UCOR
United Cleanup Oak Ridge LLC
P.O. Box 4699 | Oak Ridge, TN 37831

DOE Contract No. 89303322DEM000067
ORRCC-22-0160
June 22, 2022

Mr. Vojin Janjic
Manager, Permit Section
Tennessee Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass, Tennessee Tower
312 Rosa L. Parks, Avenue, 11 Floor
Nashville, Tennessee 37243-1102

Dear Mr. Janjic:

89303322DEM000067: National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water at the East Tennessee Technology Park (ETTP) (NPDES Permit No. TN0002950) – Submittal of Monitoring Plans

The NPDES Permit for storm water at the ETTP (individual NPDES Permit No. TN0002950) was issued to the U.S. Department of Energy on February 4, 2022, and became effective on April 1, 2022. A minor modification to the permit was issued by the Tennessee Department of Environment and Conservation (TDEC) on May 17, 2022. The NPDES Permit includes additional monitoring and reporting requirements, and conditions, including submittal of updated monitoring plans within 90 days of the permit effective date. The due date for submitting the monitoring plans to TDEC is June 30, 2022.

Enclosure 1 is a copy of the *East Tennessee Technology Park Environmental Monitoring Program Surface Water, Sediment, and Soil Sampling and Analysis Plan, Oak Ridge, Tennessee* (UCOR-4033/R12) which meets the requirement in NPDES Permit, Section 1.1.2 and Section 3.5, for submittal of an updated Environmental Monitoring Plan within 90 days of the permit effective date.

Enclosure 2 is a copy of the *East Tennessee Technology Park Biological Monitoring and Abatement Program, Sampling and Analysis Plan, Oak Ridge, Tennessee* (UCOR-4034/R11), which meets the requirement in NPDES Permit, Section 1.1.2 and Section 3.4, for submittal of an updated Biological Monitoring and Abatement Program Plan within 90 days of the permit effective date.

Enclosure 3 is a copy of the *East Tennessee Technology Park Storm Water Pollution Prevention Program, Sampling and Analysis Plan, Oak Ridge, Tennessee* (UCOR-4028/R13), which meets the requirement in NPDES Permit Section 5.13, to update the benchmark levels, as needed, within 90 days of the permit effective date.

Please contact Tony Poole (865) 201-4076 or Kevin Crow (865) 363-5382 if you have any questions or require additional information.

Sincerely,

SAMANTHA PACK (Affiliate)

Digitally signed by SAMANTHA PACK (Affiliate)
Date: 2022.06.21 16:53:23 -04'00'

Samantha R. Pack
Environmental Services Manager

SRP:DAP:alt

Enclosures: As Stated

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ENCLOSURE 1
Letter: ORRCC-22-0160

National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water at the East Tennessee Technology Park (ETTP) (NPDES Permit No. TN0002950) – Submittal of Monitoring Plans / East Tennessee Technology Park, Environmental Monitoring Program Surface Water, Sediment, and Soil, Sampling and Analysis Plan, Oak Ridge, Tennessee (UCOR-4033/R12)

UCOR
United Cleanup Oak Ridge LLC

UCOR-4033/R12

East Tennessee Technology Park Environmental Monitoring Program Surface Water, Sediment, and Soil Sampling and Analysis Plan, Oak Ridge, Tennessee

This document is approved for public release per review by:

Leesa K. Laymance — 5/26/22

UCOR Classification & Information Control Office — Date

UCOR-4033/R12

East Tennessee Technology Park Environmental Monitoring Program Surface Water, Sediment, and Soil Sampling and Analysis Plan, Oak Ridge, Tennessee

Date Issued—June 2022

Effective Date—October 1, 2022

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

United Cleanup Oak Ridge LLC
under contract 89303322DEM000067

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APPROVALS

East Tennessee Technology Park Environmental Monitoring Program Surface Water, Sediment, and Soil Sampling and Analysis Plan, Oak Ridge, Tennessee	UCOR-4033/R12 June 2022 Effective October 1, 2022

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 Financial Officer, Internal Audit, Labor Relations, General Counsel, Community Outreach, or Project Services and Support OR ☒ (4) Document identified in USQD-MS-CX-REPORTS-1074
USQD Preparer:	C. W. Caldwell Digitally signed by C. W. Caldwell Date: 2022.06.06 14:31:08 -04'00' Name / Date
Exhibit L Mandatory Contractor Document	☐ No (No Proforma Change Control Board [PCCB] reviewer signature required.) ☐ Yes (Requires review by the PCCB.)
PCCB Reviewer:	Name / Date

Prepared by:
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Geologist
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REVISION LOG

Revision number	Effective Date	Description of changes	Sections or pages affected
0	October 2011	Initial issue of document.	All
1	October 2012	Annual update.	All
2	October 2013	Annual update.	All
3	October 2014	Annual update. Revisions include modifications to be consistent with WRRP 5-year monitoring requirements.	All
4	Issued in July for October 2015	Annual update. Revisions include deletion of monitoring conducted for WRRP.	All
5	Issued in September for October 2015	Revised tables to reflect additional monitoring required by WRRP.	11–13, 21, 24
6	October 2016	Annual update. Revisions include clarifications of DQO and additional analyses at Poplar Creek monitoring locations.	7, 10, 18
7	October 2017	Annual update.	All
8	October 2018	Annual update.	All
9	October 2019	Annual update.	All
10	October 2020	Annual update.	All
11	October 2021	Annual update.	All
12	October 2022	Annual update.	All

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CONTENTS

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TABLES

FIGURES

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ACRONYMS

ALARA	as low as reasonably achievable
AMSED	Analytical Master Specification Electronic Deliverable
CA	corrective action
CCV	contract compliance verification
COC	chain of custody
CRK	Clinch River kilometer
DMC	Document Management Center
DOE	U.S. Department of Energy
DQO	data quality objective
EC&P	Environmental Compliance and Protection
EDD	electronic data deliverable
EFPC	East Fork Poplar Creek
EIMS	Environmental Information Management System
EMP	Environmental Monitoring Program
EPA	U.S. Environmental Protection Agency
ESWO	Emergency Services Watch Office
ETTP	East Tennessee Technology Park
FY	fiscal year
MIK	Mitchell Branch kilometer
O	Order
PCB	polychlorinated biphenyl
PEMS	Project Environmental Measurements System
QA	quality assurance
QC	quality control
SAP	sampling and analysis plan
SMO	Sample Management Office
SSO	Sampling Subcontractor Organization
UCOR	United Cleanup Oak Ridge LLC
VOC	volatile organic compound
WRRP	Water Resources Restoration Program

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EXECUTIVE SUMMARY

The Environmental Monitoring Program (EMP) at the East Tennessee Technology Park (ETTP) includes environmental surveillance, which is conducted at various locations by United Cleanup Oak Ridge LLC (UCOR) in order to assess the impacts, if any, of plant operations on the environment, to assess the efficacy of pollution prevention (P2) measures and remedial actions (RAs), and to comply with the requirements of U.S. Department of Energy (DOE) Orders (Os) 231.1B, *Environment, Safety and Health Reporting* (latest revision), and 458.1, Chg. 4, *Radiation Protection of the Public and the Environment*. The EMP sampling and analysis plan (SAP) sets forth the objectives and strategy for environmental surveillance of surface water, sediment, and soil at ETTP and its environs, and defines the specific sampling and analysis requirements effective October 1, 2022, at each of the surveillance locations.

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1. INTRODUCTION

1.1 PROGRAM OBJECTIVES

The East Tennessee Technology Park (ETTP) Environmental Monitoring Program (EMP) conducts routine environmental surveillance monitoring of surface water, sediment, and soil in order to assess the impact of ETTP operations on the public and the environment, and to comply with U.S. Department of Energy (DOE) requirements.

This sampling and analysis plan (SAP) defines the actions necessary, effective October 1, 2022, for meeting the program objectives. Changes to this SAP must be approved in writing. In the event that samples must be analyzed by laboratories incapable of conducting the specified analyses, the nearest comparable methodology will be selected.

1.2 MONITORING STRATEGY

The ETTP EMP conducts environmental surveillance activities at 12 surface water locations (see Fig. 1 in Chap. 4, "Tables and Figures"). Four of the locations monitor water at exit points (K-702-A Slough, K-901-A, K-1007-B, and K-1700). Eight of the locations monitor ambient stream conditions (Clinch River kilometer [CRK]-16, CRK-23, K-1710, and K-716; and Mitchell Branch kilometer [MIK] 0.45, MIK 0.59, MIK 0.71, and MIK 1.4.)

Mitchell Branch is designated by the state of Tennessee for fish and aquatic life, recreation, livestock watering and wildlife, and irrigation. Mitchell Branch is listed on the state of Tennessee 303(d) list of water quality-impaired waters due to the channelization of the stream and due to the presence of polychlorinated biphenyls (PCBs) and low dissolved oxygen. Therefore, the quality of Mitchell Branch does not meet the water use designations that have been established by the state of Tennessee.

Poplar Creek from mile 0.5 to origin is designated by the state of Tennessee for fish and aquatic life, recreation, livestock watering and wildlife, and irrigation. Poplar Creek from mile 0.0 to 0.5 is also designated for industrial water supply. The Poplar Creek Embayment of the Clinch River Arm of the Watts Bar Reservoir is listed on the state of Tennessee 303(d) list of water quality-impaired waters due to the presence of PCBs and mercury. Therefore, the water quality of the Poplar Creek Embayment does not meet the water use designations that have been established by the state of Tennessee. East Fork Poplar Creek (EFPC), which is a tributary of Poplar Creek, is known to discharge these contaminants to Poplar Creek. EFPC is affected by activities that have been conducted at the Y-12 National Security Complex (Y-12). The Mitchell Branch subwatershed is potentially another source of mercury and PCBs to Poplar Creek, so it may contribute to the listing of the Poplar Creek Embayment on the state's 303(d) list.

The Clinch River flows around the western portion of ETTP. The Clinch River from mile 4.4 to 12.0 (the mouth of Poplar Creek) is designated by the state of Tennessee for domestic water supply, industrial water supply, fish and aquatic life, recreation, livestock watering and wildlife, irrigation, and navigation. The Clinch River arm of the Watts Bar Reservoir is listed on the state of Tennessee 303(d) list of quality-impaired waters due to the presence of PCBs, chlordane, and mercury. Therefore, the water quality of the Clinch River does not meet the water use designations that have been established by the state. The Clinch River receives stormwater runoff and other discharges directly from ETTP. It also receives discharges from Poplar Creek (where it enters the Clinch River at mile 12.0) and Mitchell Branch, which is a tributary to Poplar Creek. Due to the minimal levels of the listed contaminants noted in analytical data from stormwater outfalls at ETTP in relation to the volume of flow in the Clinch River, it is believed that ETTP has little or

no adverse impact on the water quality of the Clinch River and is not connected to the listing of the Clinch River on the state's 303(d) list.

Surface water, sediment, and soil surveillance are conducted to assess the impacts, if any, of ETTP operations on the public and the environment. Results from CRK-23, K-1710, and MIK 1.4 sampling locations provide information representative of surface water conditions upstream from most ETTP influences, while monitoring at locations MIK 0.45, 0.59, and 0.71; and K-716 provides data on stream conditions near or below many of the ETTP influences. CRK 16 provides data on stream conditions below Oak Ridge Reservation (ORR) influences. The remaining locations are situated at convergence points, where surface water from large areas converges before discharging to Poplar Creek or the Clinch River. The monitoring requirements are presented in Tables 1 through 15 in Chap. 4. The surface water, sediment, and soil monitoring locations are shown in Figs. 1 and 2 in Chap. 4. Soil and sediment monitoring will not be conducted under the EMP in fiscal year (FY) 2022.

1.3 DEFINITIONS

Duplicate—A quality assurance (QA) sample collected concurrently with a regular sample and analyzed for the same parameters using identical handling and analytical techniques.

Field Blank—A blank sample prepared in the field at the same time of sample collection and submitted to the laboratory as a sample.

Field Reading—Measurement or analysis obtained in the field.

Grab sample—A sample consisting of an aliquot of at least 100 mL (except in those cases where smaller volumes are specified per the latest requested method) collected at a single discrete moment in time (grab samples for volatile organic compounds [VOCs] will be collected in three 40-mL bottles).

Quarter—Any of the following three-month periods: January 1 to March 31, April 1 to June 30, July 1 to September 30, and October 1 to December 31.

Trip Blank—A blank sample prepared by filling a sample container with analyte-free water in the laboratory. (This blank is transported to the sample location or shipping facility and accompanies the regular sample to the laboratory and is handled as a regular sample.)

2. ORGANIZATIONAL RESPONSIBILITIES

2.1 ENVIRONMENTAL COMPLIANCE AND PROTECTION ORGANIZATION

The Environmental Compliance and Protection (EC&P) organization provides overall management of the EMP at ETTP. The responsibilities of the EC&P organization include the following tasks associated with the EMP Surface Water SAP effort:

- Maintaining the ETTP EMP Surface Water SAP, which defines the necessary actions required to implement the program.
- Authorizing and approving in writing any deviations from the ETTP EMP Surface Water SAP requirements. (Changes to this SAP may be issued to the Program Manager of the United Cleanup Oak Ridge LLC [UCOR] Oak Ridge Sample Management Office [SMO] as addenda. Prior to collection of samples, EC&P personnel will provide direction to the Sampling Subcontractor Organization [SSO] for prepopulating the current environmental information management system [EIMS], including the desired project numbers to be used.)
- Reviewing all surface water field sampling procedures, checklists, schedules, and programs developed by subcontract sampling, analytical, and operations organizations.
- Providing oversight and guidance for the operation, maintenance, and calibration of the surface water monitoring instrumentation.
- Serving as liaison between the SSO and the maintenance organization for matters regarding the EMP sampling effort.
- Establishing laboratory/field screening levels for water samples that will trigger immediate notifications from subcontractor laboratory personnel, the SMO, or the sampling technicians. (The screening levels shall be established in accordance with reference standards in a manner that encourages and facilitates environmental as low as reasonably achievable [ALARA] objectives.)
- Evaluating all analytical results that equal or exceed screening levels to determine if there have been changes in field conditions that need to be addressed to reduce pollutant discharges. (Follow-up actions may include recommendations for additional sampling frequencies. For exceedances of screening levels for gross alpha or gross beta activity, isotopic analyses may be required to fully characterize the discharge.)
- Initiating investigations to determine the cause of any exceedance of applicable water quality standards (if any such standards exist and are appropriate for the water body in question).
- Establishing project quantitation levels for all analytical parameters that will implement data quality objectives (DQOs). (The quantitation levels must allow analytical results to be compared to applicable reference standards and screening levels and should also facilitate environmental ALARA evaluations of all discharges.)
- Evaluating data completeness and suitability.
- Evaluating data through comparison of the sample results with duplicate and trip blank results.
- Evaluating and reporting data as required by DOE orders and agreements with regulatory agencies.
- Providing EMP data to operations and project organizations upon request.

