. 3. Organizational relationships.

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APPENDIX A.
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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Table A.1. OF200 early site preparation location-specific ARRs

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
		Floodplains		
Presence of floodplain as defined in 10 *CFR* 1022.4	Design or modify selected alternatives to reduce risk of flood loss, minimize harm to or within floodplains, and restore and preserve floodplain values to extent practicable. Structures constructed in a floodplain shall meet, at a minimum, building standards pursuant to the National Flood Insurance Program.	DOE actions that involve potential impacts to, or take place within, floodplains—**applicable**	10 *CFR* 1022.3(a)(1) through (4)	Sect. 4.1. Headworks
	Undertake a careful evaluation of the potential effects of any new construction in floodplains. Identify, evaluate, and, as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on floodplains.		10 *CFR* 1022.3(b) and (d)	
	Avoid, to the extent possible, the long- and short-term adverse effects associated with occupancy and modification of floodplains.		10 *CFR* 1022.3(c)	
	Measures to take to mitigate adverse effects of actions in floodplains include, but are not limited to, minimum grading requirements, runoff controls, design and construction constraints, and protection of ecology-sensitive areas.		10 *CFR* 1022.13(a)(3)	
	If no practicable alternative to locating or conducting the action in the floodplain is available, then before taking action design or modify the action in order to minimize potential harm to or within the floodplain, consistent with the policies set forth in Executive Order 11990.		10 *CFR* 1022.14(a)	
		Aquatic Resources		
Within area impacting stream or any other body of water -and- presence of wildlife resources (e.g., fish)	The effects of water-related projects on fish and wildlife resources and their habitat shall be considered with a view to the conservation of fish and wildlife resources by preventing loss of and damage to such resources.	Action that impounds, modifies, diverts, or controls a stream or other body of water, except where the maximum surface area of an impoundment is less than 10 acres or for land management activities by federal agencies with respect to federal lands under their jurisdiction—**relevant and appropriate**	16 *USC* 662(a) (*Fish and Wildlife Coordination Act*)	Sect. 4.1. Headworks; Sect. 5.2 Stormwater Pollution Prevention Plan

Table A.1. OF200 early site preparation location-specific ARARs (cont.)

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Waters of the state as defined in TCA 69-3-103(33)	Must comply with the substantive requirements of the ARAP for erosion and sediment control to prevent pollution of waters of the state.	Action potentially altering the properties of any waters of the state—**applicable**	TCA 69-3-108(b)(1)(j)	Sect. 4.1. Headworks; Sect. 5.2 Stormwater Pollution Prevention Plan
	Pollution control requirements, as detailed in each particular General Permit, include but are not limited to, the following: Activity must not result in discharge of waste or substances that may be harmful to humans or wildlife; Material may not be placed in a location or manner so as to impair surface water flow into or out of any wetland area; • Work must be carried out in a manner that does not violate water quality criteria as stated in TDEC 0400-4-3-.03, including, but not limited to, prevention of discharges that cause a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the designated uses for that water body by TDEC 0400-4-4; • Excavation and fill activities shall be kept to a minimum, and all excess material shall be hauled upland and properly stabilized or disposed of. • Sediment shall be prevented from entering waters of the state; erosion and sediment controls shall be designed according to the size and slope of disturbed or drainage to detain runoff and trap sediment, and shall be properly selected, installed, and maintained in accordance with manufacturer's specifications and good engineering practices. • Erosion and sedimentation control shall be in place and functional before earthmoving operations begin; must be maintained throughout construction period. Temporary measures may be removed at the beginning of work day but shall be replaced at end of work day.	Action potentially altering the properties of any waters of the state—**TBC**	TDEC ARAP Program conditions common to all General Permits	Sect. 4.1. Headworks; Sect. 5.2 Stormwater Pollution Prevention Plan

Table A.1. OF200 early site preparation location-specific ARARs (cont.)

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Waters of the state as defined in TCA 69-3-103(33) (cont.)	• Litter, construction debris, and construction chemicals exposed to stormwater shall be picked up prior to anticipated storm events or otherwise prevented from becoming a pollutant source for stormwater discharges. • Clearing, grubbing, or other disturbance of areas immediately adjacent to waters of the state shall be limited to the minimum necessary to accomplish the proposed activity. Unnecessary vegetation removal is prohibited, and disturbed areas shall be stabilized and revegetated as soon as practicable. • Appropriate steps shall be taken to ensure petroleum products or other chemical pollutants are prevented from entering waters of the state, including groundwater; • Adverse impacts to T&E species or cultural, historical, or archeological features or sites are prohibited.			Sect. 2.2 Site Ecology, Sect. 3.3 Work Elements and Planned Activities
Loss of net resource value of state waters (ARAP program)	No activity can be authorized by the Commissioner unless any lost resource value associated with the proposed impact is offset by mitigation sufficient to result in no net loss of resource value.	Activity that would result in an appreciable permanent loss of resource value of a state water —**applicable**	TDEC Rule 0400-40-07-.04(6)(c)	Not applicable to early site preparation activities since no work in or effecting state waters that would result in an appreciable permanent loss will occur.
Mitigation of state waters other than wetlands (ARAP program)	Must provide mitigation that results in no overall net loss of resource values for any activity that would result in appreciable permanent loss of resource value of a state water. For any mitigation involving relocation or re-creation of a stream segment, to extent practicable must complete mitigation before any impact occurs to existing state waters. Mitigation measures include but are not limited to: restoration of degraded stream reaches and/or riparian zones; new (relocated) stream channels; removal of pollutants from and hydrologic buffering of stormwater runoff; and other measures which have a reasonable likelihood of increasing the resource value of a state water. Mitigation measures or actions should be prioritized in the following order: restoration, enhancement, re-creation, and protection.	Activity that would result in an appreciable permanent loss of resource value of a state water —**applicable**	TDEC 0400-40-07-.04(7)(a)	Not applicable to early site preparation activities since no work in or effecting state waters that would result in an appreciable permanent loss will occur.

Table A.1. OF200 early site preparation location-specific ARARs (cont.)

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)	Document section describing controls/actions to meet ARARs
Location encompassing aquatic ecosystem as defined in 40 *CFR* 230.3(c)	The discharge of dredged or fill material into waters of the United States is prohibited if there is a practical alternative that would have less adverse impact. No discharge shall be permitted that results in violation of state water quality standards, violates any toxic effluent standard, and/or jeopardizes an endangered species or its critical habitat. No discharge will be permitted that will cause significant degradation of waters of the United States. No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps in accordance with 40 *CFR* 230.70 et. seq. are taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Action that involves the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands—**applicable**	40 *CFR* 230.10(a), (b), (c), and (d) 40 *CFR* 230 Subpart H	Sect. 22 Site Ecology, Sect. 3.3 Work Elements and Planned Activities

ARAP = Aquatic Resource Alteration Permit
ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
DOE = U.S. Department of Energy
OF200 = Outfall 200
T&E = threatened and endangered
TCA = *Tennessee Code Annotated*
TBC = To Be Considered
TDEC = Tennessee Department of Environment and Conservation
USC = *United States Code*

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Table A.2. OF200 early site preparation action-specific ARARs

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
	General Construction Standards—all remediation activities			
Activities causing fugitive dust emissions	Shall take reasonable precautions to prevent particulate matter from becoming airborne; reasonable precautions shall include, but are not limited to, the following:	Fugitive emissions from demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land —**applicable**	TDEC 1200-03-08-.01(1)	Sect. 4..4.1 Erosion and Dust Control
	• use, where possible, of water or chemicals for control of dust, and		TDEC 1200-03-08-.01(1)(a)	
	• application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stock piles, and other surfaces which can create airborne dusts;		TDEC 1200-03-08-.01(1)(b)	
	Shall not cause or allow fugitive dust to be emitted in such a manner as to exceed 5 minute/hour or 20 minute/day beyond property boundary lines on which emission originates.		TDEC 1200-03-08-.01(2)	
Activities causing radionuclide emissions	Shall not exceed those amounts that would cause any member of the public to receive an EDE of 10 mrem per year	Radionuclide emissions from point sources, as well as diffuse or fugitive emissions, at a DOE facility—**applicable**	40 *CFR* 61.92 TDEC 1200-03-11-.08(6)	Sect. 5.1 S&H Plan
Activities causing stormwater runoff (e.g., clearing, grading, excavation)	Implement good construction management techniques (including sediment and erosion controls, vegetative controls, and structural controls) in accordance with the substantive requirements of General Permit No. TNR10-0000 ("General Permit for Stormwater Discharges Associated with Construction Activities") to ensure that stormwater discharge:	Dewatering or stormwater runoff discharges from land disturbed by construction activity—disturbance of ≥ 1 acres total—**applicable**	TCA 69-3-108(l) TDEC 0400-40-10-.03(2)(a); General Permit No. TNR10-0000 (effective September 30, 2016) (**TBC guidance**)	Sect. 3.3 Work Elements and Planned Activities, Sect. 4.4.1 Erosion and Dust Control, Sect. 5.2 Stormwater Pollution Prevention Plan
	• does not violate water quality criteria as stated in TDEC 0400-40-03-.03 including but not limited to prevention of discharges that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the designated uses for that water body by TDEC 0400-40-04;	Stormwater discharges from construction activities—**TBC**	General Permit No. TNR10-0000, Sect. 5.3.2	
	• does not contain distinctly visible floating scum, oil, or other matter;			
	• does not cause an objectionable color contrast in the receiving stream; and			

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Activities causing stormwater runoff (e.g., clearing, grading, excavation) (cont.)	• results in no materials in concentrations sufficient to be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream.			
	Water Treatment			
Construction or modification of intake and outfall structures for effluents	Construction, maintenance, repair, rehabilitation, or replacement of intake or outfall structures shall be carried out in such a way that work: Does not violate water quality criteria as stated in TDEC 0400-40-03-.03, including, but not limited to, prevention of discharges that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the designated uses for that water body by TDEC 0400-40-04. Activities in non-navigable streams shall be conducted in the dry; in navigable streams, where impracticable to work in the dry, work may be conducted within the water column. Shall be located and oriented so as to avoid permanent alteration or damage to the integrity of the stream channel, including the opposite stream bank. Alignment of the structure (except for diffusers) should be as parallel to the stream flow as is practicable, with the discharge pointed downstream. Diffusers may be placed perpendicular to stream flow for more complex mixing. Intake and outfall structures shall be designed to minimize harm and prevent impoundment of normal or base flows. Velocity dissipation devices shall be placed as needed at discharge locations to provide a non-erosive velocity from the structure. Activity may not be conducted in a manner that would permanently disrupt the movement of fish and aquatic life. Material may not be placed in a location or manner so as to impair surface water flow into or out of any wetland area.	Construction of intake and outfall structures in waters of the state—**applicable**	TCA 69-3-108(l) TDEC 0400-40-07-.01 TDEC General Permit for Construction of Intake and Outfall Structures (effective April 7, 2015) —**TBC guidance**	Not applicable; no work will be performed on an operational intake or outfall structure during early site preparation