2.2 SAMPLE MANAGEMENT OFFICE

The SMO will be responsible for ensuring that all collected samples are analyzed, and that all analytical data are entered into an approved computer system. Responsibilities are as follows:

- Selecting the appropriate laboratory(ies) to conduct the analyses of samples.
- Following proper chain of custody (COC) procedures for receiving EMP samples.
- Recording and maintaining analytical information in the current EIMS for the required analytical parameters.
- Ensuring that EMP samples are analyzed using proper QA/quality control (QC) techniques and procedures as specified in this SAP.
- Ensuring that analyses of EMP samples are completed within required holding times.
- Notifying EC&P personnel immediately of any abnormal conditions noted during sampling or analysis that might indicate an environmental incident.
- Furnishing hard copy or electronic data files of EMP analytical information to designated EC&P personnel in accordance with project specifications.
- Providing sample shipment services upon request.
- Implementing screening level system in the laboratory information management system (if the laboratory has the capability) in order to identify analytical measurements, which are outside the limitations specified by the EC&P organization.
- Notifying EC&P personnel immediately by telephone or email of any approved and verified analytical data that are outside the specified limitations.
- Notifying EC&P personnel immediately of any failures to comply with the sample administration requirements and conditions of this SAP, such as missed holding times, failure to obtain samples, failure to analyze samples by required analytical methods, sample temperatures out of specifications, or failure to follow proper QA/QC techniques.
- Initiating the collection of replacement samples as directed by EC&P in case of sample administration failures, such as missed holding times, inappropriate methods, sample temperatures out of specification, or improper identification of preservatives.
- Completing a Contract Compliance Verification (CCV) Scoresheet on the current EIMS within 10 working days of receipt of the laboratory data.
- Reviewing case narratives in the Forms packages on each laboratory data package and verifying that data on the hard copy of the analytical results agree with the data that have been entered into the current EIMS.
- Sending a record copy of all laboratory data to the UCOR Document Management Center (DMC) for active local storage for a minimum of three years.
- Ensuring that all laboratory data packages are processed according to applicable SMO procedures.

2.3 SAMPLING SUBCONTRACTOR ORGANIZATION

The SSO is responsible for conducting sampling and field measurement activities and sample shipments in accordance with the requirements of this SAP, SSO internal procedures, and other applicable plans and procedures. These responsibilities include the following:

- Providing sufficient numbers of adequately trained personnel to ensure that samples are obtained in accordance with the requirements of this SAP. (Sampling personnel will be trained in accordance with accepted sample collection and preparation practices.)
- Developing and following appropriate procedures for sampling water, sediment, and soil. (Sampling personnel will use appropriate personal protective equipment [PPE] and will adhere to established, accepted safety practices, including when traveling on highways or by boat.)
- Maintaining and updating SSO internal procedures for sample collection and preservation; COC; instrumentation calibration, use and maintenance; equipment decontamination; sample transportation; training requirements; and ensuring that SSO internal procedures mirror the requirements of the U.S. Environmental Protection Agency (EPA), the U.S. Department of Transportation (DOT), the Tennessee Department of Environment and Conservation (TDEC), and other appropriate federal or state agencies.
- Properly collecting, preserving, and transporting or shipping samples to analytical labs.
- Using proper login and COC procedures.
- Recording and maintaining sampling and field information in the current EIMS. (EIMS will be prepopulated prior to sample collection per the direction of the EC&P organization.)
- Performing QA/QC tasks for sampling and field measurements.
- Immediately notifying EC&P personnel of any field measurement results that exceed established screening levels or of any abnormal conditions noted during sampling that might indicate a noncompliance or environmental incident (also requires notification of the ETTP Emergency Services Watch Office [ESWO]).
- Collecting samples on an emergency/call-in basis as requested by EC&P or the ESWO office.
- Contacting EC&P when samples cannot be collected from the most representative sampling point of the locations specified in this SAP.
- Decontaminating all sampling equipment used in the field in accordance with accepted EPA and internal SSO procedures to reduce the possibility of cross-contamination of samples.
- Maintaining original COC documentation and furnishing copies to the SMO program manager.
- Shipping samples to the appropriate laboratories in compliance with required holding times and temperatures.

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3. SAMPLING AND ANALYSIS

3.1 GENERAL REQUIREMENTS FOR SAMPLING AND ANALYSIS

Samples and measurements must be representative of the actual discharge or flow, sediment, or surface soil conditions. No surface water sample will be collected that duplicates a National Pollutant Discharge Elimination System (NPDES) sample at the same location.

Surface water samples will be collected, preserved, and handled as specified in Tables 1 through 15 in Chap. 4. Requests for deviations shall be in writing and shall provide defensible rationale and describe the desired substitute.

Duplicate and field blank QA/QC samples will be collected and analyzed at the rate of 5% (1 per 20 samples). A schedule for obtaining duplicates shall be provided by EC&P organization personnel. Trip blanks will be collected at the rate of one blank for each cooler that contains VOC samples. EC&P organization personnel will review all data reports for completeness and consistency with this SAP. If inconsistencies are found, the SMO or SSO, as appropriate, will be notified for resolution. The SSO or SMO will provide the requested information in a timely fashion and resubmit corrected data in the approved format. Duplicate, field blank, and trip blank results will be used by EC&P organization personnel to evaluate the sample results.

Sediment and soil samples shall be collected and handled in accordance with the EPA Region 4 Analytical Services Branch *Laboratory Operations and Quality Assurance Manual* (EPA 2018, Analytical Services Branch, Athens, GA) protocol and subcontractor standard operating procedures. The soil samples collected at ambient air locations will be core surface samples to a depth of 6 in. Records shall be maintained of the precise core sample locations, and these locations should not be subject to disturbance by vehicles. Analytical results will be reported within 30 days of sample collection.

Instruments shall be calibrated and maintained in accordance with manufacturers' instructions.

Observations of abnormal conditions including, but not limited to, sheens, unusual films, unusual floating solids or debris, dying vegetation, or any other indications of an unusual condition must be reported to EC&P as soon as practicable.

3.2 DATA QUALITY OBJECTIVES

The DQOs for the EMP surface water, sediment, and soil monitoring program are to provide analytical data that have been collected, analyzed, evaluated, and reported, as required by DOE Order (O) 231.1B, *Environment, Safety, and Health Reporting*; DOE O 458.1, *Radiation Protection of the Public and Environment*; the Water Resources Restoration Program (WRRP), as well as agreements with regulatory agencies. Samples and measurements collected in accordance with this SAP shall be representative of the nature of the monitored discharge.

Parameters and frequencies for monitoring are chosen based upon process knowledge (PK) of the past operations at ETTP, results from historical monitoring, needs of projects that use data from EMP monitoring, DOE requirements, and agreements with regulatory agencies. The parameters and frequencies are reviewed annually and may be modified depending upon changes in conditions, needs, or monitoring results.

Data are reviewed quarterly or semiannually, depending on the frequency of the monitoring. Such reviews include comparisons to regulatory or DOE standards and to historical results. Radiological trends are also documented and reported in the *ETTP Quarterly Derived Concentration Standards Deliverable*.

3.3 QUALITY CONTROL SAMPLES

Duplicates of grab samples shall be taken in a random manner at a rate of 5% (1 per 20 samples) of the total number of grab samples. Duplicate sampling will be random and unbiased. Duplicate sampling locations will be selected by SSO personnel with approval from EC&P personnel. These samples will be designated as duplicates in the field logbook and other documentation, and will be submitted for analysis in the same manner as other required samples. The required number of trip blanks is designated in each specific analytical method.

The following laboratory QC samples will be analyzed, as appropriate, for the analytical methods:

- Method blanks—One per 20 samples or one per sample batch, whichever is more frequent.
- Matrix spike—One per 20 samples or one per analytical batch, whichever is more frequent.
- Matrix spike duplicate—One per 20 samples or one per analytical batch, whichever is more frequent.
- Laboratory control sample—One per 20 samples or one per sample batch.

The laboratory shall be responsible for all QC and corrective actions (CAs) as defined per analytical method, statement of work (SOW), and required methodology.

3.4 RECORDING OF RESULTS

Field logbooks will be maintained in compliance with PROC-ES-2700, *Field Logbooks and Field Data Forms.* The field logbook will provide a daily record of all sampling activities. For each sample or measurement taken pursuant to the requirements of this SAP, appropriate SSO personnel shall record the following information on an approved field data form and/or in an approved field logbook:

- The exact place, date, and time of sampling.
- The exact person(s) collecting samples.
- The results of all field readings.
- Any unusual conditions that may have been observed during sample collection.

SMO personnel shall ensure that laboratory personnel record the following information in laboratory reports and in the current EIMS:

- The dates and times the analyses were performed.
- The person(s) or laboratory performing the analyses.
- The analytical techniques or methods used.
- The results of all required analyses.

3.5 DATA EVALUATION AND REPORTING

Environmental monitoring data for ETTP are collected, managed, and reported in accordance with UCOR procedure *Handling and Reporting Environmental Data* (PROC-EC-3510). Data packages containing the original laboratory analytical results are sent from the contracted laboratories to the SMO. Each data package is sent as portable document format (PDF) files on a data storage disk. Also, the PDF files may be emailed at times to expedite delivery. The data submittals are stamped as having been received when they reach the SMO. An internal tracking number is assigned to each data package by the laboratory.

The laboratory will submit an electronic data deliverable (EDD) using the Analytical Master Specification Electronic Deliverable (AMSED) format. The laboratory will load the data directly into Project Environmental Measurements System (PEMS) by internet connection. The AMSED format and data packages components are defined in the following documents:

- AMSED EDD Formats, Appendix J, *Analytical Master Specifications for Analytical Laboratory Services UCOR, an AECOM-led partnership with Jacobs Oak Ridge, Tennessee*, UCOR-4413/R4 (2019).
- "Analytical Data Deliverable Requirements," Chap. 4, UCOR-4413/R4.
- *Oak Ridge Sample Management Office Procurement of Analytical Services*, PROC-ES-5000, latest revision.

These documents are available on the UCOR Forms and Procedures, and UCOR & BJC/OR Document List websites. One data package for each data deliverable shall be provided to the SMO for use in the verification and validation process.

Data packages are processed according to approved SMO procedures. An SMO Baseline CCV scoresheet is completed in Tracker by the SMO representative within 10 working days of receipt of the laboratory data package. Administrative questions covered by the CCV scoresheet include whether correct sample identifications have been reported, associated COC documentation has been completed, and contract turnaround times have been achieved. Technical questions covered by the CCV scoresheet include whether correct methods have been used, correct parameters and units reported, analytical holding times achieved, and whether record copy data deliverables are complete. The data are also checked at this time to ensure that all screening level exceedances were reported by the laboratories. As a QC check, confirmation will be made that 100% of record copy and electronic data are in agreement. When the record copy and electronic data do not agree, the laboratory is contacted, and the correct information is identified. Corrections are made to the electronic and/or record copy data, as appropriate. Deviations or inconsistencies will be identified, and a Database Change Form or Nonconformance Report (NCR) will be initiated to clarify any questionable or nonconforming information.

The laboratory data packages will be submitted electronically to the UCOR DMC. EMP records will be maintained and readily available in the UCOR DMC in "active" local storage for three years.

Monitoring at the three weir locations (K-901-A, K-1007-B, and K-1700) is conducted in part to support the WRRP. Therefore, these data will receive 100% validation and 100% verification. Data validation will be performed in accordance with PROC-ES-5005, *Oak Ridge Sample Management Office Laboratory Data Validation for Inorganic and Organic Analyses*, and PROC-ES-5006, *Oak Ridge Sample Management Office Laboratory Data Validation for Radiochemical Analyses*. To ensure the quality of analytical data, 100% of the analytical data will receive Validation Support Level (VSL) 4 (full data deliverable and full analytical QC, 1/20 or 1/batch) data validation. Laboratory data validation will be in accordance with the following guidance:

- UCOR validation procedures.
- EPA Contract Laboratory Program's *National Functional Guidelines for Organic Superfund Methods Data Review* (OLEM 9240.0-51, 2020) and *National Functional Guidelines for Inorganic Superfund Methods Data Review* (OLEM 9240.1-66, 2020).
- EPA/240/R-02/004 (EPA QA/G-8), *Guidance on Environmental Data Verification and Data Validation,* November 2002 (reissued January 2008).

All data (100%) will undergo CCV in accordance with PROC-ES-5002, *Oak Ridge Sample Management Office Laboratory Contract Compliance Verification and Invoicing*. Initial review of analytical data is performed by the SMO and includes verification that all required deliverables were provided by the laboratory within the required turnaround time. Additionally, the data package deliverable is compared with associated electronic data uploaded by the laboratory to PEMS, ensuring one-to-one correspondence between the two sources of information.

After analytical results have been received by EC&P personnel, they will be evaluated against this SAP to ensure that all required outfalls have been sampled, analytical results have been received for all required parameters, project quantitation levels have been met, screening level exceedances have been reported, and duplicate samples have been collected and analyzed as required. Should any inconsistencies between the results and the requirements of this SAP be noted, the SMO will be contacted. If it is determined that a correction of the analytical results is warranted, SMO personnel will provide corrected results to EC&P personnel in the approved file format.

After determining that the analytical results are complete, EC&P personnel will evaluate the data in the following manner:

- EC&P personnel will compare the analytical results from field duplicate samples to the corresponding analytical results from the required surveillance samples. If EC&P personnel determine that significant discrepancies exist between these results (relative percent difference between field duplicates and original results ≥ 20% for water), then appropriate personnel will be notified. The sample collection protocol and analytical methods will be reviewed for potential problems. If no problems in sample collection protocol or analytical methods are found, additional sampling and/or analytical measurement studies may be required to further clarify the discrepancies.
- The results of trip blanks will be reviewed to determine if any samples may have been contaminated during their handling. Should any significant levels of contaminants be identified in the trip blanks, the original sample results will be flagged. If significant levels of contaminants are identified in a large number of trip blanks, appropriate SSO or SMO personnel will be notified, and sample collection methods and procedures will be reviewed.
- EC&P personnel will prepare a quarterly data report to present and discuss the results of the monitoring.
- On at least an annual basis, EC&P personnel will submit monitoring results from EIMS to the Oak Ridge Environmental Information System (OREIS) in accordance with PROC-ES-1001, *Transmitting Environmental and Geographic Data to the Oak Ridge Environmental Information System (OREIS)*.