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Construction or modification of intake and outfall structures for effluents (cont.)	Backfill activities must be accomplished in a manner that stabilizes the stream bed and banks to prevent erosion. All contours must be returned to pre-project conditions to the extent practicable and completed activities may not disrupt or impound stream flow. Stream beds must not be used as transportation routes for construction equipment; Temporary stream crossings shall be limited to one point in the construction area and erosion control measures shall be utilized where stream banks are disturbed. Crossing shall be constructed so that stream flow is not obstructed. Following work, all materials used for temporary crossing must be removed and disturbed stream banks restored and stabilized. Materials used in intake and outfall structures must be free of contaminants and wastes as defined by TCA 69-3-103(18). Clearing, grubbing and other disturbances to riparian vegetation shall be kept to a minimum necessary for slope construction and equipment operations. Unnecessary tree removal is prohibited. Sediment shall be prevented from entering waters of the state. Erosion and sediment control measures shall be properly selected, installed, and maintained and must be in place and functional before earth moving operations begin. Litter, construction debris, and construction chemicals exposed to stormwater shall be picked up prior to anticipated storm events or otherwise prevented from becoming a pollutant source during storms. Excavated materials, removed vegetation, construction debris, and other wastes shall be removed to an upland location and properly stabilized or disposed of to prevent reentry into the waterway. Take appropriate steps to ensure petroleum products or other chemical pollutants are prevented from entering waters of the state. In the event of a spill, take immediate measures to prevent pollution of waters of the state.			Not applicable; no stream crossings will take place or work performed on an operational intake or outfall structure during early site preparation

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Collection/treatment of surface water	Onsite wastewater treatment units that are part of a wastewater treatment facility subject to regulation under Sect. 402 or Section 307(b) of the CWA are exempt from the requirements of RCRA Subtitle C for all tank systems, conveyance systems (whether piped or trucked), and ancillary equipment used to store or transport RCRA-contaminated water.	Onsite wastewater treatment units that are subject to regulation under Sect. 402 or Sect. 307(b) of CWA (NPDES permitted) **—applicable**	40 *CFR* 270.1(c)(2)(v) TDEC 0400-12-01-.07(1)(b)(4)(iv) 40 *CFR* 264.1(g)(6) 40 *CFR* 260.10 53 *FR* 34079, September 2, 1988	Not applicable (water not expected to be hazardous)
	Industrial wastewater discharges that are point source discharges subject to regulation under § 402 of the CWA, as amended, are not solid wastes for the purpose of hazardous waste management.	Generation of industrial wastewater for discharge—**applicable**	40 *CFR* 261.4(a)(2) TDEC 0400-12-01-.02(1)(d)(1)(ii)	
	Discharge is not prohibited, unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 268.40 or are D003 reactive cyanide.	Restricted RCRA characteristic hazardous wastes managed in a CWA wastewater treatment system—**applicable**	40 *CFR* 268.1(c)(4)(iv); TDEC 0400-12-01-10(1)(a)(3)(iv)(IV)	
Discharge of treated water into UEFPC	All discharges of industrial waste or other waste shall receive, prior to discharge, the degree of treatment or effluent reduction necessary to comply with water quality standards, or state or federal laws and regulations pursuant thereto, and where appropriate will comply with the standards of performance as required by the Tennessee Water Quality Control Act (TCA §§69-3-101, et. seq.)	Point source discharge(s) of pollutants into surface waters of the state as defined in TCA 69-3-103(33)—**applicable**	TDEC 0400-40-03-.05(6) TDEC 0400-40-05-.08(g) 40 *CFR* 122.44	Not applicable; no water to be discharged to EFPC during early site preparation
Point source effluent limitations and standards – technology based	For industrial discharges without applicable federal effluent guidelines, best professional judgment should be employed to determine appropriate effluent limitations and standards.	Industrial point source discharges without applicable federal effluent guidelines—**applicable**	TDEC 0400-40-05-.09(1)(b)(2)	Not applicable; no water to be discharged to EFPC during early site preparation
Point source effluent limitations and standards – water-quality based	Effluent limitations on toxic substances will be required in accordance with TDEC's General Water Quality Criteria using the LC_{50} and/or IC_{25} criteria and appropriate application factor for each toxic parameter.	Point source discharge(s) of pollutants into waters of the U.S.—**applicable**	TDEC 0400-40-05-.10(1)	Not applicable; no water to be discharged to EFPC during early site preparation
	Appropriate limitations on organic related and other oxygen demanding parameters will be required to ensure adequate dissolved oxygen in the state's waters in accordance with TDEC's General Water Quality Criteria.		TDEC 0400-40-05-.10(2)	
	Effluent limitations may be required to insure compliance with the Antidegradation Statement in TDEC 0400-40-03-.06.		TDEC 0400-40-05-.10(4)	

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Antidegradation requirements	New or increased discharges that would cause measurable degradation of the parameter that is unavailable shall not be authorized. Nor will discharges be authorized if they cause additional loadings of unavailable parameters that are bioaccumulative or that have criteria below current method detection levels.	Waters with "unavailable parameters" [as defined in TDEC 0400-40-03-.06(2)]—**applicable**	TDEC 0400-40-03-.06(2)(a)	Not applicable; no water to be discharged to EFPC during early site preparation
	No new or expanded water withdrawals that will cause additional measurable degradation of the unavailable parameter shall be authorized.		TDEC 0400-40-03-.06(2)(b)	
	Where one or more of the parameters comprising the habitat criterion are unavailable, activities that cause additional degradation of the unavailable parameter or parameters above the level of de minimis shall not be authorized.		TDEC 0400-40-03-.06(2)(c)	
Bypass of untreated water	Bypass, as defined in Rule 0400-40-05-.02, is prohibited unless: • bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; • there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and • for anticipated bypass, prior notice is given, if possible, at least ten days before the date of the bypass; or • for unanticipated bypass, notice is submitted of an unanticipated bypass within 24 hours from the time that the operator becomes aware of the bypass.	Point source discharge(s) of pollutants into waters of the U.S.—**applicable**	TDEC 0400-40-05-.07(2)(l)	Not applicable; no water to be discharged to EFPC during early site preparation
	A bypass that does not cause effluent limitations to be exceeded may be allowed only if the bypass is necessary for essential maintenance to assure efficient operation.		TDEC 0400-40-05-.07(2)(m)	

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Emissions from water treatment off-gas system	Discharge of air contaminants must be in accordance with the appropriate provisions of Rules of the TDEC Chap. 1200-03 et. seq., any applicable measures of control strategy, and provisions of the Tennessee Air Quality Act.	Emissions of air pollutants from new air contaminant sources—**applicable**	TDEC 1200-03-09-.01(1)(d)	Not applicable; no water treatment to be done during early site preparation
	Source impact analysis shall demonstrate that allowable emission increases would not cause or contribute to air pollution in violation of any ambient air quality standard in Chap. 1200-03-03, of any national ambient air quality standard, or any applicable maximum allowable increase as defined in TDEC 1200-03-09-.01(4) (i.e., maximum increase in pollutant over baseline concentrations).		TDEC 1200-03-09-.01(1)(f)	
	Radionuclide emission measurements in conformance with 40 *CFR* 61.93(b) shall be made. Shall measure all radionuclides which could contribute greater than 10 percent of the potential EDE for a release point.	Release points which have the potential to discharge radionuclides into the air in quantities which could cause an EDE in excess of 1 percent of 10 mrem/year to any member of the public—**applicable**	40 *CFR* 61.93(b)(4)(i) TDEC 1200-3-11-.08(6)	
	Periodic confirmatory measurements shall be made to verify low emissions.	Other release points which have the potential to release radionuclides into the air—**applicable**		
Waste Generation, Characterization, Segregation, and Storage				
Characterization of solid waste	Must determine if solid waste is hazardous waste or if waste is excluded under 40 *CFR* 261.4(b); and	Generation of solid waste as defined in 40 *CFR* 261.2 and which is not excluded under 40 *CFR* 261.4(a)—**applicable**	40 *CFR* 262.11(a) TDEC 0400-12-01-.03(1)(b)(1)	Sect. 4.4 Waste Management
	Must determine if waste is listed under 40 *CFR* Part 261; or		40 *CFR* 262.11(b) TDEC 0400-12-01-.03(1)(b)(2)	
	Must determine whether the waste is identified in Subpart C of 40 *CFR* 261, characterizing the waste by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used.		40 *CFR* 262.11(c) TDEC 0400-12-01-.03(1)(b)(3)	
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chap. 40 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste which is determined to be hazardous—**applicable**	40 *CFR* 262.11(d); TDEC 0400-12-01-.03(1)(b)(4)	