3.6 SCREENING LEVELS

Screening levels have been established for all parameters. A screening level is a value that has been assigned for a particular analytical parameter that is less than a reference standard, such as Tennessee Ambient Water

Quality Criteria (AWQC). Screening levels have been set up to provide laboratory and sampling personnel advance notification that an analytical result or field reading for a particular parameter may be a concern. Notification of screening level exceedances should be sent automatically from designated subcontract laboratories to the SMO upon completion of sample analysis and verification of analytical results. The SMO is responsible for immediately notifying EC&P personnel that the screening level exceedance has occurred.

If a screening level is exceeded, an investigation is undertaken by EC&P personnel to determine the cause of the exceedance. Personnel from the EC&P organization will determine if a best management practice (BMP) or a corrective measure may be required. When necessary, CAs will be implemented.

Screening levels are included in the project quantitation levels, screening levels, and reference standards in Table 13 (see Chap. 4). The SMO will notify the project of any results exceeding the screening level and any results with apparent analytical deficiencies such as missed holding times or other issues noted in the laboratory narrative. Any results identified as anomalous (by the SMO or project) will be investigated for analytical or clerical/transcription errors at the laboratory.

3.7 RECORDS RETENTION

All records and information resulting from the monitoring activities required by this SAP, including all sampling records, instrument calibration and maintenance records, laboratory data packages, and data verification checklists, shall be retained locally for a minimum of three years, or longer if requested by EC&P personnel. Activity-specific files that contain all project-related documents and information shall be submitted to the DMC in accordance with the requirements of this SAP.

All laboratory data from the previous FY shall be submitted to the DMC each January, or prior to that if storage space becomes an issue. For example, in January 2022, all laboratory data for sampling conducted through FY 2021 shall be submitted to the DMC. Laboratory data shall be grouped separately by FY and by program, such as EMP. All records submitted to the DMC shall be labeled as active records, to be maintained locally for a minimum of three (3) years. For example, submittals for FY 2022 shall be maintained as active records until at least October 1, 2024. Sampling and shipping records need not be sent to the DMC until the end of the contract.

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4. TABLES AND FIGURES

Table 1. Specific requirements for water sampling and analysis—K-702-A

Field readings

Parameter	Method	Frequency	Sample type
Dissolved oxygen	SM 4500-O C or G	2/year	Grab
pH	SM 4500-H^+ B	2/year	Grab
Temperature	SM 2550 B	2/year	Grab
Turbidity	EPA 180.1	2/year	Grab

Laboratory analyses

Parameter	Method	Frequency	Sample type
Alpha activity[a]	EPA 900.0	2/year	Grab
Beta activity[a]	EPA 900.0	2/year	Grab
^{99}Tc	^{99}Tc by beta LSC[b]	2/year	Grab
$^{233/234}$U, $^{235/236}$U, ^{238}U	Alpha spec	2/year	Grab
Mercury	EPA 245.7 or EPA 1631	2/year	Grab
Methylmercury	EPA 1630	2/year	Grab
Hexavalent chromium	SM 3500-CR C (2009) or ASTM D5257	2/year	Grab
Metals[a]	EPA 200.8	2/year	Grab
PCB	SW846-8082	2/year	Grab
Pesticides	SW846-8081[f]	2/year	Grab
VOC	SW846-8260	2/year	Grab

[a]Metals analyses should include Ag, As, Ca, Cd, Cr, Cu, Mg, Ni, Pb, Sb, Se, Tl, U, Zn.
[b]LSC = Liquid scintillation counting.

Table 2. Specific requirements for water sampling and analysis—K-716

Field readings

Parameter	Method	Frequency	Sample type
Dissolved oxygen	SM 4500-O C or G	2/year	Grab
pH	SM 4500-H+ B	2/year	Grab
Temperature	SM 2550 B	2/year	Grab
Turbidity	EPA 180.1	2/year	Grab

Laboratory analyses

Parameter	Method	Frequency	Sample type
^{99}Tc	^{99}Tc by beta LSC	2/year	Grab
Alpha activity[a]	EPA 900.0	2/year	Grab
Beta activity[a]	EPA 900.0	2/year	Grab
$^{233/234}$U, $^{235/236}$U, ^{238}U	Alpha spec	2/year	Grab
Mercury	EPA 245.7 or EPA 1631	2/year	Grab
Metals[b]	EPA 200.8	2/year	Grab
TSS	SM 2540 D	2/year	Grab

[a]If alpha activity exceeds 15 pCi/L, or if beta activity exceeds 50 pCi/L, then isotopic analyses will be conducted for ^{237}Np using ^{237}NP by alpha, ^{238}Pu using PU ISO by alpha, and $^{239/240}$Pu using PU ISO by alpha.
[b]Metals analyses should include Ag, As, Ca, Cd, Cr, Cu, Mg, Ni, Pb, Sb, Se, Tl, U, Zn.

Table 3. Specific requirements for water sampling and analysis—K-901-A Monitoring Station[a]

Field readings

Parameter	Method	Frequency[b]	Sample type
Conductivity	RSI-FOP-PRO-050	2/year	Grab
Dissolved oxygen	SM 4500-O C or G	2/year	Grab
Oxidation-reduction potential	RSI-FOP-PRO-049	2/year	Grab
pH	SM 4500-H+ B	2/year	Grab
Temperature	SM 2550 B	2/year	Grab
Turbidity	EPA 180.1	2/year	Grab

Laboratory analyses

Parameter	Method	Frequency[b]	Sample type
Alpha activity[c]	EPA 900.0	2/year	Grab
Beta activity[c]	EPA 900.0	2/year	Grab
^{99}Tc	^{99}Tc by beta LSC	2/year	Grab
$^{233/234}$U, $^{235/236}$U, ^{238}U	EPA 907.0/alpha spec	2/year	Grab
Hexavalent chromium	SM 3500-CR C (2009) or ASTM D5257	2/year	Grab
Mercury	EPA 1631	2/year	Grab
Methylmercury	EPA 1630	2/year	Grab
Metals[d]	SW 846-6010 or SW846-6020	2/year	Grab
PCB[e]	SW846-8082[f]	2/year	Grab
Pesticides	SW846-8081[f]	2/year	Grab
VOC[g]	SW846-8260	2/year	Grab

[a]Samples will be collected at upstream side of the weir.
[b]Samples will be collected during baseflow conditions. Samples will be collected during the second and fourth quarters of FY 2020.
[c]If alpha activity exceeds 15 pCi/L or if beta activity exceeds 50 pCi/L then isotopic analyses will be conducted for ^{237}Np using ^{237}NP by alpha, ^{238}Pu using PU ISO by alpha, and $^{239/240}$Pu using PU ISO by alpha.
[d]Metals analyses should include Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, Sb, Se, Si, Sr, Tl, U, V, Zn.
[e]PCB should include Aroclor[1®]-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260, and total Aroclors.
[f]An equivalent method may be used in order to meet the required detection limit.
[g]See Table 15 for the list of volatile compounds.

[1]Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Table 4. Specific requirements for water sampling and analysis—K-1007-B Monitoring Station[a]

Field readings

Parameter	Method	Frequency[b]	Sample type
Conductivity	RSI-FOP-PRO-050	2/year	Grab
Dissolved oxygen	SM 4500-O C or G	2/year	Grab
Oxidation-reduction potential	RSI-FOP-PRO-049	2/year	Grab
pH	SM 4500-H+ B	2/year	Grab
Temperature	SM 2550 B	2/year	Grab
Turbidity	EPA 180.1	2/year	Grab

Laboratory analyses

Parameter	Method	Frequency[b]	Sample type
Alpha activity[c]	EPA 900.0	2/year	Grab
Beta activity[c]	EPA 900.0	2/year	Grab
^{99}Tc[d]	^{99}Tc by beta LSC	2/year	Grab
$^{233/234}$U, $^{235/236}$U, ^{238}U	EPA 907.0/alpha spec	2/year	Grab
Hexavalent chromium	SM 3500-CR C (2009) or ASTM D5257	2/year	Grab
Mercury	EPA 1631	2/year	Grab
Methylmercury	EPA 1630	2/year	Grab
Metals[e]	SW846-6010 or SW846-6020	2/year	Grab
PCB[f]	SW846-8082[g]	2/year	Grab
Pesticides	SW846-8081[g]	2/year	Grab
VOC[h]	SW846-8260	2/year	Grab

[a]Samples will be collected at upstream side of the weir.
[b]Samples will be collected during baseflow conditions. Samples will be collected during the second and fourth quarters of FY 2020.
[c]If alpha activity exceeds 15 pCi/L, or if beta activity exceeds 50 pCi/L, then isotopic analyses will be conducted for ^{237}Np using ^{237}NP by alpha,^{238}Pu using PU ISO by alpha, and $^{239/240}$Pu using PU ISO by alpha.
[d]Collection of a sample for ^{99}Tc at K-1007-B requires collection of a corresponding sample for ^{99}Tc from Storm Water Outfall 490.
[e]Metals analyses should include Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, Sb, Se, Si, Sr, Tl, U, V, Zn.
[f]PCB should include Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260, and total Aroclors.
[g]An equivalent method may be used in order to meet the required detection limit.
[h]See Table 15 for the list of volatile compounds.

Table 5. Specific requirements for water sampling and analysis—K-1700 Monitoring Station[a]

Field readings

Parameter	Method	Frequency[b]	Sample type
Conductivity	RSI-FOP-PRO-050	4/year	Grab
Dissolved oxygen	SM 4500-O C or G	4/year	Grab
Oxidation-reduction potential	RSI-FOP-PRO-049	4/year	Grab
pH	SM 4500-H+ B	4/year	Grab
Temperature	SM 2550 B	4/year	Grab
Turbidity	EPA 180.1	4/year	Grab

Laboratory analyses

Parameter	Method	Frequency[b]	Sample type
Alpha activity[c]	EPA 900.0	4/year	Grab
Beta activity[c]	EPA 900.0	4/year	Grab
Gamma Scan[d]	EPA 901.1	4/year	Grab
^{90}Sr	EPA 905.0	4/year	Grab
^{99}Tc	^{99}Tc by beta LSC	4/year	Grab
^{228}Th, ^{230}Th, ^{232}Th	EPA 907.0/alpha spec	4/year	Grab
$^{233/234}$U, $^{235/236}$U, ^{238}U	EPA 907.0/alpha spec	4/year	Grab
Hexavalent chromium	SM 3500-CR C (2009) or ASTM D5257	4/year	Grab
Mercury	EPA 1631	4/year	Grab
Methylmercury	EPA 1630	4/year	Grab
Metals[e]	SW846-6010 or SW846-6020	4/year	Grab
PCB[f]	SW846-8082[g]	4/year	Grab
Pesticides	SW846-8081[g]	4/year	Grab
VOC[h]	SW846-8260	4/year	Grab
Bicarbonate	SM-2320 B	4/year	Grab
Carbonate	SM-2320 B	4/year	Grab
Chloride	EPA 300.0	4/year	Grab
Fluoride	SM-4500-F-C or EPA 300.0	4/year	Grab
Nitrate-Nitrite (as N)	EPA 353.2	4/year	Grab
Sulfate	EPA 300.0	4/year	Grab

[a]Samples will be collected at upstream side of the weir.
[b]Samples will be collected during baseflow conditions.
[c]If alpha activity exceeds 15 pCi/L, or if beta activity exceeds 50 pCi/L, then isotopic analyses will be conducted for ^{237}Np using ^{237}NP by alpha, ^{238}Pu using PU ISO by alpha, and $^{239/240}$Pu using PU ISO by alpha.
[d]Gamma scan will include at a minimum ^{137}Cs, ^{60}Co, and ^{40}K.
[e]Metals analyses should include Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, Sb, Se, Si, Sr, Tl, U, V, Zn.
[f]PCB should include Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260, and total Aroclors.
[g]An equivalent method may be used in order to meet the required detection limit.
[h]See Table 15 for the list of volatile compounds.

Table 6. Specific requirements for water sampling and analysis—MIK 0.45

Field readings

Parameter	Method	Frequency	Sample type
Dissolved oxygen	SM 4500-O C or G	4/year	Grab
pH	SM 4500-H^+ B	4/year	Grab
Temperature	SM 2550 B	4/year	Grab
Turbidity	EPA 180.1	4/year	Grab

Laboratory analyses

Parameter	Method	Frequency	Sample type
^{99}Tc	^{99}Tc by beta LSC	4/year	Grab
Hexavalent chromium	SM 3500-CR C (2009) or ASTM D5257	4/year	Grab
Mercury	EPA 245.7 or EPA 1631	4/year	Grab
Metals[a]	EPA 200.8	1/year	Grab
PCBs	EPA 608 or EPA 625	4/year	Grab
VOCs[b]	EPA 624	1/year	Grab

[a]Metals analyses should include Ag, As, Ca, Cd, Cr, Cu, Mg, Ni, Pb, Sb, Se, Tl, U, Zn.
[b]VOC analyses should consist of cis-1,2-dichloroethene; 1,1,1-trichloroethane, trichloroethene, vinyl chloride, and any tentatively identified compounds.

Table 7. Specific requirements for water sampling and analysis—MIK 0.59

Field readings

Parameter	Method	Frequency	Sample type
Dissolved oxygen	SM 4500-O C or G	4/year	Grab
pH	SM 4500-H+ B	4/year	Grab
Temperature	SM 2550 B	4/year	Grab
Turbidity	EPA 180.1	4/year	Grab

Laboratory analyses

Parameter	Method	Frequency	Sample type
^{99}Tc	^{99}Tc by beta LSC	4/year	Grab
Hexavalent chromium	SM 3500-CR C (2009) or ASTM D5257	4/year	Grab
Mercury	EPA-245.7 or EPA 1631	4/year	Grab

Table 8. Specific requirements for water sampling and analysis—MIK 0.71

Field readings

Parameter	Method	Frequency	Sample type
Dissolved oxygen	SM 4500-O C or G	4/year	Grab
pH	SM 4500-H^+ B	4/year	Grab
Temperature	SM 2550 B	4/year	Grab
Turbidity	EPA 180.1	4/year	Grab

Laboratory analyses

Parameter	Method	Frequency	Sample type
^{99}Tc	^{99}Tc by beta LSC	4/year	Grab
Hexavalent chromium	SM 3500-CR C (2009) or ASTM D5257	4/year	Grab
Mercury	EPA 245.7 or EPA 1631	4/year	Grab
Metals[a]	EPA 200.8	1/year	Grab
VOCs[b]	EPA 624	1/year	Grab

[a]Metals analyses should include Ag, As, Ca, Cd, Cr, Cu, Mg, Ni, Pb, Sb, Se, Tl, U, Zn.