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Characterization of hazardous waste	Must obtain a detailed chemical and physical analysis on a representative sample of the waste(s), which at a minimum contains all the information that must be known to treat, store, or dispose of the waste in accordance with pertinent sections of 40 *CFR* 264 and 268.	Generation of RCRA-hazardous waste for storage, treatment or disposal—**applicable**	40 *CFR* 264.13(a)(1) TDEC 0400-12-01-.06(2)(d)(1)	Not applicable; no RCRA hazardous waste is expected
	Must determine if the waste meets the treatment standards in 40 *CFR* 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge of waste.		40 *CFR* 268.7(a) TDEC 0400-12-01-.10(1)(g)(1)(i)	
	Must determine the underlying hazardous constituents (as defined in 40 *CFR* 268.2[i]) in the waste.	Generation of RCRA characteristic hazardous waste (and is not D001 non-waste waters treated by CMBST, RORGS, or POLYM of Sect. 268.42 Table 1) for storage, treatment or disposal — **applicable**	40 *CFR* 268.9(a) TDEC 0400-12-01-.10(1)(i)(1)	
	Must determine if the waste is restricted from land disposal under 40 *CFR* 268 et. seq. by testing in accordance with prescribed methods or use of generator knowledge of waste.		40 *CFR* 268.7 TDEC 0400-12-01-.10(1)(g)(1)(i)	
	Must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 *CFR* 268.40 et. seq.		40 *CFR* 268.9(a) TDEC 0400-12-01-.10(1)(i)(1)	
Temporary storage of hazardous waste in containers onsite – "Satellite Accumulation Area"	A generator may accumulate as much as 55 gal of hazardous waste at or near any point of generation where wastes initially accumulate which is under the control of the operator of the process generating waste provided that he: • complies with 40 *CFR* 265.171, 265.172 and 265.173(a); and	Accumulation of 55 gal or less of RCRA hazardous waste at or near any point of generation—applicable	40 *CFR* 262.34(c)(1)(i) TDEC 0400-12-01-.03(4)(e)(5)(i)(I)	Not applicable; no RCRA hazardous waste is expected
	• container is marked with the words "Hazardous Waste" or with other words that identify contents.		40 *CFR* 262.34(c)(1)(ii) TDEC 0400-12-01-.03(4)(e)(5)(i)(II)	
Temporary storage of hazardous waste in containers onsite – "90-Day Storage Area"	A generator may accumulate hazardous waste at the facility provided that: • the waste is placed in containers that comply with Subparts I, AA, BB, and CC of 40 *CFR* 265; and	Accumulation of RCRA hazardous waste onsite as defined in 40 *CFR* 260.10 —applicable	40 *CFR* 262.34(a)(1)(i) TDEC 0400-12-01-.03(4)(e)(2)(i)(I)	Not applicable; no RCRA hazardous waste is expected

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Temporary storage of hazardous waste in containers onsite – "90-Day Storage Area" (cont.)	• container is marked with the date upon which each period of accumulation begins; and		40 *CFR* 262.34(a)(2) TDEC 0400-12-01-.03(4)(e)(2)(ii)	
	• container is marked with the words "Hazardous Waste"		40 *CFR* 262.34(a)(3) TDEC 0400-12-01-.03(4)(e)(2)(iii)	
Use and management of hazardous waste in containers	If container is not in good condition (e.g., severe rusting, structural defects) or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers—**applicable**	40 *CFR* 265.171 TDEC 0400-12-01-.05(9)(b)	Not applicable; no RCRA hazardous waste is expected
	Use container made or lined with materials compatible with waste to be stored so that the ability of the container is not impaired.		40 *CFR* 265.172 TDEC 0400-12-01-.05(9)(c)	
	Keep containers closed during storage, except to add/remove waste.		40 *CFR* 265.173(a) TDEC 0400-12-01-.05(9)(d)(1)	
	Open, handle and store containers in a manner that will not cause containers to rupture or leak.		40 *CFR* 265.173(b) TDEC 0400-12-01-.05(9)(d)(2)	
Storage of hazardous waste in container area	Area must have a containment system designed and operated in accordance with 40 *CFR* 264.175(b).	Storage of RCRA-hazardous waste in containers with free liquids—**applicable**	40 *CFR* 264.175(a) TDEC 0400-12-01-.06(9)(f)(1)	Not applicable; no RCRA hazardous waste is expected
	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or Containers must be elevated or otherwise protected from contact with accumulated liquid.	Storage of RCRA-hazardous waste in containers that do not contain free liquids — **applicable**	40 *CFR* 264.175(c) TDEC 0400-12-01-.06(9)(f)(3)	

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Management of PCB waste	Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* 761, Subpart D.	Generation of waste containing PCBs at concentrations 50 ppm—**applicable**	40 *CFR* 761.50(a)	Not applicable; no PCB waste is expected
	Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Generation of PCB remediation waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.61	
Management of PCB/radioactive waste	Any person storing such waste must do so taking into account both its PCB concentration and radioactive properties, except as provided in 40 *CFR* 761.65(a)(1), (b)(1)(ii) and (c)(6)(i).	Generation for disposal of PCB/ radioactive waste with ≥ 50 ppm PCBs —**applicable**	40 *CFR* 761.50(b)(7)(i)	Not applicable; no PCB/ radioactive waste is expected
	Any person disposing of such waste must do so taking into account both its PCB concentration and its radioactive properties.		40 *CFR* 761.50(b)(7)(ii)	
	If, after taking into account only the PCB properties in the waste, the waste meets the requirements for disposal in a facility permitted, licensed, or registered by a state as a municipal or non-municipal nonhazardous waste landfill (e.g., PCB bulk product waste under 40 *CFR* 761.62[b][1]), the person may dispose of such waste without regard to the PCBs, based on its radioactive properties alone in accordance with applicable requirements.			
Temporary storage of PCB waste in containers	Container(s) shall be marked as illustrated in 40 *CFR* 761.45(a).	Storage of PCBs and PCB items at concentrations ≥ 50 ppm for disposal —**applicable**	40 *CFR* 761.65(c)(1)	Not applicable; no PCB waste is expected
	A notation must be attached to the PCB container indicating the date the item was removed from service.		40 *CFR* 761.65(c)(1)	
	Storage area must be properly marked as required by 40 *CFR* 761.40(a)(10).		40 *CFR* 761.65(c)(3)	
	Any leaking PCB Items and their contents shall be transferred immediately to a properly marked non-leaking container(s).		40 *CFR* 761.65(c)(5)	
	Except as provided in 40 *CFR* 761.65(c)(6)(i) and (ii), container(s) shall be in accordance with requirements set forth in DOT HMR at 49 *CFR* 171-180.		40 *CFR* 761.65(c)(6)	

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Storage of PCB/ radioactive waste in containers	For liquid wastes, containers must be non-leaking. For non-liquid wastes, containers must be designed to prevent buildup of liquids if such containers are stored in an area meeting the containment requirements of 40 *CFR* 761.65(b)(1)(ii). For both liquid and nonliquid wastes, containers must meet all regulations and requirements pertaining to nuclear criticality safety.	Storage of PCB/radioactive waste in containers other than those meeting DOT HMR performance standards—**applicable**	40 *CFR* 761.65(c)(6)(i)(A) 40 *CFR* 761.65(c)(6)(i)(B) 40 *CFR* 761.65(c)(6)(i)(C)	Not applicable; no PCB/ radioactive waste is expected
Storage of PCB waste and/or PCB/radioactive waste in a RCRA-regulated container storage area	Does not have to meet storage unit requirements in 40 *CFR* 761.65(b)(1) provided unit: • is permitted by EPA under RCRA Sect. 3004, or • qualifies for interim status under RCRA Sect. 3005, or • is permitted by an authorized state under RCRA Sect. 3006, and • PCB spills cleaned up in accordance with Subpart G of 40 *CFR* 761.	Storage of PCBs and PCB items designated for disposal—**applicable**	40 *CFR* 761.65(b)(2) 40 *CFR* 761.65(b)(2)(i) 40 *CFR* 761.65(b)(2)(ii) 40 *CFR* 761.65(b)(2)(iii) 40 *CFR* 761.65(c)(1)(iv)	Not applicable; no PCB/ radioactive waste is expected
		Treatment/Disposal of Waste		
Disposal of RCRA-hazardous waste in a land-based unit	May be land disposed only if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 *CFR* 268.40 before land disposal. The table lists either "total waste" standards, "waste-extract" standards, or "technology-specific" standards (as detailed further in 40 *CFR* 268.42).	Land disposal, as defined in 40 *CFR* 268.2, of restricted RCRA waste—**applicable**	40 *CFR* 268.40(a) TDEC 0400-12-01-.10(3)(a)	Not applicable; no RCRA hazardous waste is expected
	For characteristic wastes (D001–D043) that are subject to the treatment standards, all underlying hazardous constituents must meet the UTSs specified in 40 *CFR* 268.48.	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment unit that is regulated under the CWA, that is CWA equivalent, or that is injected into a Class I nonhazardous injection well—**applicable**	40 *CFR* 268.40(e) TDEC 0400-12-01-.10(3)(a)(5)	Not applicable; no RCRA hazardous waste is expected

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Disposal of RCRA-hazardous waste in a land-based unit (cont.)	Soils may be land disposed if treated prior to disposal according to the alternative treatment standards of 40 *CFR* 268.49(c) or according to the UTS specified in 40 *CFR* 268.48 applicable to the listed hazardous waste and/or applicable characteristic of hazardous waste if the soil is characteristic.	Land disposal, as defined in 40 *CFR* 268.2, of restricted hazardous soils —**applicable**	40 *CFR* 268.49(b) TDEC 0400-12-01-.10(3)(j)(2)	Not applicable; no RCRA hazardous waste is expected
Variance from a treatment standard for RCRA restricted hazardous wastes	A variance from a treatment standard may be approved if it is: • not physically possible to treat the waste to the level specified in the treatment standard, or by the method specified as the standard; or • inappropriate to require the waste to be treated to the level specified in the treatment standard or by the method specified as the treatment standard even though such treatment is technically possible.	Generation of a RCRA hazardous waste requiring treatment prior to land disposal—**applicable**	40 *CFR* 268.44 TDEC 0400-12-01-.10(3)(e)	Not applicable; no RCRA hazardous waste is expected
Disposal of RCRA wastewaters in a CWA wastewater treatment unit	Are not prohibited, unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 268.40, or are D003 reactive cyanide.	Restricted RCRA characteristic hazardous wastewaters managed in a wastewater treatment system which is NPDES permitted—**applicable**	40 *CFR* 268.1(c)(4)(iv) TDEC 0400-12-01-.10(1)(a)(3)(iv)(IV)	Not applicable; no RCRA hazardous waste is expected
Disposal of PCB decontamination waste and residues	Shall be disposed of at their existing PCB concentration unless otherwise specified in 40 *CFR* 761.79(g).	PCB decontamination waste and residues for disposal—**applicable**	40 *CFR* 761.79(g)	Not applicable; no PCB waste is expected
Disposal of PCB cleanup wastes	Shall be disposed of either: • in a facility permitted, licensed or registered by a state to manage municipal solid waste under 40 *CFR* 258 or non-municipal, nonhazardous waste subject to 40 *CFR* 257.5 thru 257.30; or • in a RCRA Subtitle C landfill permitted by a state to accept PCB waste; or • in an approved PCB disposal facility; or • through decontamination under 40 *CFR* 761.79(b) or (c).	Generation of non-liquid PCBs at any concentration during and from the cleanup of PCB remediation waste—**applicable**	40 *CFR* 761.61(a)(5)(v)(A)	Not applicable; no PCB waste is expected

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Disposal of PCB cleaning solvents, abrasives, and equipment	May be reused after decontamination in accordance with 40 *CFR* 761.79. For liquids, disposed of in accordance with 40 *CFR* 761.60(a).	Generation of PCB wastes from the cleanup of PCB remediation waste—**applicable**	40 *CFR* 761.61(a)(5)(v)(B)	Not applicable; no PCB waste is expected
Performance-based disposal of liquid PCB remediation waste	Shall be disposed of according to 40 *CFR* 761.60(a) or (e), or decontaminate in accordance with 40 *CFR* 761.79.	Disposal of liquid PCB remediation waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.61(b)(1)	Not applicable; no PCB waste is expected
Performance-based disposal of PCB remediation waste	May dispose by one of the following methods: • in a high-temperature incinerator approved under 40 *CFR* 761.70(b), • by an alternate disposal method approved under 40 *CFR* 761.60(e), • in a chemical waste landfill approved under 40 *CFR* 761.75, • in a facility with a coordinated approval issued under 40 *CFR* 761.77, or • through decontamination in accordance with under 40 *CFR* 761.79	Disposal of non-liquid PCB remediation waste as defined in 40 *CFR* 761.3 —**applicable**	40 *CFR* 761.61(b)(2) 40 *CFR* 761.61(b)(2)(i) and (ii)	Not applicable; no PCB waste is expected
Risk-based disposal of PCB remediation waste	May be disposed of in a manner other than prescribed in 40 *CFR* 761.61 (a) or (b) if approved in writing by EPA and method will not pose an unreasonable risk of injury to human health or the environment.	Disposal of PCB remediation waste —**applicable**	40 *CFR* 761.61(c)	Not applicable; no PCB waste is expected
Disposal of universal waste	The generator of the universal waste must determine whether the waste exhibits a characteristic of hazardous waste. If it is determined to exhibit such a characteristic, it must be managed in accordance with TDEC 0400-12-01-.01 through .10. If the waste is not hazardous, the generator may manage and dispose of the waste in any way that is in compliance with applicable federal, state, and local solid waste regulations.	Generation of universal waste (as defined in 40 *CFR* 273) for disposal—**applicable**	40 *CFR* 273.33 TDEC 0400-12-01-.12(3)(d)	Sect. 4.4 Waste Management

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
Disposal of asbestos-containing waste material (e.g., pipe lagging, insulation, ceiling tiles)	All asbestos-containing waste material must be deposited as soon as practicable at a waste disposal site operated in accordance with Section 61.154 or a site that converts RACM and asbestos-containing waste material into non-asbestos (asbestos free) material according to the provisions of 40 *CFR* 61.155.	Removal and disposal of RACM except Category I nonfriable asbestos containing material—**applicable**	40 *CFR* 61.150(b)(1) and (2) TDEC 1200-03-11-.02(2)(j)(2)(i) and (ii)	Sect. 4.4 Waste Management
		Transportation		
Transportation of hazardous materials	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material shall be subject to and must comply with all applicable provisions of the HMTA and HMR at 49 *CFR* 171–180.	Transportation of hazardous materials offsite "in commerce"—**applicable**	49 *CFR* 171.1(c)	Sect. 4.4 Waste Management
Transportation of PCB wastes	Must comply with the manifesting provisions at 40 *CFR* 761.207 through 40 *CFR* 761.218.	Relinquishment of control over PCB wastes by transporting, or offering for transport—**applicable**	40 *CFR* 761.207 (a)	Not applicable; no PCB waste is expected
Transportation of universal waste offsite	Offsite shipments of universal waste by a large quantity handler of universal waste shall be made in accordance with 40 *CFR* 273-38 (TDEC 0400-12-01-.12[3][i]).	Offsite shipment of universal waste by a large quantity generator of universal waste—**applicable**	40 *CFR* 273.38 TDEC 0400-12-01-.12(3)(i)	Not applicable; no universal waste is expected to be shipped off-site during ESP
Transportation of used oil offsite	Except as provided in paragraphs (a) to (c) of this rule, generators must ensure that their used oil is transported by transporters who have obtained EPA ID numbers.	Offsite shipment of used oil by generators of used oil—**applicable**	40 *CFR* 279.24 TDEC 0400-12-01-.11(3)(e)	Sect. 4.4 Waste Management
Transportation of hazardous waste offsite	Must comply with the generator requirements of 40 *CFR* 262.20–23 for manifesting, Sect. 262.30 for packaging, Sect. 262.31 for labeling, Sect. 262.32 for marking, Sect. 262.33 for placarding, Sect. 262.40, 262.41(a) for record keeping requirements, and Sect. 262.12 to obtain EPA ID number.	Offsite transportation of RCRA hazardous waste—**applicable**	40 *CFR* 262.10(h) TDEC 0400-12-01-.03(1)(a)(8)	Not applicable; no RCRA/ hazardous waste is expected
	Must comply with the requirements of 40 *CFR* 263.11–263.31. A transporter who meets all applicable requirements of 49 *CFR* 171-179 and the requirements of 40 *CFR* 263.11 and 263.31 will be deemed in compliance with 40 *CFR* 263.	Transportation of hazardous waste within the United States requiring a manifest—**applicable**	40 *CFR* 263.10(a) TDEC 0400-12-01-.04(1)(a)(1)	Not applicable; no RCRA hazardous waste is expected Not applicable; no RCRA hazardous waste is expected

Table A.2. OF200 early site preparation action-specific ARARs (cont.)

Action	Requirements	Prerequisite	Citation(s)	Mechanism for meeting ARARs
	The generator manifesting requirements of 40 *CFR* 262.20–262.32(b) do not apply. Generator or transporter must comply with the requirements set forth in 40 *CFR* 263.30 and 263.31 in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way—**applicable**	40 *CFR* 262.20(f) TDEC 0400-12-01-.03(3)(a)(6)	Not applicable; no RCRA hazardous waste is expected

ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
CMBST = Combustion
CWA = Clean Water Act of 1972
DEACT = deactivation
DOE = U.S. Department Energy
DOT = U.S. Department of Transportation
EDE = effective dose equivalent
EFPC = East Fork Poplar Creek
EPA = U.S. Environmental Protection Agency
S&H = safety and health
FR = *Federal Register*
HMR = Hazardous Materials Regulations
HMTA = Hazardous Materials Transportation Act of 1975
ID = identification
NPDES = National Pollutant Discharge Elimination System
OF200 = Outfall 200
PCB = polychlorinated biphenyl
POLYM = polymerization
RACM = regulated asbestos-containing material
RCRA = Resource Conservation and Recovery Act of 1976
RORGS = Recovery of Organics
TBC = To Be Considered
TCA = Tennessee Code Annotated
TDEC = Tennessee Department of Environment and Conservation
UEFPC = Upper East Fork Poplar Creek
UTS = Universal Treatment Standard

Table A.3. OF200 early site preparation chemical-specific ARARs

Action/medium	Requirements	Prerequisite	Citation(s)	Mechanism for Meeting ARARs
Surface water quality criteria for release of treated water into UEFPC	Waters shall not contain substances or combination of substances including disease-causing agents which, by way of either direct exposure or indirect exposure through food chains, may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), physical deformations, or restrict or impair growth in fish or aquatic life or their offspring.	Release of wastewater or effluents into surface water—**applicable** as instream criteria beyond the mixing zone[a]	TDEC 0400-40-03-.03(3) – (6)	Not applicable; no waste water or effluents will be released into EFPC during early site preparation
	Water shall not contain toxic substances that will render the water unsafe or unsuitable for water contact activities, including the capture and subsequent consumption of fish and shellfish, or will propose toxic conditions that will adversely affect man, animal, aquatic life, or wildlife.			Not applicable; no waste water or effluents will be released into EFPC during early site preparation
	Water shall not contain other pollutants that will be detrimental to fish or aquatic life, or adversely affect the quality of the waters for recreation, irrigation, or livestock watering and wildlife.			Not applicable; no waste water or effluents will be released into EFPC during early site preparation
Radionuclides in the environment	Exposure to individual members of the public from radiation shall not exceed a TED of 0.1 rem/year (100 mrem/year), exclusive of the dose contributions from background radiation, any medical administration the individual has received, or voluntary participation in medical/research programs.	Release of radionuclides to the environment from an active NRC-licensed operation—**relevant and appropriate**	TDEC 0400-20-05-.60(1)(a)	Sect. 5.1 S&H Plan
	The dose in any unrestricted area from external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with 1200-02-07-.35, does not exceed 0.002 rem (0.02 mSv) in any one hour.		TDEC 0400-20-05-.60(1)(b)	Sect. 5.1 S&H Plan
	Shall use, to the extent practicable, procedures and engineering controls based on sound radiation protection principles to achieve doses to members of the public that are ALARA.		TDEC 0400-20-05-.40(2)	Sect. 5.1 S&H Plan

ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate requirement
AWQC = ambient water quality criteria
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
S&H = safety and health
NRC = Nuclear Regulatory Commission
OF = Outfall
ROD = Record of Decision
TDEC = Tennessee Department of Environment and Conservation
TED = total effective dose
UEFPC = Upper East Fork Poplar Creek
Y-12 = Y-12 Nuclear Security Complex