[b]VOC analyses should consist of cis-1,2-dichloroethene; 1,1,1-trichloroethane, trichloroethene, vinyl chloride, and any tentatively identified compounds.

Table 9. Specific requirements for water sampling and analysis—MIK 1.4

Field readings

Parameter	Method	Frequency	Sample type
Dissolved oxygen	SM 4500-O C or G	4/year	Grab
pH	SM 4500-H^+ B	4/year	Grab
Temperature	SM 2550 B	4/year	Grab
Turbidity	EPA 180.1	4/year	Grab

Laboratory analyses

Parameter	Method	Frequency	Sample Type
^{99}Tc	^{99}Tc by beta LSC	4/year	Grab
Alpha activity[a]	EPA 900.0	4/year	Grab
Beta activity[a]	EPA 900.0	4/year	Grab
$^{233/234}$U, $^{235/236}$U, ^{238}U	Alpha spec	4/year	Grab
Hexavalent chromium	SM 3500-CR C (2009) or ASTM D5257	4/year	Grab
Mercury	EPA 245.7 or EPA 1631	4/year	Grab
Metals[b]	EPA 200.8	4/year	Grab
PCB	EPA 608 or EPA 625	4/year	Grab
VOCs[c]	EPA 624	4/year	Grab

[a]If alpha activity exceeds 15 pCi/L, or if beta activity exceeds 50 pCi/L, then isotopic analyses will be conducted for ^{237}Np using ^{237}NP by alpha, ^{238}Pu using PU ISO by alpha, and $^{239/240}$Pu using PU ISO by alpha.
[b]Metals analyses should include Ag, As, Ca, Cd, Cr, Cu, Mg, Ni, Pb, Sb, Se, Tl, U, Zn.
[c]VOC analyses should consist of cis-1,2, dichloroethene; 1,1,1-trichloroethane, trichloroethene, vinyl chloride, and any tentatively identified compounds.

Table 10. Specific requirements for water sampling and analysis—K-1710

Field readings

Parameter	Method	Frequency	Sample type
Dissolved oxygen	SM 4500-O C or G	2/year	Grab
pH	SM 4500-H^+ B	2/year	Grab
Temperature	SM 2550 B	2/year	Grab
Turbidity	EPA 180.1	2/year	Grab

Laboratory analyses

Parameter	Method	Frequency	Sample type
^{99}Tc	^{99}Tc by beta LSC	2/year	Grab
Alpha activity[a]	EPA 900.0	2/year	Grab
Beta activity[a]	EPA 900.0	2/year	Grab
$^{233/234}$U, $^{235/236}$U, ^{238}U	Alpha spec	2/year	Grab
Mercury	EPA 245.7 or EPA 1631	2/year	Grab
Metals[b]	EPA 200.8	2/year	Grab
TSS	SM 2540 D	2/year	Grab

[a]If alpha activity exceeds 15 pCi/L, or if beta activity exceeds 50 pCi/L, then isotopic analyses will be conducted for ^{237}Np using ^{237}NP by alpha, ^{238}Pu using PU ISO by alpha, and $^{239/240}$Pu using PU ISO by alpha.
[b]Metals analyses should include Ag, As, Ca, Cd, Cr, Cu, Mg, Ni, Pb, Sb, Se, Tl, U, Zn.

Table 11. Specific requirements for water sampling and analysis—CRK 16

Field readings

Parameter	Method	Frequency	Sample type
Dissolved oxygen	SM 4500-O C or G	2/year	Grab
pH	SM 4500-H^+ B	2/year	Grab
Temperature	SM 2550 B	2/year	Grab
Turbidity	EPA 180.1	2/year	Grab

Laboratory analyses

Parameter	Method	Frequency	Sample type
^{99}Tc	^{99}Tc by beta LSC	2/year	Grab
$^{233/234}$U, $^{235/236}$U, ^{238}U	Alpha spec	2/year	Grab
Alpha activity[a]	EPA 900.0	2/year	Grab
Beta activity[a]	EPA 900.0	2/year	Grab
Mercury	EPA 245.7 or EPA 1631	2/year	Grab
Metals[b]	EPA 200.8	2/year	Grab
VOCs[c]	SW846-8260	2/year	Grab

[a]If alpha activity exceeds 15 pCi/L, or if beta activity exceeds 50 pCi/L, then isotopic analyses will be conducted and include, at a minimum, ^{237}Np using ^{237}NP by alpha, ^{238}Pu using PU ISO by alpha, and $^{239/240}$Pu using PU ISO by alpha.
[b]Metals analyses should include Ag, As, Ca, Cd, Cr, Cu, Mg, Ni, Pb, Sb, Se, Tl, U, Zn.
[c]VOC analyses should consist of cis-1,2-dichloroethene; 1,1,1-trichloroethane, trichloroethene, vinyl chloride, and any tentatively identified compounds.

Table 12. Specific requirements for water sampling and analysis—CRK 23

Field readings

Parameter	Method	Frequency	Sample type
Dissolved oxygen	SM 4500-O C or G	2/year	Grab
pH	SM 4500-H^+ B	2/year	Grab
Temperature	SM 2550 B	2/year	Grab
Turbidity	EPA 180.1	2/year	Grab

Laboratory analyses

Parameter	Method	Frequency	Sample type
^{99}Tc	^{99}Tc by beta LSC	2/year	Grab
$^{233/234}$U, $^{235/236}$U, ^{238}U	Alpha spec	2/year	Grab
Alpha activity[a]	EPA 900.0	2/year	Grab
Beta activity[a]	EPA 900.0	2/year	Grab
Mercury	EPA 245.7 or EPA 1631	2/year	Grab
Metals[b]	EPA 200.8	2/year	Grab
VOCs[c]	SW846-8260	2/year	Grab

[a]If alpha activity exceeds 15 pCi/L, or if beta activity exceeds 50 pCi/L, then isotopic analyses will be conducted and include, at a minimum, ^{237}Np using ^{237}NP by alpha, ^{238}Pu using PU ISO by alpha, and $^{239/240}$Pu using PU ISO by alpha.
[b]Metals analyses should include Ag, As, Ca, Cd, Cr, Cu, Mg, Ni, Pb, Sb, Se, Tl, U, Zn.
[c]VOC analyses should consist of cis-1,2-dichloroethene; 1,1,1-trichloroethane, trichloroethene, vinyl chloride, and any tentatively identified compounds.

Table 13. Project quantitation levels, screening levels, and reference standards for surface water monitoring at East Tennessee Technology Park

Parameter	Project quantitation level	Screening level	Reference standard	Units
		Anions		
Bicarbonate/Carbonate	20000	N/A	N/A	µg/L
Chloride	200	N/A	N/A	µg/L
Fluoride	100	N/A	N/A	µg/L
Sulfate	1000	N/A	N/A	µg/L
		Metals		
Aluminum	100	N/A	N/A	µg/L
Antimony	1	75	640	µg/L
Arsenic	2	7	10[b]	µg/L
Barium	5	N/A	N/A	µg/L
Beryllium	0.5	75	100	µg/L
Boron	150	N/A	N/A	µg/L
Cadmium	2	Detectable	0.72[b]	µg/L
Calcium	1000	N/A	N/A	µg/L
Chromium	10	8	74[b]	µg/L
Cobalt	1	N/A	N/A	µg/L
Copper	20	7	9.0[b]	µg/L
Iron	100	N/A	N/A	µg/L
Lead	2	2	2.5[b]	µg/L
Lithium	20	NA	NA	µg/L
Manganese	5	N/A	N/A	µg/L
Magnesium	100	N/A	N/A	µg/L
Mercury	0.0005	Detectable	0.051[b]	µg/L
Methylmercury	0.00002	Detectable	N/A	µg/L
Nickel	20	39	52[b]	µg/L
Potassium	1000	N/A	N/A	µg/L
Selenium	10	1	1.5[b]	µg/L
Silicon	50	N/A	N/A	µg/L
Silver	0.5	2.4	3.2[b]	µg/L
Sodium	1000	N/A	N/A	µg/L
Strontium	5	N/A	N/A	µg/L
Thallium	0.1	Detectable	0.47[b]	µg/L
Uranium	0.1	N/A	N/A	µg/L
Vanadium	5	N/A	N/A	µg/L
Zinc	100	90	120[b]	µg/L

Table 13. Project quantitation levels, screening levels, and reference standards for surface water monitoring at East Tennessee Technology Park (cont.)

Parameter	Project quantitation level	Screening level	Reference standard	Units
		Miscellaneous		
Nitrate/Nitrite	0.01	N/A	N/A	mg/L
TSS	4	N/A	N/A	mg/L
		PCBs		
Aroclor-1016	1	0.00064	0.00064	µg/L
Aroclor-1221	2	0.00064	0.00064	µg/L
Aroclor-1232	1	0.00064	0.00064	µg/L
Aroclor-1242	1	0.00064	0.00064	µg/L
Aroclor-1248	1	0.00064	0.00064	µg/L
Aroclor-1254	1	0.00064	0.00064	µg/L
Aroclor-1260	1	0.00064	0.00064	µg/L
Total Aroclor	1	0.000064	0.000064	µg/L
		Pesticides		
Aldrin	1	0.0004	0.00050[b]	µg/L
a-BHC	2	0.037	0.049[b]	µg/L
b-BHC	1	0.13	0.17[b]	µg/L
Lindane	1	1.4	1.8[b]	µg/L
Chlordane	1	0.0061	0.0081[b]	µg/L
4-4-DDT	1	0.0017	0.0022[b]	µg/L
4-4-DDE	1	0.0017	0.0022[b]	µg/L
4-4-DDD		0.0023	0.0031[b]	µg/L
Dieldrin		0.0004	0.00054[b]	µg/L
a-Endosulfan		67	89[b]	µg/L
b-Endosulfan		67	89[b]	µg/L
Endosulfan sulfate		67	89[b]	µg/L
Endrin		0.45	0.6[b]	µg/L
Endrin aldehyde		0.23	0.3[b]	µg/L
Heptachlor		0.0006	0.00079[b]	µg/L
Heptachlor epoxide		0.0029	0.00039[b]	µg/L
Toxaphen	1	0.00064	0.0028[b]	µg/L

Table 13. Project quantitation levels, screening levels, and reference standards for surface water monitoring at East Tennessee Technology Park (cont.)

Parameter	Project quantitation level	Screening level	Reference standard	Units
		Radionuclides		
Gamma Scan	10	50	N/A	pCi/L
Gross alpha	3	15	15	pCi/L
Gross beta	4	50	50	pCi/L
^{137}Cs	10	3,075	4,100	pCi/L
^{60}Co	10	10,500	14,00	pCi/L
^{237}Np	0.2	1,050	1,400	pCi/L
^{238}Pu	0.1	323	430	pCi/L
$^{239/240}$Pu	0.1	300	400	pCi/L
^{90}Sr	1	1,275	1,700	pCi/L
^{99}Tc	20	292,500	390,000	pCi/L
^{228}Th	0.2	581	830	pCi/L
^{230}Th	0.2	540	720	pCi/L
^{232}Th	0.2	465	620	pCi/L
^{233}U	0.2	900	1,200	pCi/L
^{234}U	0.2	900	1,200	pCi/L
^{235}U	0.2	975	1,300	pCi/L
^{236}U	0.2	975	1,300	pCi/L
^{238}U	0.2	1,050	1,400	pCi/L
		Field Readings		
Dissolved oxygen (minimum)	4.0–8.0	< 6.0	5.0[b]	mg/L
pH (maximum)	14.0	> 8.4	9.0[b]	Standard Units
pH (minimum)	1.0	< 6.4	6.0[b]	Standard Units
Temperature	0–100	> 27	N/A	°C
Turbidity	1.0	N/A	N/A	NTU

[a]Reference standards for radionuclides equal derived concentration standards (DCSs) for ingested water (DOE-STD-1196-2021, *Derived Concentration Technical Standard*, July, 2021), and screening levels equal 4% of DCS values. Reference standards and screening levels for gross alpha and gross beta measurements correspond to the national primary drinking water standard (40 *CFR* Part 141, *National Primary Drinking Water Regulations*, Subparts B [Maximum Contaminant Levels] and G [National Primary Drinking Water Regulations: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels]).
[b]Tennessee General Water Quality Criteria.

N/A = Not applicable
NTU = nephelometric turbidity unit

Table 14. General sample container, preservation, holding time, and volume requirements

Parameter	Container	Preservation	Holding time	Minimum volume/sample
Anions	HDPE[a]	Cool, ≤ 6°C	28 days	250 mL
Bicarbonate/Carbonate	HDPE[a]	Cool, ≤ 6°C	14 days	250 mL
ICPMS[b] metals	HDPE[a], Glass, FP[d]	HNO_3 pH < 2	6 months	1 L (unfiltered)
Mercury	HDPE[a], Glass, FP[d]	HCl pH < 2 Cool, ≤ 6°C	28 days (CVAA[c]) 90 days (CVAFS[e])	125 mL (unfiltered)
Methyl mercury	HDPE[a], FP[d]	HCl pH < 2 Cool, ≤ 6°C	28 days	250 mL
Nitrate/nitrite	HDPE[a], Glass, FP[d]	Cool, ≤ 6°C, H_2SO_4 pH < 2	28 days	125 mL (unfiltered)
PCBs[f]	Glass, FP[d]-lined septum	Cool, ≤ 6°C	1 year	3-1 L
Pesticides	Amber Glass, FP[d]-lined septum	Cool, ≤ 6°C	7 days	3-1 L
Gamma radionuclides	Plastic or glass	Cool, ≤ 6°C	6 months	2-1 L unpreserved
Total uranium and gross alpha/beta	HDPE[a]	HNO_3 pH < 2	6 months	1 L preserved (unfiltered)
VOCs[g]	Glass, FP[d]-lined septum	Cool, ≤ 6°C	7 days	3-40 mL vials

[a]HDPE = high-density polyethylene
[b]ICPMS = inductively coupled plasma mass spectrometry
[b]HDPE = high-density polyethylene
[c]CVAA = cold vapor atomic absorption
[d]FP = fluoropolymer
[e]CVAFS = cold vapor atomic fluorescence spectrometry
[f]PCB = polychlorinated biphenyl
[g]VOC = volatile organic compounds

Table 15. VOCs to be monitored at ETTP weirs

Parameter	Method	Reporting limit	Screening level	Reference standard	Units
1,1,1-trichloroethane	SW846-8260	1	75	100	µg/L
1,1,2,2-tetrachloroethane	SW846-8260	1	30	40[a]	µg/L
1,1,2-trichloroethane	SW846-8260	1	66	100	µg/L
1,1-dichloroethane	SW846-8260	1	75	100	µg/L
1,1-dichloroethene	SW846-8260	1	5325	7100[a]	µg/L
1,2-dichloroethane	SW846-8260	1	277	370[a]	µg/L
1,2-dichloropropane	SW846-8260	1	112	150[a]	µg/L
2-butanone	SW846-8260	10	75	100	µg/L
2-hexanone	SW846-8260	10	75	100	µg/L
4-methyl-2-pentanone	SW846-8260	10	75	100	µg/L
acetone (2-propanone)	SW846-8260	10	75	100	µg/L
benzene	SW846-8260	1	382	510[a]	µg/L
Bromodichloromethane (dichlorobromomethane)	SW846-8260	1	128	170[a]	µg/L
bromoform	SW846-8260	1	1050	1400[a]	µg/L
bromomethane (methyl bromide)	SW846-8260	1	75	1500[a]	µg/L
carbon disulfide	SW846-8260	1	75	100	µg/L
carbon tetrachloride	SW846-8260	1	12	16[a]	µg/L
chlorobenzene	SW846-8260	1	1200	1600[a]	µg/L
chloroethane	SW846-8260	1	75	100	µg/L
chloroform	SW846-8260	1	3,525	4700[a]	µg/L
chloromethane (methyl chloride)	SW846-8260	1	75	100	µg/L
cis-1,2-dichloroethene	SW846-8260	1	75	100	µg/L
cis-1,3-dichloropropene	SW846-8260	1	158	210	µg/L
Dibromochloromethane (chlorodibromomethane)	SW846-8260	1	97	130[a]	µg/L
ethylbenzene	SW846-8260	1	1575	2100[a]	µg/L
methylene chloride	SW846-8260	1	4425	5900[a]	µg/L
styrene	SW846-8260	1	75	100	µg/L
tetrachloroethene	SW846-8260	1	24	33[a]	µg/L
toluene	SW846-8260	1	11250	15000[a]	µg/L
trans-1,2-dichloroethene	SW846-8260	1	7500	10000[a]	µg/L
trans-1,3-dichloropropene	SW846-8260	1	75	100	µg/L
trichloroethene	SW846-8260	1	225	300[a]	µg/L
vinyl chloride	SW846-8260	1	18	24[a]	µg/L

Parameter	Method	Reporting limit	Screening level	Reference standard	Units
xylenes (dimethyl benzene)	SW846-8260	1	75	100	µg/L

[a]Tennessee General Water Quality Criteria (Organisms Only Criteria), September 2019.

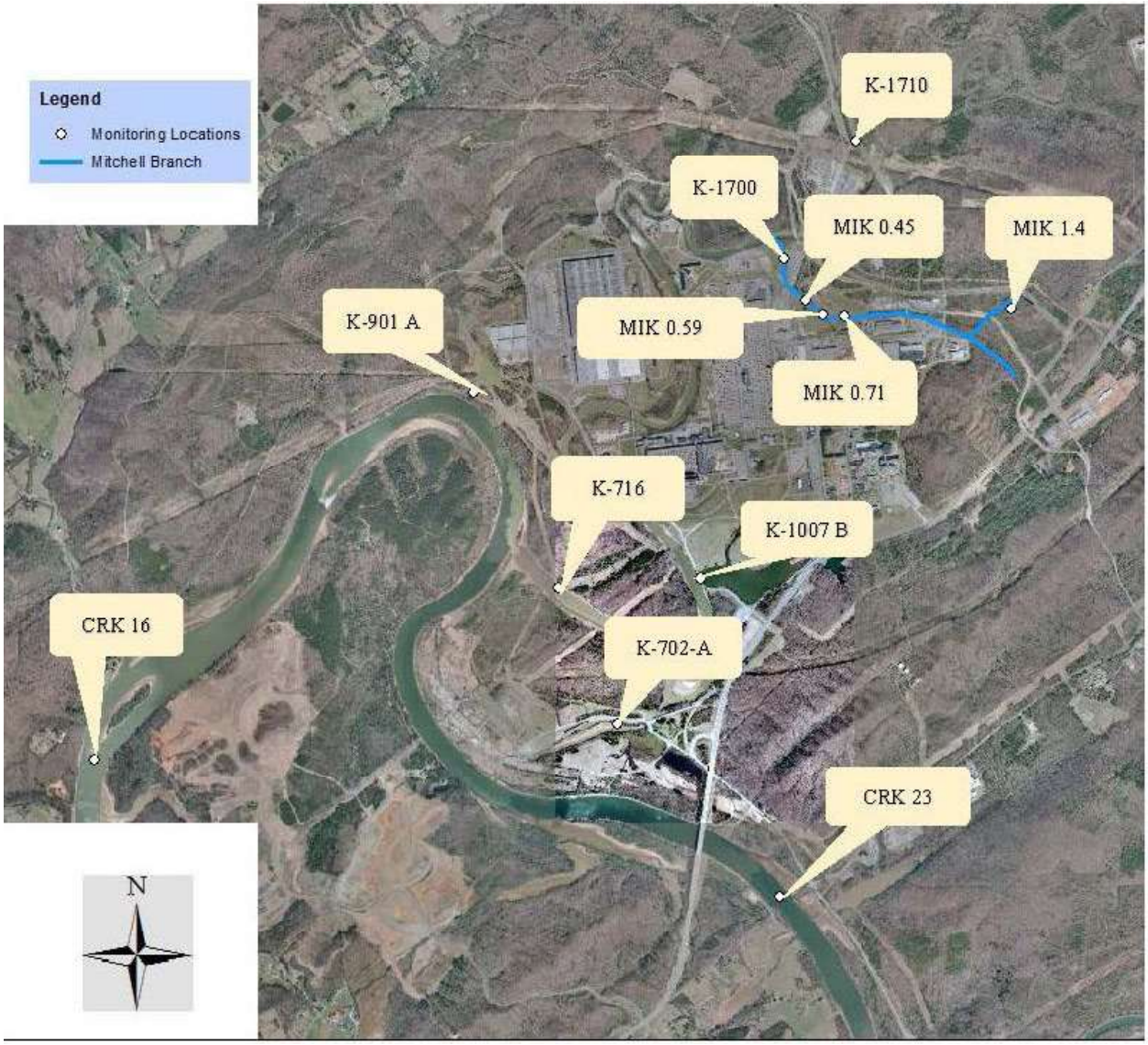

Fig. 1. ETTP surface water monitoring locations.

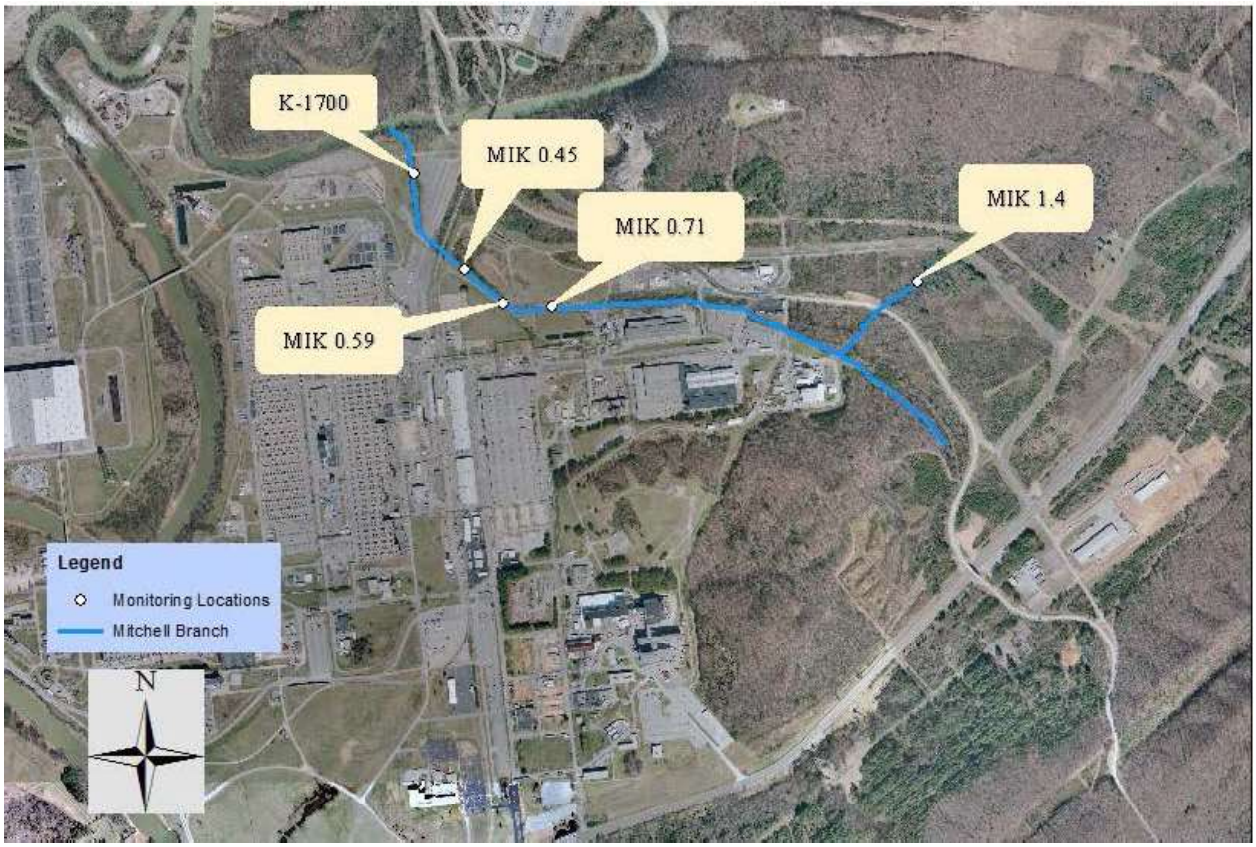

Fig. 2. Mitchell Branch surface water monitoring locations.

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ENCLOSURE 2
Letter: ORRCC-22-0160

National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water at the East Tennessee Technology Park (ETTP) (NPDES Permit No. TN0002950) – Submittal of Monitoring Plans / East Tennessee Technology Park, Biological Monitoring and Abatement Program, Sampling and Analysis Plan, Oak Ridge, Tennessee (UCOR-4034/R11)

UCOR
United Cleanup Oak Ridge LLC

UCOR-4034/R11

East Tennessee Technology Park
Biological Monitoring and Abatement Program,
Sampling and Analysis Plan,
Oak Ridge, Tennessee

This document is approved for public release per review by:

Gerald B. Boroughs — 5/26/22

UCOR Classification & Information Control Office — Date

UCOR-4034/R11

East Tennessee Technology Park
Biological Monitoring and Abatement Program,
Sampling and Analysis Plan,
Oak Ridge, Tennessee

Date Issued—June 2022

Effective Date—October 1, 2022

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

United Cleanup Oak Ridge LLC
under 89303322DEM000067

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APPROVALS

East Tennessee Technology Park Biological Monitoring and Abatement Program, Sampling and Analysis Plan, Oak Ridge, Tennessee	UCOR-4034/R11 June 2022 Effective October 2022

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 Financial Officer, Internal Audit, Labor Relations, General Counsel, Community Outreach, or Project Services and Support OR ☒ (4) Document identified in USQD-MS-CX-REPORTS-1074
USQD Preparer:	MICHAEL NATZKE (Affiliate) Digitally signed by MICHAEL NATZKE (Affiliate) Date: 2022.06.06 14:39:28 -04'00' Name / Date
Exhibit L Mandatory Contractor Document	☒ No (No Proforma Change Control Board [PCCB] reviewer signature required.) ☐ Yes (Requires review by the PCCB.)
PCCB Reviewer:	Name / Date

Prepared by:

M. L. Coffey
Geologist
UCOR

6-6-22
Date

Concurred by:

K. R. Crow, P. E.
Subcontractor Integration/ETTP Landlord
Environmental Programs
UCOR

6-6-22
Date

Approved by:

D. A. (Tony) Poole
Operations Manager/ETTP Landlord
Environmental Programs
UCOR

6-6-22
Date

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REVISION LOG

Revision number	Effective date	Description of changes	Sections or pages affected
0	September 2011	Initial issue of document.	All
1	September 2012	First annual review. Changes include deletion of reference to species richness in community studies, and revision of title of BMAP project manager to BMAP Manager.	Multiple
2	September 2013	Second annual review. Changes include reference to the Quality Assurance Program Plan and the deletion of one annual toxicity test at the ambient surface water monitoring locations.	Multiple
3	September 2014	Third annual review. Changes include revision of the Data Quality Objectives section.	Multiple
4	June 2015	Third annual review. Changes include the deletion of the toxicity testing task.	Multiple
5	September 2016	Fourth annual review. Minor editorial changes.	Multiple
6	August 2017	Fifth annual review. Minor changes.	Multiple
7	June 2018	Sixth annual review. Minor changes.	Multiple
8	June 2019	Seventh annual review. Minor changes.	Multiple
9	July 2020	Eighth annual review. Minor changes.	Multiple
10	July 2021	Ninth annual review. Minor changes.	Multiple
11	July 2022	Tenth annual review. Minor changes. Updated document shell to United Cleanup Oak Ridge LLC.	Multiple

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CONTENTS

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ACRONYMS

BMAP	Biological Monitoring and Abatement Program
BMP	Biological Monitoring Program
CFR	*Code of Federal Regulations*
COC	chain of custody
CY	calendar year
DOE	U.S. Department of Energy
EC&P	Environmental Compliance and Protection
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
FY	fiscal year
NPDES	National Pollutant Discharge Elimination System
OREIS	Oak Ridge Environmental Information System
ORNL	Oak Ridge National Laboratory
PCB	polychlorinated biphenyl
QAP	Quality Assurance Plan
QC	quality control
QSSOP	Quality System Standard Operating Procedure
RA	remedial action
RTL	ready-to-load
SAP	sampling and analysis plan
TDEC	Tennessee Department of Environment and Conservation
UCOR	United Cleanup Oak Ridge LLC

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EXECUTIVE SUMMARY

The Biological Monitoring and Abatement Program (BMAP) is conducted at the East Tennessee Technology Park (ETTP) as a requirement of the ETTP National Pollutant Discharge Elimination System (NPDES) Permit No. TN0002950. In accordance with the ETTP NPDES stormwater permit, which became effective April 1, 2022, the biological monitoring will be implemented and documented through the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) programs to more closely match the cleanup and abatement effectiveness.