APPENDIX B.
EARLY SITE PREPARATION DRAWINGS

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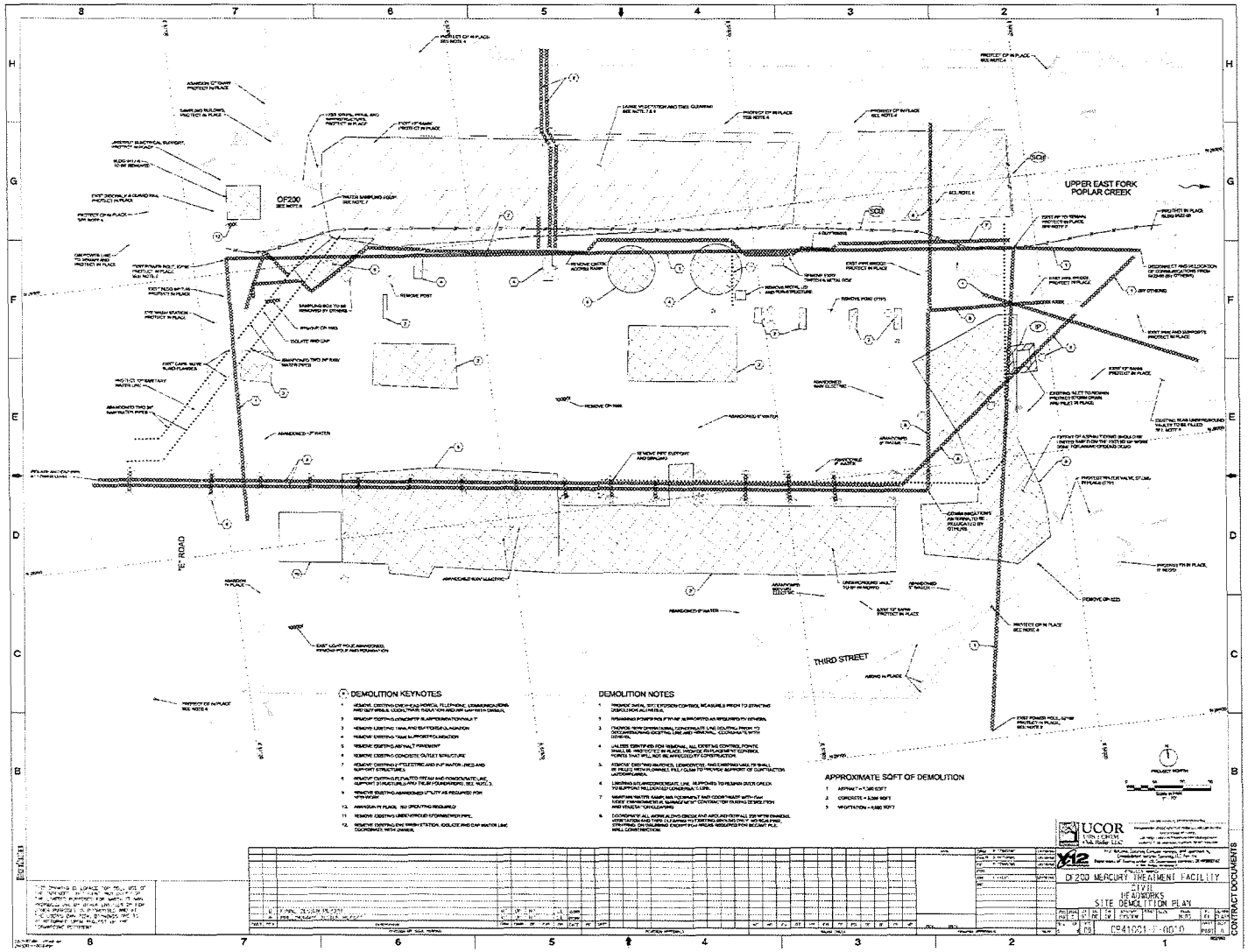
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DEMOLITION NOTES
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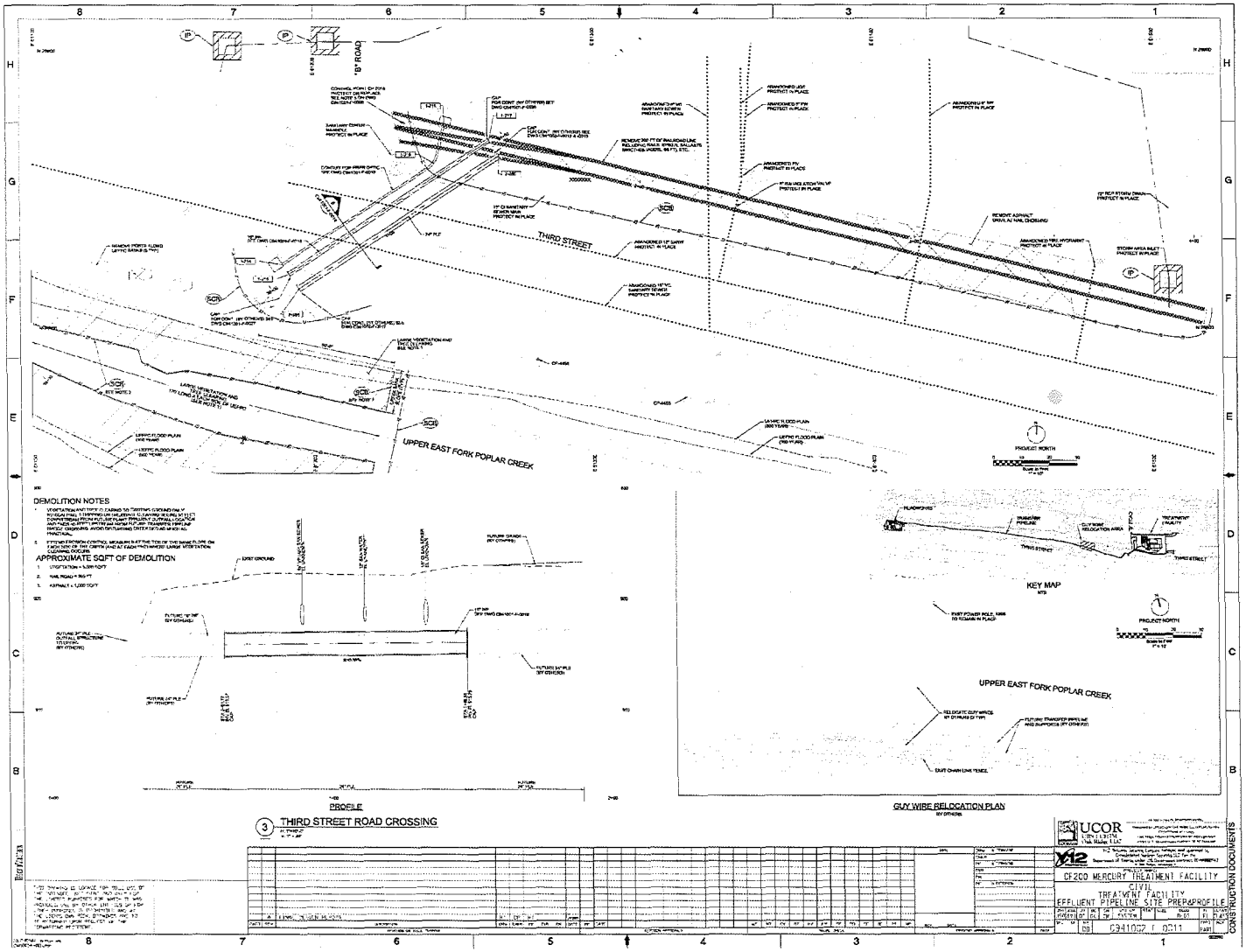
DF200 MERCURY TREATMENT FACILITY
CIVIL
HEADWORKS
SITE DEMOLITION PLAN
CONTRACT DOCUMENTS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DEMOLITION NOTES
APPROXIMATE SQFT OF DEMOLITION
PROFILE
KEY MAP
GUY WIRE RELOCATION PLAN
3 THIRD STREET ROAD CROSSING
UCOR
CF200 MERCURY TREATMENT FACILITY
CIVIL
TREATMENT FACILITY
EFFLUENT PIPELINE SITE PREP&PROFILE
CONSTRUCTION DOCUMENTS

APPENDIX C.
EARLY SITE PREPARATION SCHEDULE

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Early Site Preparation Schedule

Activity	Start	Finish
Planning and Design	January 2017	June 2017
Procurement	April 2017	September 2017
Early Site Preparation Field Activities	December 2017	July 2018
Treatment Facility Mobilization	August 2018	December 2018
Begin Treatment Facility Construction	December 2018	--

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APPENDIX D.
PROCESS BASE AND STORM FLOW MASS BALANCE

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ASSUMPTIONS

1. CALCULATIONS BASED ON AN AVERAGE INFLUENT FLOW OF 1,350 GPM
2. STREAM NUMBERS CORRESPOND TO STREAM NUMBERS IN THE PFDS
3. WATER QUALITY INFORMATION FOR FEED WATER DERIVED FROM DESIGN BASIS AND ASSUMED 90TH PERCENTILE DATA UNLESS OTHERWISE INDICATED
4. PARAMETER HAS NUMERICAL NPDES DISCHARGE LIMIT ON CURRENT PERMIT
5. WATER QUALITY INFORMATION FROM TREATABILITY TESTING PERFORMED TO DATE - GRAB SAMPLE
6. WATER QUALITY INFORMATION FROM TREATABILITY TESTING PERFORMED TO DATE - BULK SAMPLE.
7. WATER QUALITY INFORMATION FROM TREATABILITY TESTING PERFORMED TO DATE PRESERVED ONSITE
8. BACKWASH WASTE BASIN EFFLUENT RECYCLES BACK TO EQ TANK INFLUENT
9. BACKWASH FLOW RATES FOR GRAVITY FILTERS ARE SHOWN, BUT NOT INCLUDED IN FLOW MASS BALANCE SINCE THESE WILL BE OPERATED IN BATCHES. AN ESTIMATED STEADY-STATE FLOW TO/FROM BACKWASH WASTE BASIN IS ASSUMED. MASS LOADING FROM THE GRAVITY FILTERS IS INCLUDED FOR MASS BALANCE.
10. LESS CRITICAL PARAMETERS (THOSE OTHER THAN TDS, TSS, AND HG CONSTITUENTS) MAY ASSUME ZERO CONCENTRATIONS IN BACKWASH WASTE BASIN RECYCLE FOR SIMPLICITY
11. PARTICULATE HG ESTIMATED AS DIFFERENCE BETWEEN THE TOTAL AND DISSOLVED HG FRACTION
12. THEORETICAL EFFLUENT CONCENTRATION BASED ON MASS BALANCE CALCULATIONS. ACTUAL VALUES MAY VARY
13. DESIGN TARGET VALUE (EQUIVALENT TO NPDES PERMIT LIMIT WHERE APPLICABLE)
14. OIL AND GREASE VALUES SHOWN ARE TO DEMONSTRATE THEORETICAL REMOVAL FOR MASS BALANCE CALCULATION PURPOSES. FREE OIL ADSORBED TO SOLIDS IS CONSIDERED AS TSS
15. SLUDGE SETTLING TANK EFFLUENT SLUDGE FLOW RATE IS AN AVERAGE OVER ONE DAY INSTANTANEOUS FLOW RATE IS APPROXIMATELY 60 GPM

PART	REV	DESCRIPTION	DWN	CHKR	DE
	B	FINAL DESIGN REPORT	SF	D1	LE
	A	PRELIMINARY DESIGN REPORT	SF	D1	LE

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DRW	S FLAIRA
CHKR	B HAETE
DE	D THOMAS
DWR	
CH	J ELLIS
PE	

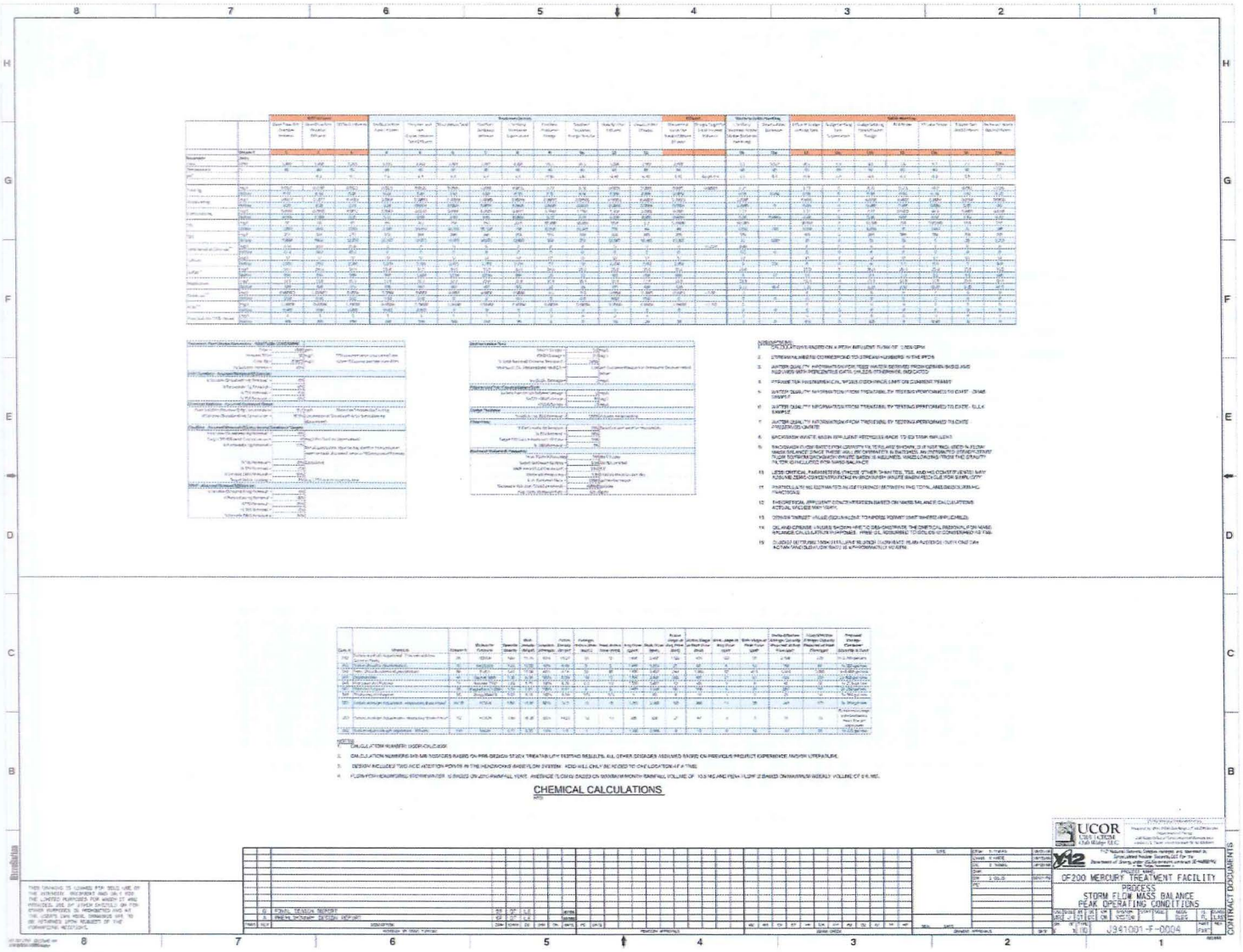
PROJECT NAME:
OF200 MERCURY TREATMENT FACILITY

PROCESS
BASE FLOW MASS BALANCE
AVERAGE OPERATING CONDITIONS

USE	DISC	DT	DC	CM	SYSTEM	STAT	SIZE	BLDG	FL	CLASS
USE	J	DT	DC	CM	SYSTEM			BLDG	FL	CLASS

TYPE: DD — J941001-F-0003 — PART — REV

CONTRACT DOCUMENTS



APPENDIX E.
OF200 MERCURY TREATMENT FACILITY SCHEDULE

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OF200 Mercury Treatment Facility Schedule

Activity	Date
Finish Pre-design Studies	March 2014
Initiate Facility Design and Design Reviews	May 2015
Approve Focused Feasibility Study/Proposed Plan D2	August 2015
Approve Amendment to the Record of Decision	April 2016
Approve Remedial Design Work Plan D2	July 2016
Submit Remedial Design Report/Remedial Action Work Plan D1	December 29, 2017 (FFA Appendix E)
Start Early Site Preparation Construction	December 2017
Start Balance of Construction	August 2018
Start Facility Construction and Component Testing	September 30, 2018 (FFA Appendix E)
Begin Start-up and Operational Readiness	August 2022
Finish Facility Construction	August 2022
Submit Phased Construction Completion Report	August 2022
Start Operations	December 2022

FFA = Federal Facility Agreement
OF200 = Outfall 200

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Comment Response Form

Document Title:	Draft D1, Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) for Water Treatment at Outfall 200	**Project/Function:**	OF200 MTF
Comments by:	Jon Richards/EPA	**Responses by:**	UCOR
Date:	12/12/2017	**Date:**	01/22/2017

Comment Number	Section/Page	Comment	Response
1	Appendix B	Appendix B (Drawings) was not included in the Remedial Design Report/Remedial Action Work Plan for review. For example, Section 4.3 (Process Piping and Mechanical) indicates that process piping is "typically placed in a secondary containment trench with traffic-rated grating;" however, without Appendix B, it is unclear if design drawings showing the process piping and associated secondary containment trenches are included and sufficiently designed. Similarly, Section 4.4.3 (Earthwork and Retaining Walls) indicates a retaining wall will be located at the Headworks structures along the East Fork Poplar Creek (EFPC); however, without Appendix B, it is unclear if the remedial design (RD) includes this retaining wall. As a result, numerous design components/systems could not be evaluated. *Revise the RDR/RAWP to include Appendix B.*	The design drawings will be provided on electronic media due to their large volume.
2	Appendix D.	The RDR/RAWP does not discuss the average operating conditions for process base flow and storm flow scenarios presented in Appendix D (Process Base and Storm Flow Mass Balance). In addition, information to support the assumptions presented in Appendix D are not provided and/or referenced. For example, Sheet J941001-F-003 (Process Base Flow Mass Balance, Average Operating Conditions) of Appendix D assumes that the calculations are based on an average influent flow of 1,350 gallons per minute (gpm); however, information to support this assumed average influent flow is not provided and/or referenced. *Revise the RDR/RAWP to discuss the average operating conditions for process base flow and storm flow scenarios presented in Appendix D.*	Information to support the design base flow and storm flow scenarios is provided in documents that were prepared prior to completion of the ROD Amendment. This section of the RDR/RAWP summarizes pertinent requirements stated in the ROD Amendment. The average operating conditions were established based on conceptual design and design studies and are documented in the approved *Remedial Design Work Plan for the Outfall 200 Mercury Treatment Facility at the Y-12 National Security Complex, Oak Ridge, Tennessee*, DOE/OR/01-2599&D2.
3	Section 1.2 (Scope)	Section 1.2 (Scope) indicates that the new Mercury Treatment Facility (MTF) will have a treatment capacity of 3000 gpm or 4.3 million gallons per day (Mgd) of influent surface water and	The MTF capacities were established during the FFA dispute resolution and are documented in the approved *Amendment to the Record of Decision for Phase I Interim Source Control*

		storage capacity of stormwater flows in excess of treatment capacity up to 2 million gallons to manage stream flows up to 40,000 gpm; yet, information to support these treatment and storage capacities and stream and stormwater flows is not provided and/or referenced. *Revise the RDR/RAWP to provide information to support the treatment and storage capacities and stream and stormwater flows.*	*Actions in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee – Water Treatment at Outfall 200*, DOE/OR/01-2697&D2.
4	Associated Plans	The RDR/RAWP does not include a quality assurance project plan/sampling and analysis plan (QAPP/SAP), traffic control plan, waste management plan, stormwater pollution prevention plan (SWPPP), erosion control plan, dust control plan, site restoration plan, or operation and maintenance plan (O&M Plan). As a result, it is unclear if the remedial design presented is sufficient to meet the applicable or relevant and appropriate requirements (ARARs) and Record of Decision (ROD) requirements, as outlined in in the RD/RA Handbook, 9355.0-048, EPA 540/R-95/059, dated June 1995 (RD/RA Handbook). *Revise the RDR/RAWP to include a project specific QAPP/SAP, traffic control plan, waste management plan, SWPPP, erosion control plan, dust control plan, site restoration plan, and O&M Plan.*	Please see responses to subcomments 4a-4j below.
4a	Section 3.1 (Project Goals)	Section 3.1 (Project Goals) indicates that collected water will be treated to meet the goal of 51 nanograms per liter (ng/L) total mercury in the treated effluent for discharge to EFPC; however, the RDR/RAWP does not include a QAPP/SAP to ensure adequate sampling and analysis of the treated effluent for discharge to EFPC will be conducted.	There will be no sampling conducted as part of the OF200 MTF construction. Sampling and analysis to support post-construction operations and monitoring will be developed prior to operation of the facility. DOE is willing to discuss future performance monitoring. A QAPP/SAP will be prepared at that time and will be made available upon request. The RDR/RAWP (Section 3.2) will be revised to clarify the future preparation of a QAPP/SAP to support O&M.
4b	Section 3.4 (Work Elements and Planned Activities)	Section 3.4 (Work Elements and Planned Activities) indicates that for planning purposes, a 30-year period of operation is assumed; however, an O&M Plan is not provided and/or referenced to document how the Outfall 200 (OF200) MTF will be operated and maintained for a 30-year period.	An O&M Plan will be prepared by the implementing O&M contractor prior to operation of the facility, and will be made available upon request. The RDR/RAWP will be revised to clarify the future preparation of an O&M plan to support O&M.
4c	Section 3.4.2 (Construction Mobilization and Readiness)	Section 3.4.2 (Construction Mobilization and Readiness) states, "Construction debris, litter, and construction chemicals will be managed throughout construction to prevent run-off to EFPC. Additionally, appropriate controls such as berms, dikes, and containers will be installed to prevent equipment fuel or oil products from entering EFPC;" however, a Waste Management Plan, SWPPP, and/or erosion control plan are not provided	A waste management plan will be prepared by the implementing construction contractors prior to mobilization and will be made available upon request. A SWPPP, which includes erosion control, is being prepared for use by the implementing contractors and will be made available upon request.