The intent of the BMAP is: (1) to detect those areas and processes that may have adverse impacts on the aquatic environment, (2) to suggest suitable remediation projects, and (3) to measure the efficacy of these efforts. This sampling and analysis plan (SAP) establishes the objectives, responsibilities, and strategies for meeting all requirements of the BMAP portion of the current NPDES permit.

This ETTP BMAP SAP is written for Fiscal Year (FY) 2023, but it may be modified by United Cleanup Oak Ridge LLC (UCOR) if warranted by operational changes or remedial actions (RAs).

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1. INTRODUCTION

1.1 PROGRAM OBJECTIVES

Biological monitoring is conducted to assess the impact of East Tennessee Technology Park (ETTP) operations on the public and the environment, and for United Cleanup Oak Ridge LLC (UCOR) compliance with the conditions of the National Pollutant Discharge Elimination System (NPDES) Permit No. TN0002950, and agreements with the Tennessee Department of Environment and Conservation (TDEC). Monitoring is also conducted to perform an ecological characterization of the waters of the state in and around ETTP, to facilitate the selection of pollution abatement measures and remedial actions (RAs), which could improve the quality of these waters, and to gauge the efficacy of such measures. For these reasons, the staff from the Biological Monitoring Program (BMP) organization conduct the Biological Monitoring and Abatement Program (BMAP) under the direction of the Environmental Compliance and Protection (EC&P) organization.

This sampling and analysis plan (SAP) defines the actions necessary for compliance with NPDES permit requirements and regulatory agreements, and defines the roles and responsibilities of support organizations involved in these actions. Changes to or deviations from this plan must be approved in writing by the appropriate EC&P personnel.

1.2 MONITORING STRATEGY

The biological monitoring strategy consists of two tasks: (1) bioaccumulation monitoring and (2) stream biological community monitoring. Bioaccumulation monitoring involves tracking of polychlorinated biphenyls (PCBs) and mercury in fish and caged clams. Stream biological community monitoring includes monitoring of the richness and density of fish and benthic macroinvertebrate species.

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2. ORGANIZATIONAL RESPONSIBILITIES

2.1 ENVIRONMENTAL COMPLIANCE AND PROTECTION ORGANIZATION

The EC&P organization is responsible for providing guidance on the implementation of the program. These responsibilities include the following:

- Maintaining the ETTP BMAP SAP, which defines the necessary actions required to implement the program.
- Authorizing and approving in writing any deviations from the ETTP BMAP SAP requirements; changes to this plan may be issued to the BMP organization Project Manager as addenda.
- Approving all changes in sampling procedures, checklists, schedules, and programs developed for the program by support organizations including, but not limited to, the BMP organization.
- Authorizing and approving in writing any use of unreleased or unpublished ETTP BMAP data outside the scope of this program.
- Evaluating data completeness and suitability, and maintaining EC&P organizational record copies of ETTP BMAP fiscal year (FY) and calendar year (CY) reports and any related information received from the BMP organization.

2.2 BIOLOGICAL MONITORING PROGRAM ORGANIZATION

The ETTP BMAP Manager from the BMP organization is responsible for the routine coordination and direction of the ETTP BMAP activities, except as noted in Sect. 2.1 of this SAP. All activities conducted for the ETTP BMAP will be performed in accordance with the Oak Ridge National Laboratory's (ORNL) BMAP Quality Assurance Plan (QAP) (QAP-ESD-03, Rev. 9, or latest revision, *Quality Assurance Plan for the Biodiversity and Ecosystem Health Group within the Environmental Sciences Division of the Oak Ridge National Laboratory, Oak Ridge, Tennessee*) and applicable BMAP project QAPs and procedures (which satisfy the requirements of 10 *Code of Federal Regulations [CFR]* Part 830, *Nuclear Safety Management,* Subpart A, *Quality Assurance Requirements*), the TDEC Division of Water Pollution Control *Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys* (TDEC Quality System Standard Operating Procedure [QSSOP] 2017), and this SAP. Responsibilities of BMP organization personnel are as follows:

- Providing sufficient numbers of adequately trained and qualified personnel to perform all required ETTP BMAP project management and field activities.
- Notifying EC&P personnel, the appropriate Facility Manager (FM) and the Emergency Services Watch Office (ESWO) prior to collecting samples at ETTP.
- Performing all monitoring, sampling and analyses described in Tables A.1 and A.2 in accordance with the frequencies and methodologies specified in this SAP.
- Following proper chain-of-custody (COC) procedures for sampling and analyses.
- Ensuring that samples are analyzed using requested analytical methods or approved replacements.
- Notifying immediately EC&P organization personnel of any failure to comply with the requirements specified in this SAP.

- Notifying EC&P organization personnel, as soon as practicable, of any abnormal conditions that may be detected during the examination and analysis of samples collected under this SAP. This notification may be of an informal nature, such as an email or telephone call to the appropriate EC&P personnel.
- Maintaining records of all sampling and analytical results and COC records for a minimum of three years.
- Interpreting all ETTP BMAP SAP monitoring data and performing data verification to determine consistency of the reported data as described in the BMAP QAP (QAP-ESD-03, Rev. 9, or latest revision).
- Preparing BMAP FY and CY reports and submitting drafts for review by the EC&P organization prior to September 30 and January 31, respectively. (The FY report should include all monitoring results for the current FY. The CY report should summarize monitoring results for the previous CY and compare the results to previous years.)
- Processing ETTP BMAP data in a prioritized manner into the BMAP database and ensuring that the data are sent from the BMAP database to the Oak Ridge Environmental Information System (OREIS) in a ready-to-load (RTL) format as described in the BMAP QAP.
- Notifying EC&P organization personnel before releasing unreleased or unpublished BMAP information to other organizations.
- Reviewing and commenting on sections related to the ETTP BMAP in the Oak Ridge Reservation (ORR) Annual Site Environmental Report (ASER).
- Providing assistance as needed for wetlands investigations or special studies at ETTP.

2.3 SAMPLING ORGANIZATION

On some occasions, extra sampling of water or sediment may be required to support the ETTP BMAP. In those cases, at the discretion of EC&P organization personnel, the sampling organization will be authorized to collect the samples. The sampling organization responsibilities are as follows:

- Providing a sufficient number of adequately trained personnel to ensure that samples are obtained in accordance with the methods specified in this SAP, or as otherwise directed by EC&P organization or BMP organization personnel. (Sampling personnel will be trained in accordance with approved U.S. Environmental Protection Agency [EPA] and appropriate, company-approved sample collections and preparation practices.)
- Collecting ETTP BMAP water or sediment samples upon request from EC&P organization personnel.
- Properly transporting or shipping the samples to the BMAP organization (or other designated laboratory) and providing proper COC tracking.
- Maintaining records, including COC records, appropriate to the situation for a minimum of three years.
- Promptly notifying EC&P organization personnel of any problems carrying out requested sampling.

3. GENERAL REQUIREMENTS FOR SAMPLING AND ANALYSIS

3.1 MONITORING REQUIREMENTS

Monitoring requirements for the ETTP BMAP SAP include the following:

- Samples and measurements shall be representative of the actual conditions.
- Special care shall be taken to ensure that no surface water sample or measurement duplicates an NPDES permit requirement at the same location. If such a sample or measurement is required, under no circumstances will NPDES-approved sampling or analytical methodology be used. NPDES-approved methodologies are listed in the *NPDES Compliance Sampling Manual*, "Standard Methods for the Examination of Water and Wastewater" (EPA 831-R-77-101), and 40 *CFR* Part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants*. NPDES methodologies may only be used when the ETTP NPDES permit does not specify a similar sample at the same location.
- COC procedures shall follow the BMAP QAP.
- Instruments used in obtaining field measurements shall be calibrated in accordance with the requirements of the BMAP QAP. Calibration and/or maintenance shall be conducted on a routine basis or whenever there is reason to believe that the instrument is out of calibration. All calibration and maintenance records shall be maintained in accordance with the BMAP QAP.
- Observations of abnormal conditions including, but not limited to, sheens, unusual films, unusual floating solids, dying vegetation, unusual sample results, or any other indication of an unusual condition shall be reported to EC&P organization personnel as soon as practicable. This notification may be of an informal nature, such as an email or phone call to the appropriate EC&P organization personnel.
- All sampling and analysis activities shall be performed in accordance with the BMAP QAP and this SAP.
- Specific SAP requirements to be completed by the BMP organization are outlined in Appendix A.
- No deviations from this plan shall be permitted without the express written authorization of the EC&P organization.

3.2 DATA QUALITY

3.2.1 Data Quality Objectives

Data collected by the program must be suitable for a variety of purposes including, but not limited to, compliance with U.S. Department of Energy (DOE) orders, agreements with regulatory agencies, support of RAs, and evaluation of the efficacy of pollution prevention (P2) and mitigation efforts. All aspects of the monitoring program will be consistent with the requirements of the latest revision of the *UCOR LLC Quality Assurance Program Plan, Oak Ridge, Tennessee* (UCOR-4141), and the *Oak Ridge National Laboratory Biological Monitoring and Abatement Program Data Management Plan, Rev. 0* (ORNL/IDMS 19851). Sampling, laboratory, and data-handling procedures will be standardized to the extent feasible. Qualifiers will be utilized to indicate special data evaluation considerations. Error associated with each radiological analysis will be reported. Sample parameters and frequencies will be evaluated each year, at a minimum, and more frequently, if conditions are found to have changed.

For example, Mitchell Branch is listed as an impaired stream due in part to the presence of PCBs, as well as physical substrate habitat alterations that have occurred during past DOE operations. The concentrations of PCBs in the tissue of fish from Mitchell Branch are above federal recommendations. The bioaccumulation task uses clams and fish to monitor the extent of the effects of PCBs on the biota in Mitchell Branch. In addition, mercury levels in fish and clams are monitored to track spatial and temporal changes of the levels of mercury in biota. The habitat assessment portion of the benthic macroinvertebrate community studies monitors the extent of the physical alterations to Mitchell Branch. As remediation efforts are completed in the Mitchell Branch watershed, this monitoring will help to gauge the effectiveness of the efforts and, if additional effort is required, guide planning for these efforts.

3.2.2 Data Evaluation

All data that contribute to regulatory or DOE order compliance determinations, or are published in internal or external documents or correspondence, are required to be checked for appropriateness by an independent, competent reviewer. This data evaluation is the responsibility of EC&P and shall consist of a review to ensure that all results were received, produced by the requested methods, and reported in the proper measurement units. EC&P will evaluate all of the monitoring results reported by the BMP organization. The BMAP Manager will be contacted for clarification when inconsistencies are found. If it is determined that a correction to data is warranted, then the BMAP Manager will ensure that the results are corrected.

3.2.3 Data Verification

Prior to transmission of monitoring results to EC&P personnel or to the BMAP database for input to OREIS, the ETTP BMAP principal investigators from the BMP organization shall review monitoring results and quality control (QC) data. The principal investigators are expected to provide timely written notification of any data errors, omissions, or quality failures to the ETTP BMAP Manager and to EC&P. Data reviews and verifications shall be conducted by BMP organization personnel as described in the BMAP QAP.

Data generated from activities performed with the ETTP BMAP shall be verified by checking to ensure that data have been accurately quantified, transcribed, and recorded; procedures have been complied with; analyses have been performed within specified parameters; electronic and hard-copy data show a one-to-one correspondence; and data appear to be reasonable and consistent.

The principal investigators, or their designees, shall work with the data management staff in determining the format for recording data that will be transmitted to the BMAP database and ultimately to the OREIS database. They will ensure that data deliverables meet the quality assurance (QA)/QC objectives of the BMAP.

3.3 RECORDS RETENTION

Sampling and analytical records as well as COC documents are maintained by the BMAP principal investigators. The procedures for control of BMAP records and documents are described in the BMAP QAP.

The BMP organization will process ETTP BMAP data in a prioritized manner into the BMAP database and ensure that the data are sent from the BMAP database to OREIS in an RTL format as described in the BMAP QAP. The RTL files, which will be task specific, will be transmitted to OREIS separately, on an annual basis. All data will be transmitted to OREIS within 180 days of the end of the FY. This data will include, but not necessarily be limited to, the following:

- Fish bioaccumulation data
- Fish and benthic macroinvertebrate species' richness and density data
- All water quality data associated with the above data

The benthic macroinvertebrate data collected using TDEC protocols and the clam bioaccumulation data are not routinely entered into OREIS. However, these data are available if there is a specific project or TDEC request. The BMP organization will maintain records of monitoring activities and results for a minimum of three years.

The EC&P organization shall maintain in the EC&P Document Center the EC&P organizational record copies of ETTP BMAP FY and CY reports, and related information received from the BMP organization.

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4. REFERENCES

10 *CFR* Part 830. *Nuclear Safety Management,* Subpart A, *Quality Assurance Requirements*, U.S. Department of Energy, Washington, D.C.

40 *CFR* Part 136. *Guidelines Establishing Test Procedures for the Analysis of Pollutants*, U.S. Environmental Protection Agency, Washington, D.C.

EPA 831-R-77-101. *NPDES Compliance Sampling Manual*, June 1992, U.S. Environmental Protection Agency, Washington, D.C.

ORNL/IDMS 19851. *Oak Ridge National Laboratory Biological Monitoring and Abatement Program Data Management Plan*, latest revision, Oak Ridge National Laboratory, Oak Ridge, TN.

QAP-ESD-03, Rev. 9 or latest revision (ORNL IDMS 10343). *Quality Assurance Plan for the Aquatic Ecology Group within the Environmental Sciences Division of the Oak Ridge National Laboratory, Oak Ridge, Tennessee*, 2016, Oak Ridge National Laboratory, Oak Ridge, TN.

TDEC QSSOP 2017. *Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys*, 2017, Tennessee Department of Environment and Conservation, Nashville, TN.

UCOR-4141/R8. *UCOR LLC Quality Assurance Program Plan, Oak Ridge, Tennessee*, September 2021, UCOR LLC, Oak Ridge, TN.

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APPENDIX A.
SITE-SPECIFIC SAMPLING AND ANALYSIS REQUIREMENTS

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APPENDIX A CONTENTS

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The East Tennessee Technology Park (ETTP) Biological Monitoring and Abatement Program (BMAP) consists of two tasks that reflect different but complementary approaches to evaluating the effects of ETTP effluents on the ecological integrity of waters near ETTP. These tasks include: (1) bioaccumulation monitoring of fish and clams, and (2) stream biological community monitoring of the richness and density of fish and benthic macroinvertebrate species. The following tables provide a summary of sampling and analysis plan (SAP) requirements for the ETTP BMAP. Detailed sampling and quality assurance (QA) procedures are documented in the BMAP QA Plan (QAP), task-specific QAPs, and project-specific procedures. The fourth-quarter benthic macroinvertebrate sampling will be conducted according to the procedures outlined in the latest revision of the Tennessee Department of Environment and Conservation's (TDEC) *Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys* (TDEC Quality System Standard Operating Procedure [QSSOP] 2017).

Table A.1. Specific requirements for the FY 2023 SAP at ETTP site waters*

Task	Methods[a]	Sample type	Sampling and analysis frequency
Fish species richness and density monitoring (K-901-A[b], K-1007-P1[b], MIK 0.4, and 0.7[c])	QAP-ESD-03-FCS	Electrofishing—3-pass removal method and qualitative sampling	1/year
Benthic macroinvertebrate species richness and density monitoring (MIK 0.4, 0.7, 0.8, and 1.4)	QAP-ESD-03-MCS (third quarter)	Surber sampler—(3 samples/site)	1/year
	TDEC QSSOP for Macroinvertebrate Stream Surveys (fourth quarter)	Semiquantitative sampling	1/year
Clam bioaccumulation monitoring—PCBs, total mercury, and methylmercury (MIK 0.2, MIK 0.3, MIK 0.4, MIK 0.7, MIK 0.8, K-1007-P1, and K-901-A)	QAP-ESD-03-BAA; PCBs; methylmercury EPA-1630; total mercury EPA-1631	Duplicate composites of caged clams	1/year
Fish bioaccumulation monitoring—PCBs (Mitchell Branch, K-702-A, K-901-A, and K-1007-P1) and total mercury (Mitchell Branch, PCK 1.6[d], PCK 8.2[d], CRK 15.0[d])	QAP-ESD-03-BAA; PCBs; total mercury EPA-1631	Electrofishing—(6 samples/site)	1/year

*Specific requirements for the sampling program are generated based upon historical investigations and continuing interactions with the TDEC NPDES permit engineer.

[a]QAP designations refer to project-specific operating procedures for the BMAP.

[b]Fish species richness and density monitoring in the K-901-A and K-1007-P1 ponds, and the K-702-A slough will be conducted under the UCOR WRRP. Results will continue to be reported in the ETTP BMAP reports.

[c]Numbered designations refer to the approximate kilometer distance upstream from the mouth of the river.

[d]Monitoring at PCK 1.6, PCK 8.2, and CRK 15.0 is conducted under the Y-12 BMAP and WRRP.

BMAP = Biological Monitoring and Abatement Program
CRK = Clinch River kilometer
EPA = U.S. Environmental Protection Agency
ETTP = East Tennessee Technology Park
FY = fiscal year
MIK = Mitchell Branch kilometer
NPDES = National Pollutant Discharge Elimination System
PCB = polychlorinated biphenyl
PCK = Poplar Creek kilometer
QAP = Quality Assurance Plan
QSSOP = Quality System Standard Operating Procedure
SAP = sampling and analysis plan
TDEC = Tennessee Department of Environment and Conservation
UCOR = United Cleanup Oak Ridge LLC
WRRP = Water Resources Restoration Program
Y-12 = Y-12 National Security Complex

Table A.2. Specific requirements for the FY 2023 SAP at ETTP storm drains*

Task	Methods[a]	Sample type	Sampling and analysis frequency
Clam bioaccumulation monitoring—PCBs (lower stormwater outfall/SD-100, upper SD-100, SD-120, SD-170, SD-180, SD-190, SD-490, and up to two locations to be determined) and total and methylmercury (SD-170, SD-180, and SD-190 only)	QAP-ESD-03-BAA; PCBs; methylmercury EPA-1630; total mercury EPA-1631	Duplicate composites of caged clams	1/year

*Specific requirements for the sampling program are generated based upon historical investigations and continuing interactions with the TDEC NPDES permit engineer.

[a]QAP designations refer to project-specific operating procedures for the BMAP.

BMAP = Biological Monitoring and Abatement Program
EPA = U.S. Environmental Protection Agency
ETTP = East Tennessee Technology Park
FY = fiscal year
NPDES = National Pollutant Discharge Elimination System
PCB = polychlorinated biphenyl
QAP = Quality Assurance Plan
SAP = sampling and analysis plan
SD = storm drain
TDEC = Tennessee Department of Environment and Conservation

Table A.3. Monitoring and reporting schedule for FY 2022

FY quarter	Task
First	Fish bioaccumulation monitoring
Second	CY report[a] (due January 31, 2023) Fish bioaccumulation monitoring
Third	Benthic macroinvertebrate species richness and density monitoring (UT-Battelle protocols) Fish species richness and density monitoring Fish bioaccumulation monitoring Bioaccumulation monitoring clam cage placement with retrieval one month later
Fourth	Benthic macroinvertebrate species diversity and density monitoring (TDEC protocols) FY report[b] (due September 30, 2023)

[a]CY report shall summarize monitoring results for previous CY and compare results to previous years.
[b]FY report shall include all monitoring results available for the current FY.

CY = calendar year
FY = fiscal year
TDEC = Tennessee Department of Environment and Conservation
UT-Battelle = UT-Battelle, LLC

APPENDIX B.
BMAP MONITORING LOCATIONS AT ETTP

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APPENDIX B

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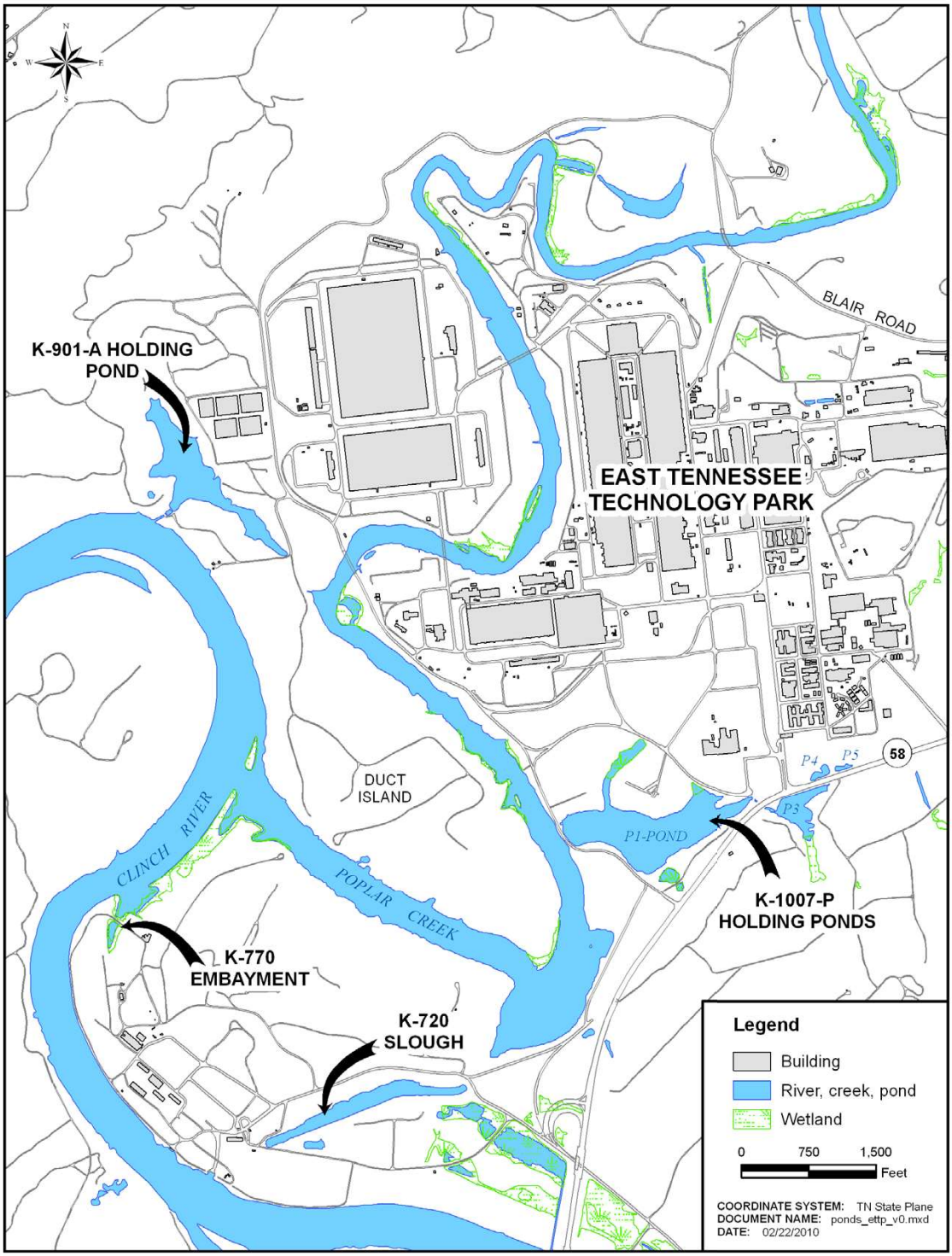

Fig. B.1. Map showing the major aquatic environments around ETTP.
(Biomonitoring work near ETTP is supported by multiple DOE programs.)

Fig. B.2. BMAP monitoring locations along Mitchell Branch.

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ENCLOSURE 3
Letter: ORRCC-22-0160

National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water at the East Tennessee Technology Park (ETTP) (NPDES Permit No. TN0002950) – Submittal of Monitoring Plans / East Tennessee Technology Park, Storm Water Pollution Prevention Program, Sampling and Analysis Plan, Oak Ridge, Tennessee (UCOR-4028/R13)

UCOR
United Cleanup Oak Ridge LLC

UCOR-4028/R13

East Tennessee Technology Park
Storm Water Pollution Prevention Program
Sampling and Analysis Plan,
Oak Ridge, Tennessee

This document is approved for public release per review by:

Dave Lannom	6/6/22
UCOR Classification & Information Control Office	Date

UCOR-4028/R13

East Tennessee Technology Park
Storm Water Pollution Prevention Program
Sampling and Analysis Plan,
Oak Ridge, Tennessee

Date Issued—June 2022

Effective Date—July 1, 2022

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

United Cleanup Oak Ridge LLC
under contract 89303322DEM000067

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APPROVALS

East Tennessee Technology Park Storm Water Pollution Prevention Program Sampling and Analysis Plan, Oak Ridge, Tennessee	UCOR-4028/R13
	June 2022

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 Financial Officer, Internal Audit, Labor Relations, General Counsel, Community Outreach, or Project Services and Support OR ☑ (4) Document identified in USQD-MS-CX-REPORTS-1074
USQD Preparer:	C. W. Caldwell — Digitally signed by C. W. Caldwell Date: 2022.06.06 14:20:11 -04'00' Name — Date
Exhibit L Mandatory Contractor Document	☐ No (No PCCB reviewer signature required.) ☐ Yes (Requires review by the Proforma Change Control Board.)
PCCB Reviewer:	Name — Date

Prepared by: Rebecca Rogers — 6/6/2022
Rebecca Rogers, P.E.
Environmental Engineer
UCOR/CDM Federal Services, Inc.
Date

Concurred by: Kevin Crow — 6/6/2022
Kevin R. Crow, P.E.
Subcontractor Integration/ETTP Landlord
Environmental Programs
UCOR
Date

Approved by: Tony Poole — 6/6/2022
D. A. (Tony) Poole, Manager
Environmental Compliance and Protection
UCOR
Date

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REVISION LOG

Revision number	Effective date	Description of changes	Pages or sections affected
0	October 2011	Initial issue with new UCOR document number.	All
1	October 2012	Content and minor editorial changes.	Multiple
2	September 2013	Content and minor editorial changes.	Multiple
3	February 2014	Content changes to Sect. 0 and other minor editorial changes.	Multiple
4	October 2014	Content and minor editorial changes.	Multiple
5	June 2015	Content and minor editorial changes.	Multiple
6	October 2016	Content and minor editorial changes.	Multiple
7	October 2017	Content and minor editorial changes.	Multiple
8	October 2018	Content and minor editorial changes.	Multiple
9	October 2019	Content and minor editorial changes.	Multiple
10	September 2020	Content and minor editorial changes.	Multiple
11	September 2020	Content and minor editorial changes.	Multiple
12	October 2021	Annual update. Revised Table 2 methods based on recent amendment to 40 *CFR* Part 136. Revised Table 3 PQLs based on current laboratory PQLs. Updated Sect. 6.4.4 based on current data management practices. Updated monitoring requirements in Chap. 7. Editorial changes.	All
13	July 2022	Annual update. Revised for compliance with NPDES Permit No. TN 0002950, which became effective April 1, 2022. Revised Table 3 update reference standards and screening levels. Updated stormwater monitoring requirements in Chap. 7. Updated subwatershed maps in Appendix A. Editorial changes.	All

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CONTENTS

TABLES

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ACRONYMS

ALARA	as low as reasonably achievable
AMSED	Analytical Master Specification Electronic Deliverable
BMP	best management practice
CA	corrective action
CCV	Contract Compliance Verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	*Code of Federal Regulations*
COC	chain of custody
CWA	Clean Water Act
CWTS	Chromium Water Treatment System
D&D	decontamination and demolition
DAL	Daily Activities List
DCS	Derived Concentration Standards
DMC	Document Management Center
DMR	Discharge Monitoring Report
DOE	U.S. Department of Energy
DQO	data quality objective
DWR	Division of Water Resources
EC&P	Environmental Compliance and Protection
EDD	electronic data deliverable
EIM	Environmental Information Management
EPA	U.S. Environmental Protection Agency
ESWO	Emergency Services Watch Office
ETTP	East Tennessee Technology Park
EU	exposure unit
FTP	file transfer protocol
FY	fiscal year
NPDES	National Pollutant Discharge Elimination System
O&G	oil and grease
OREIS	Oak Ridge Environmental Information System
ORFP	Oak Ridge Forest Products
PCCR	Phased Construction Completion Report
PEMS	Project Environmental Measurements System
PQL	project quantitation level
QA	quality assurance
QC	quality control
RA	remedial action
RWP	radiation work permit
SAP	Sampling and Analysis Plan
SDG	sample delivery group
SMO	Sample Management Office
SOW	Statement of Work
SSO	Sampling Subcontractor Organization
SWPP	Storm Water Pollution Prevention
TAT	turnaround time
TDEC	Tennessee Department of Environment and Conservation
UCOR	United Cleanup Oak Ridge LLC
VOC	volatile organic compound

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EXECUTIVE SUMMARY

The purpose of the Storm Water Pollution Prevention (SWPP) Program is to evaluate and characterize stormwater runoff from the East Tennessee Technology Park (ETTP). The objectives of the SWPP Program are to determine potential sources of pollutants affecting stormwater discharges; minimize the discharge of pollutants by providing effective erosion and sediment controls; and monitor and evaluate the discharge of pollutants from ETTP to Mitchell Branch, Poplar Creek, and the Clinch River. Stormwater outfalls are sampled as needed for various parameters that vary from year to year depending on activities within the drainage basins. This Sampling and Analysis Plan (SAP) defines organizational roles and responsibilities; outlines sampling, analysis, and data management requirements; provides quality assurance/quality control (QA/QC) requirements; and provides specific sampling and analysis requirements for select stormwater outfalls in the last quarter of fiscal year (FY) 2022 and in FY 2023. The ETTP SWPP Program is implemented through the ETTP SWPP Program Baseline Document, the ETTP SWPP Program SAP, and the ETTP SWPP Program Annual Update Report.