		and/or referenced.	The RDR/RAWP will be revised to clarify the future preparation of waste management plans and SWPPPs to support the construction.
4d	Section 3.4.3 (Construction of Headworks)	Section 3.4.3 (Construction of Headworks) states, "Disturbed areas will be stabilized and/or revegetated;" however, a site restoration plan is not provided and/or referenced.	Site restoration is detailed in the design drawings and specifications. The RDR/RAWP will be revised to clarify where the site restoration requirements are to be found.
4e	Section 3.4.4 (Construction of the Treatment Plant)	Section 3.4.4 (Construction of the Treatment Plant) states, "Clearing or other disturbance of areas immediately adjacent to EFPC will be minimized during installation of the treated water discharge line and disturbed areas will be stabilized and revegetated;" however, details regarding the clearing and other disturbance of areas is not provided and/or referenced. Similarly, a site restoration plan to stabilize and revegetate cleared and disturbed areas is not provided and/or referenced.	Clearing and site restoration are detailed in the design drawings and specifications. The RDR/RAWP will be revised to clarify where the clearing and site restoration requirements are to be found.
4f	Section 4.2.1 (Process Monitoring)	Section 4.2.1 (Process Monitoring) indicates that the anticipated monitoring will include a combination of influent and effluent sampling and analysis, in-process sampling and analysis, and online instrumentation; however, the RDR/RAWP does not include a QAPP/SAP to ensure adequate sampling and analysis is conducted as specified.	Please refer to the responses to comments #4a and 4b. There will be no sampling conducted as part of the OF200 MTF construction. Sampling and analysis to support post-construction operations and monitoring will be developed prior to operation of the facility. DOE is willing to discuss future performance monitoring. A QAPP/SAP will be prepared at that time and will be made available upon request. An O&M plan will be prepared by the implementing O&M contractor prior to operation of the facility, and will be made available upon request. The RDR/RAWP will be revised to clarify the future preparation of a QAPP/SAP and O&M plan to support O&M.
4g	Section 4.4.1 (Erosion and Dust Control)	Section 4.4.1 (Erosion and Dust Control) indicates a SWPPP will be prepared in accordance with the Tennessee General National Pollutant Discharge Elimination System (NPDES) permit for discharges associated with construction activities; however, a SWPPP is not provided.	Please refer to the response to comment #4c. A SWPPP, which includes erosion control, is being prepared for use by the implementing contractors and will be made available upon request. The RDR/RAWP will be revised to clarify the future preparation of a SWPPP to support the construction.
4h	Section 4.4.1 (Erosion and Dust Control)	Section 4.4.1 (Erosion and Dust Control) states, "During construction, precautions will be taken to minimize fugitive dust;" however, a dust control plan is not provided and/or referenced.	A SWPPP, which addresses dust suppression, is being prepared for use by the implementing contractors and will be made available upon request.

			The RDR/RAWP will be revised to clarify the future preparation of dust control plans to support the construction.
4i	Section 4.4.2 (Roads, Access, and Parking)	Section 4.4.2 (Roads, Access, and Parking) states, "Access to the Headworks and Treatment Plant facility will be from existing roads able to accommodate semi-tractor trailers or single-unit trucks (i.e., American Association of State Highway and Transportation Officials [AASHTO]);" however, a traffic control plan is not provided and/or referenced.	A traffic control plan will be prepared by the implementing contractors and will be made available upon request. The RDR/RAWP will be revised to clarify the future preparation of traffic control plans to support the construction.
4j	Section 5.1 (Waste Management Plan)	Section 5.1 (Waste Management Plan) states that, "Once operations begin and waste streams are generated, they will be analyzed for waste determination and acceptance prior to disposal. Those waste items that exhibit a characteristic of hazardous waste will be properly packaged, labeled, segregated stored, transported, and disposed in accordance with regulatory requirements. Waste items that are determined to be RCRA [Resource Conservation and Recovery Act] universal waste will be segregated and managed as such. If the waste is to be disposed at EMWMF [Environmental Management Waste Management Facility], a Waste Handling Plan will be prepared and approved prior to disposal;" yet, the RDR/RAWP does not include a Waste Management Plan to ensure waste streams are adequately identified and addressed.	Please refer to the response to comment #4c. A waste management plan will be prepared by the implementing contractors prior to mobilization and will be made available upon request. The RDR/RAWP will be revised to clarify the future preparation of waste management plans to support the construction.
5	Section 3.1 (Project Goals)	Section 3.1 (Project Goals) indicates that, "To limit the total mercury flux to EFPC from OF200, mercury concentrations in EFPC surface water, including any water bypassing the OF200 MTP will be limited to a daily maximum concentration of 2000 ng/L total mercury and an annual rolling flux of 1 kg/year [kilogram per year] total mercury;" however, information to support these total mercury concentrations in EFPC surface water are not provided and/or referenced. It should be noted that Section 3.2 (Performance Monitoring) indicates that any bypass water will be limited not to exceed 1400 ng/L dissolved mercury to protect acute toxicity to fish and aquatic life. As such, it is unclear if the Section 3.1 levels are protective of the receiving water and comply with ARARs given the more stringent dissolved mercury criteria. *Revise the RDR/RAWP to provide and/or reference information to support the total mercury concentrations in EFPC surface water.*	This language was developed by TDEC during dispute resolution as documented in the approved *Amendment to the Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee – Water Treatment at Outfall 200*, DOE/OR/01-2697&D2.
6	Section 3.3 (Project Scope)	Section 3.3 (Project Scope) indicates the RD includes transfer of collected water, following grit separation, to the Treatment Plant site via a "primarily ultraviolet resistant high-density polyethylene (HDPE), with select sections constructed of cement-lined ductile iron pipe;" however, further details regarding this pipeline and how it will be monitored to ensure	The transfer piping is detailed in the design drawings and specifications. The RDR/RAWP will be revised to clarify where the transfer piping details are to be found.

		leaks/biofouling/corrosion do not occur are not provided and/or referenced. This is of particular concern given that the water will be pre-treatment and the approximately 3,100-foot pipeline will be constructed along the south side of EFPC, as shown on Figure 3 (OF200 MTF Site Location). Further, Section 3.4.5 (Installation of Transfer Piping) indicates that the pipeline will be buried at road crossings and elevated on a pipe bridge at the EFPC crossing. It should be noted that without Appendix B (Drawings) drawings, the location of the sections constructed of HDPE and cement-lined ductile iron pipe and locations of buried pipeline are unknown. *Revise the RDR/RAWP to provide details regarding the pipeline that will transfer collected water to the Treatment Plant site.*	
7	Figure 4 (OF200 MTF Process Flow Diagram)	Figure 4 (OF200 MTF Process Flow Diagram) lacks the level of detail provided in Section 3.4 (Work Elements and Planned Activities). *Revise the RDR/RAWP to ensure Figure 4 and Section 3.4 provide a consistent level of detail.*	Figure 4 is a simplified block flow diagram as identified in the title. Process flows and controls are detailed in the design drawings and specifications. The RDR/RAWP will be revised to clarify where the process flow and control details are to be found. The text in Section 3.4 and Figure 4 will be revised to be consistent with one another.
7a	Figure 4 & Section 3.4	Figure 4 includes an "Intake Structure;" however, Section 3.4 indicates that the intake structure includes an overflow/diversion weir, concrete channel fitted with a manual bar rack, and wet wells.	Figure 4 is a simplified block flow diagram, which only provides summary-level information. More detailed information is described in Section 3.4 and further detailed in the design drawings and specifications.
7b	Figure 4 & Section 3.4	Section 3.4 states that the effluent from the equalization tank will be pumped to a pH control and dechlorination tank; however, Figure 4 does not include a pH control or dechlorination tank. Instead, Figure 4 only includes "Mercury and Solids Pretreatment Process."	Figure 4 is a simplified block flow diagram, which only provides summary-level information. More detailed information is described in Section 3.4 and further detailed in the design drawings and specifications.
7c	Figure 4 & Section 3.4	Section 3.4 indicates that a sulfide-functional polymer and ferric chloride coagulant will be added after pH control and dechlorination; however, Figure 4 only includes the addition of chemicals.	Figure 4 is a simplified block flow diagram, which only provides summary-level information. More detailed information is described in Section 3.4 and further detailed in the design drawings and specifications.
7d	Figure 4 & Section 3.4	Section 3.4 states, "The effluent from the flocculation and chemical precipitation process will then go to inclined-plate clarifier/thickeners to remove the solids;" however, Figure 4 only includes "Solids Conditioning and Dewatering."	Figure 4 is a simplified block flow diagram, which only provides summary-level information. More detailed information is described in Section 3.4 and further detailed in the design drawings and specifications.
7e	Figure 4 & Section 3.4	Section 3.4 indicates that the filtration process will consist of a series of gravity filters containing filter media that will be operated in parallel with individual units being backwashed or taken offline as needed; however, Figure 4 only includes	Figure 4 provides summary-level information. More detailed information is described in Section 3.4 and further detailed in the design drawings and specifications.

		"Filtration for Mercury Removal."	
7f	Figure 4 & Section 4.1.1	Section 4.1.1 (Headworks) states, "The grit slurry is pumped to a grit washer/dewatering screw, located outdoors near the grit pump building;" however, Figure 4 only includes "Grit Processing."	Figure 4 is a simplified block flow diagram, which only provides summary-level information. More detailed information is described in Section 4.1.1 and further detailed in the design drawings and specifications.
7g	Figure 4 & Section 4.1.2	Section 4.1.2 (Stormwater Storage) indicates that the stormwater storage tank is equipped with a passive overflow; however, this is not illustrated on Figure 4.	Figure 4 is a simplified block flow diagram, which only provides summary-level information. More detailed information is described in Section 4.1.2 and further detailed in the design drawings and specifications.
7h	Figure 4 & Section 4.1.4.1	Section 4.1.4.1 (Equalization and Precipitation) references a sludge settling tank where remaining sludge is diverted; however, Figure 4 does not include a sludge settling tank.	Figure 4 is a simplified block flow diagram, which only provides summary-level information. More detailed information is described in Section 4.1.4.1 and further detailed in the design drawings and specifications.
SC-1	Figures 2 & 3	Figure 2, Suspected Areas of Mercury Contamination in the UEFPC Watershed, Page 3 and Figure 3, OF200 MTF Site Location, Page 11: Figures 2 and 3 lacks sufficient detail to provide a basic understanding of current site conditions. For example, a. The direction of surface and groundwater flow, as discussed in Section 2.4 (Previous Actions), is not shown; b. The location of the small wetland, discussed in Section 2.3 (Site Ecology), is not shown; c. Section 2.5 (OF200 Mercury Treatment Facility Boundaries) states, "The Treatment Plant site is bounded by 2nd Street to the north, 3rd Street to the south, B Road to the west, and A Road to the east (Fig. 3); however, these boundaries are not labeled; d. The circle and diamond symbols included in the Figure 2 legend are not defined; and, e. The insets in Figure 3 are unreadable. *Revise Figures 2 and 3 to include sufficient detail to address these issues.*	Figures 2 and 3 will be revised for clarification. a. For OF200, Surface water flow is of primary importance. Groundwater flow is of secondary importance; the figure is meant to show sources of surface water contamination and surface water flow. b. The wetland area described is downstream of the MTF and is not impacted by the MTF construction project. c. The boundaries are shown on Figure 3; the streets are of secondary importance and are shown on the associated design drawings. d. The legend on Figure 2 has been revised to clarify. e. The insets in Figure 3 have been revised to clarify; detailed site plans are shown on the associated design drawings.
	Section 2.3, Site Ecology, Page 7	Section 2.3 indicates that the EFPC channel has been "extensively modified over the years by the installation of structures such as road crossings and weirs and through significant use of riprap and erosion controls;" however, it is unclear if these modifications were accounted for in the design components/systems. *Ensure these modifications are provided and accounted for on Appendix B (Drawings) drawings.*	This section describes historic activities associated with the channel, and the design has accounted for current site conditions, as shown on the associated design drawings.
SC-3	Section 3.3, Project Scope,	Section 3.3 states, "The grit removal system design also included solids dewatering and loading into solid waste	The design drawings will be provided on electronic media due to their large volume. Please see response to comment #1.

	Page 14	containers for disposal;" however, the grit removal system design is not included in the RDR/RAWP. *Revise the RDR/RAWP to include detailed designs for all referenced remedial action (RA) components.*	
SC-4	Section 3.4.3, Construction of Headworks, Page 20	Section 3.4.3 indicates that any needed backfill will be imported yet details regarding the backfill source are not provided and/or referenced. As a result, it is unclear if the backfill will be clean and appropriate for use along the EFPC. *Revise Section 3.4.3 to include details regarding the backfill source and any sampling and analysis that will be conducted to confirm the material is clean.*	The backfill will be clean imported backfill. Details of testing for acceptance of imported backfill is included in the design technical specifications. Section 3.4.3 will be revised to clarify clean imported backfill as specified.
SC-5	Figure 5, Headworks Layout, Page 16 and Figure 6, Treatment Plant Layout, Page 17	Figures 5 and 6 do not include labels or identification of key RD components. As a result, the usefulness of the figures to document the Headworks and Treatment Plant layouts is unclear. *Revise Figures 5 and 6 to label key RD components at the Headworks and Treatment Plant.*	Figures 5 and 6 are schematics of the treatment system components. Details of key RD components are shown on the associated design drawings.
SC-6	Section 4.1.4.2, Filtration, Page 26	The text indicates that the media in the multi-media filter (MMF) includes "a layer of garnet sand, topped by silica sand, and final finished by a layer of anthracite coal;" however, information to support the use of this media to address the mercury contamination at OF200 is not provided and/or referenced. *Revise Section 4.1.4.2 to provide information to support the use of this media to address the mercury contamination at OF200.*	Unit processes for mercury removal were evaluated during conceptual design and are documented in the approved *Remedial Design Work Plan for the Outfall 200 Mercury Treatment Facility at the Y-12 National Security Complex, Oak Ridge, Tennessee*, DOE/OR/01-2599&D2. The selected unit processes, including media filtration, were approved in the *Amendment to the Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee – Water Treatment at Outfall 200*, DOE/OR/01-2697&D2. Section 4.1.4.2 will be revised to clarify the information that was used to select the specific media in the multi-media filter.
SC-7	Section 4.1.4.2, Filtration, Page 26	Section 4.1.4.2 indicates that the MMF units require periodic backwashing at a higher loading rate than normal influent sufficient to adequately lift and loosen the bed. Backwashing generally includes air scour to loosen packed solids in the media bed, using blowers to provide the air scour; however, details regarding this periodic backwashing is not provided and/or referenced. *Revise the RDR/RAWP to provide details regarding the backwashing and air scouring.*	Details of key RD components, including the air scour and backwashing, are included on the associated design drawings and technical specifications.
SC-8	Section 4.5, Geotechnical, Page 29	The section indicates that a two-phased geotechnical field investigation was performed to identify soil and rock conditions at the site to support the structural and foundation design of the OF200 MTF. The text further states that the investigations consisted of the collection and testing of soil and rock sampled from the Headworks, transfer pipeline, and Treatment Plant	Results of the site-specific geotechnical field investigations are documented in the two referenced reports and were used to design the foundations for all structures. Details of the foundation design are shown on the associated design drawings.

		areas. While the Report of Limited Geotechnical Exploration, Outfall 200 Mercury Treatment Facility, Y-12 National Security Complex, Oak Ridge, Tennessee (GEOServices LLC) and Geotechnical Report for Data Gap Characterization at the Proposed Outfall 200 Mercury Treatment Facility Sites (CTI and Associates for Strata-G, LLC) are referenced, further details are not provided. *Revise Section 4.5 to discuss the results of the geotechnical field investigation and its impact on the current RD.*	
SC-9	Section 4.7, Structural, Page 33	The text indicates that building foundations, tank foundations, backfilled water-holding basin walls, and retaining walls were designed to resist seismic loads caused by lateral earth pressures; however, information supporting this statement is not provided and/or referenced. *Revise Section 4.7 to provide and/or reference information to substantiate that building foundations, tank foundations, backfilled water-holding basin walls, and retaining walls were designed to resist seismic loads caused by lateral earth pressures.*	Structural design loads are included on the associated design drawings.
SC-10	Section 4.8.3, Process Support Fume Hood, Page 34	The text states, "The HVAC [heating, ventilation, and air conditioning] system will be sized to accommodate the air flow required for the hood;" however, details associated with the sizing of the HVAC system are not provided and/or referenced in the RDR/RAWP. *Revise the RDR/RAWP to include details associated with the sizing of the HVAC system.*	Details of the HVAC systems, including treatment building hood design, are shown on the associated design drawings.

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Comment Response Form

Document Title:	Draft D1, Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) for Water Treatment at Outfall 200	**Project/Function:**	OF200 MTF
Comments by:	Randy Young /TDEC	**Responses by:**	UCOR
Date:	12/12/2017	**Date:**	12/25/2017

Comment Number	Section/Page	Comment	Response
1	General	The Tennessee Division of Water Resources requests the opportunity to discuss future performance monitoring as it relates to monitoring requirements for Outfall 200 under the NPDES permit. Specifically, the Division is seeking to optimize effluent monitoring at the relocated outfall used in assessing mercury removal with data useful to assess removal of other toxic metals addressed in the permit.	DOE respectfully requests that the State of Tennessee speak with one voice regarding the planned CERCLA activities in the UEFPC watershed; specifically, that TDEC's Division of Remediation and Division of Water Resources employ a consistent regulatory authority to pursue future monitoring requirements for planned CERCLA remedial actions and activities. Monitoring for Outfall 200 MTF will be addressed through the CERCLA process and documented in the Comprehensive Monitoring Plan and associated reports, similar to prior actions implemented under the UEFPC Phase I ROD.
SC-1	Executive Summary, 3rd Paragraph, Last Sentence	"The discharge from the storm sewer system currently constitutes the largest source of mercury releases to EFPC under base flow conditions". From the 2016 RER, the mercury flux measured at the existing Outfall 200 is approximately 2,200 grams/day – the loading that would be collected and treated in the new MTF. The flux measured at Station 17 is approximately 8,100 grams/day. The difference between these measurements represents additional loading due to contaminated stream sediments downstream of the OF200 MTF Headworks that will not be captured for treatment. This additional loading represents the "largest source of mercury releases to EFPC." *Please clarify that the OF 200 MTF will only collect and treat approximately 27 percent of the mercury being discharged to UEFPC.*	Mercury flux was evaluated prior to approval of the ROD Amendment; it is not the intent of the RDR/RAWP to reevaluate flux. The RDR/RAWP will be revised to state: "The discharge from the storm sewer system constitutes a documented source of mercury releases to EFPC under base flow conditions. The amount of mercury flux is variable, depending on flow conditions and contributions from other sources. The adaptive management approach, described in the ROD amendment and embodied in DOE's *Strategic Plan for Mercury Remediation at the Y-12 National Security Center,* recognizes the dynamic nature of mercury discharges and impacts. The ROD amendment provides for evaluation of actual system performance after two years of operation and determination of any necessary follow-on actions at that time, and further specifies that the system may be modified in the future if warranted by performance monitoring data and/or any future

			changed conditions, using the adaptive management approach."
SC-2	Section 5.1, Waste Management Plan	Based upon characterization results, waste generated during construction activities is expected to be only non-contaminated debris. However, there is the chance that free mercury and mercury contaminated sediment and soil could be encountered while constructing the headworks within and close to the creek. DOE should include a plan to collect the free mercury and how to manage mercury contaminated sediments and soil.	The following will be added to Section 5.1: "If free mercury is encountered during construction or following excavation, then the mercury, along with the soil and debris in the surrounding area, will be collected, packaged and sent to an approved commercial TSDRF for treatment and disposal. Mercury will be managed in accordance with applicable and appropriate regulations."