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1. INTRODUCTION

The National Pollutant Discharge Elimination System (NPDES) permit for the East Tennessee Technology Park (ETTP), Permit No. TN0002950 regulates the discharge of groundwater and stormwater runoff from ETTP to Mitchell Branch, Poplar Creek, and the Clinch River. The permit became effective on April 1, 2022, and is set to expire on March 31, 2027. A minor modification to the permit was issued by the Tennessee Department of Environment and Conservation (TDEC) on May 17, 2022.

The purpose of the Storm Water Pollution Prevention (SWPP) Program is to evaluate and characterize stormwater runoff from ETTP. The objectives of the SWPP Program are to determine potential sources of pollutants affecting stormwater discharges; minimize the discharge of pollutants by providing effective erosion and sediment controls; and monitor and evaluate the discharge of pollutants from ETTP to Mitchell Branch, Poplar Creek, and the Clinch River. Stormwater outfalls are sampled as needed for various parameters that vary from year to year depending on activities going on within the drainage basins. SWPP Program monitoring includes:

- Stream Impairment Monitoring
- Radiological Monitoring
- Remedial Action Monitoring
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Phased Construction Completion Report (PCCR) Monitoring
- Legacy Contamination Monitoring
- Investigative Monitoring
- NPDES Permit-Renewal Monitoring
- Flux Monitoring

SWPP Program monitoring is conducted in accordance with this Sampling and Analysis Plan (SAP). NPDES compliance monitoring is conducted in accordance with the ETTP NPDES SAP (UCOR-4030, *East Tennessee Technology Park National Pollutant Discharge Elimination System Sampling and Analysis Plan, Oak Ridge, Tennessee*).

This SAP defines organizational roles and responsibilities; outlines sampling, analysis, and data management requirements; provides quality assurance/quality control (QA/QC) requirements; and specifies select stormwater outfalls to be monitored in the remainder of fiscal year (FY) 2022 and in FY 2023. Any changes to the requirements specified in this SAP shall be issued in writing. No deviations from the requirements are to be implemented without prior approval from Environmental Compliance and Protection (EC&P) Program personnel.

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2. ORGANIZATIONAL RESPONSIBILITIES

2.1 UCOR ENVIRONMENTAL COMPLIANCE AND PROTECTION PROGRAM

The United Cleanup Oak Ridge LLC (UCOR) EC&P Program provides overall management of the Clean Water Act (CWA) program at ETTP. Responsibilities include the following tasks associated with the SWPP Program:

- Defining and coordinating the monitoring and surveillance activities to achieve compliance with the requirements of the NPDES permit and SWPP Program.
- Preparing and routinely revising the ETTP SWPP Program SAP, which provides SWPP Program requirements for the upcoming FY.
- Providing written guidance for any deviations in sampling or analytical requirements from those specified in the ETTP SWPP Program SAP.
- Reviewing applicable field sampling procedures, checklists, schedules, and programs developed by the Sampling Subcontractor Organization (SSO) and the Oak Ridge Sample Management Office (SMO).
- Transferring SWPP Program monitoring results from the current Environmental Information Management (EIM) system to the Oak Ridge Environmental Information System (OREIS) on at least a semiannual basis.
- Preparing, reviewing, and evaluating analytical data that will be presented in the *East Tennessee Technology Park Storm Water Pollution Prevention Program Annual Update Report*.
- Reviewing the ETTP SWPP Program Annual Report in accordance with the QA/QC checks described in PPD-EC-3194, *Balance of Environmental Regulations Program Description,* and as documented on Form-3439, Environmental Compliance and Protection (EC&P) Independent Review.
- Reporting all NPDES permit noncompliances in accordance with the requirements of the NPDES permit and other applicable guidelines.
- Initiating investigations to determine the cause of any NPDES permit noncompliances and preparing a narrative report of such activities for submittal to TDEC in the NPDES Discharge Monitoring Report (DMR).
- Assisting in defining actions that would prevent the recurrence of conditions leading to NPDES permit noncompliances.
- Coordinating scheduling for storm drain sampling with SSO personnel and establishing priorities and providing schedules for installations of sampling equipment.
- Notifying SSO personnel when sampling equipment should be picked up for decontamination and storage or moved to another monitoring location.
- Reviewing analytical data submitted by the Oak Ridge SMO and field data submitted by the SSO for accuracy and compliance with the requirements of this SAP and the NPDES permit.
- Providing specific written guidance regarding an alternate sampling location upon notification that a sample(s) cannot be obtained from the most representative sampling location specified in this SAP.
- Interpreting requirements of this SAP and providing guidance to SSO and Oak Ridge SMO personnel to ensure compliance.

- Providing guidance on stormwater-related sampling issues to SSO sampling personnel, facility operations personnel, and the UCOR Emergency Services Watch Office (ESWO), as necessary.
- Providing oversight of the documentation of the operation, maintenance, and calibration of all monitoring instrumentation used to fulfill the monitoring requirements specified in the SWPP Program.
- Providing oversight of the smoke and dye testing of the storm drain system.
- Providing information concerning routine stormwater outfall maintenance (i.e., mowing, access upgrades, repair/replacement of signs) to facilitate SWPP Program sampling.
- Establishing laboratory/field screening levels that will trigger immediate notifications from subcontractor laboratory personnel, the Oak Ridge SMO, and the SSO. (The screening levels are established at levels less than permit limits, where applicable, or in accordance with reference standards in a manner that encourages and facilitates environmental as low as reasonably achievable [ALARA] objectives.)
- Evaluating all stormwater analytical results that equal or exceed screening levels to determine if there have been changes in field conditions that need to be addressed to reduce pollutant discharges. (Follow-up actions may include recommendations for additional sampling. For exceedances of screening levels for radiological parameters—including gross alpha, gross beta, or total uranium—isotopic data may be required to fully characterize the discharge.)
- Establishing project quantitation levels (PQLs) for all analytical parameters that will implement data quality objectives (DQOs). (The quantitation levels must allow analytical results to be compared to applicable reference standards and screening levels and must also facilitate environmental ALARA evaluations of all discharges.)
- Participating in monthly sampling coordination meetings with SSO and Oak Ridge SMO personnel, and other relevant personnel.
- Coordinating stormwater outfall sampling and monitoring results for various environmental investigations conducted at ETTP to ensure that all applicable analytical data are reported to the appropriate regulatory agencies.

2.2 SAMPLING SUBCONTRACTOR ORGANIZATION

The SSO shall perform SWPP Program sampling activities at ETTP. The SSO is also responsible for shipment of stormwater samples from ETTP to approved laboratories. These activities must be conducted in accordance with the requirements of this SAP, SSO internal procedures, and other applicable plans and procedures. Responsibilities are as follows:

- Providing a sufficient number of adequately trained personnel to ensure that stormwater samples are obtained in accordance with the methods and frequencies specified in this SAP.
- Training of sampling personnel in accordance with the approved U.S. Environmental Protection Agency (EPA) and SSO internal sample collection and preparation practices.
- Collecting stormwater samples in accordance with the methods, locations, and frequencies specified in this SAP; an approved sampling schedule; and all appropriate internal SSO procedures and guidelines
- Completing all required field data forms, logbook entries, chain of custody (COC) forms, etc., in accordance with the guidelines in this SAP and internal SSO procedures.
- Contacting UCOR EC&P personnel with SWPP Program samples cannot be collected as required.

- Preparing field sampling procedures, field data sheets, checklists, log sheets, and schedules, and training sampling personnel in their use.
- Collecting SWPP Program stormwater samples and performing field measurements and utilizing proper QA/QC techniques in accordance with PROC-ES-2203, *Surface Water Sampling—Manual and Automated,* and PROC-ES-2704, *Field Quality Control Sampling,* respectively.
- Using COC procedures in accordance with PROC-ES-2708, *Chain of Custody Protocol for Environmental Sampling.*
- Entering verified stormwater sampling and field data into the current EIM system as required.
- Notifying UCOR EC&P personnel if conditions are observed in the field during sampling activities that might indicate an NPDES permit noncompliance or environmental insult (i.e., discoloration of effluent, visible solids in effluent, oily sheen, foam, scum).
- Obtaining additional samples as directed by UCOR EC&P and/or other authorized personnel, when sample administrative failures, such as broken or missing sample containers, missed holding times, missed samples, improper use of sample preservatives, etc., are identified in sufficient time.
- Notifying UCOR EC&P personnel of any problems with accessibility to outfalls in order to ensure that stormwater samples can be collected safely.
- Furnishing copies of all stormwater field sheets, and field and laboratory COC documentation to designated UCOR EC&P personnel upon request.
- Shipping stormwater samples to specified analytical laboratories in compliance with required holding times and temperatures.
- Collecting samples on an emergency/call-in basis, as requested by UCOR EC&P and/or other authorized personnel.
- Calibrating, operating, and maintaining all water quality measurement in accordance with manufacturers' guidelines and internal SSO procedures; maintaining and controlling instrumentation and equipment manuals.
- Maintaining a paper and electronic copy of all field sheets, logbook entries, instrument calibration records, shipping records, and other data applicable to the sample collection and shipment process for a minimum of three years.
- Properly decontaminating stormwater sampling equipment used in the field according to accepted EPA and internal SSO procedures to reduce the possibility of the cross-contamination of samples.
- Using proper personal protective equipment (PPE), where required, for the collection of stormwater samples.
- Obtaining radiation work permits (RWPs), where required, for the collection of stormwater samples, and following all guidance contained in the RWPs.
- Assisting UCOR EC&P organization personnel with stormwater system investigations, including dye testing, smoke testing, sample collection, and field measurements, as necessary.
- Maintaining and updating SSO internal procedures for sample collection and preservation; COC; instrumentation calibration, use, and maintenance; equipment decontamination; sample transportation; training requirements; etc.
- Participating in monthly sampling coordination meetings with UCOR EC&P and Oak Ridge SMO personnel.

- Using all required safety procedures and equipment when travel by boat on waterways near ETTP is required for any reason, including the collection of SWPP Program samples.
- Providing all necessary equipment to perform calibration and maintenance of portable stormwater sampling equipment.
- Checking the availability of adequate power supply, proper programming, proper cable connection, and total readiness of automated equipment for sampling before each expected storm event. (These actions will be performed for all automated sampling setups that have been placed in the field for the duration of the time the equipment remains in the field.) Repairing or replacing automated sampling equipment in the field as soon as possible if problems are noted.
- Removing ancillary sampling equipment, including weir boxes, invert funnels, strainers, etc., from storm drain pipes upon completion of sampling activities at the storm drain. This equipment will be cleaned and stored by SSO personnel in accordance with the requirements of this document (Sect. 5.7, "Contamination Control").
- Cleaning of ancillary sampling equipment for placement at the designated stormwater outfall(s) that are to be sampled. The cleaned equipment shall be transported to the sampling location in a manner that prevents exposure of the equipment to contaminants. Cleaned equipment shall not be stored for any appreciable length of time before installation. If the cleaned sampling equipment cannot be installed on the day it is received, it shall be stored inside a building in a clean, dry location. If the cleaned equipment becomes contaminated in any way, it shall be returned to be re-cleaned.
- Developing alternative sampling methods and experimental sampling equipment that may be used in conjunction with automated sampling equipment.
- Ensuring that an adequate supply of consumable sampling supplies such as pump tubing, sample tubing, bubbler tubing, chart paper, etc., is maintained at all times.
- Providing necessary assistance and technical support in determining the appropriate instrumentation to meet the sampling requirements of this SAP.
- Installing storm drain monitoring equipment at designated locations in accordance with Sect. 0 of this SAP and any revisions of this plan that are issued by the UCOR EC&P organization, and in accordance with the guidelines in this SAP and the EPA's *NPDES Storm Water Sampling Guidance Document* (EPA 833-B-92-001). (Scheduling of the installation of equipment will be performed by the UCOR EC&P organization and must be followed exactly. Placement of equipment in storm drain pipes will be performed so that only drainage from the pipe is sampled, and sheet flow and/or rainfall that has not been discharged from the pipe will not be sampled.)
- Transporting equipment to the sampling location in a manner that prevents exposure of cleaned equipment to contaminants.
- Decontaminating automated samplers that have been used in the field according to designated procedures, replacing contaminated pump tubing and sample tubing with clean tubing, and performing routine maintenance on automated equipment, when necessary.
- Providing inventory control for stormwater sampling equipment and developing a tracking system for the equipment.
- Providing notification to UCOR EC&P organization personnel when instrument installation or removal has been performed or when instrumentation is found to be malfunctioning.
- Notifying the UCOR ESWO immediately of any problems with monitoring instrumentation that could cause a noncompliance with the NPDES permit.

- Creating and maintaining a field calibration log sheet that will be completed when an automated sampler or flowmeter is calibrated. (These log sheets, along with all other information pertaining to instrument calibration, will be maintained by the SSO for a minimum of three years.)
- Operating, calibrating, and maintaining automated samplers used for SWPP Program sampling in accordance with manufacturer's recommendations and guidelines as stated in applicable instruction manuals.
- Purchasing pre-cleaned, medical-grade tubing to be used in automated sampling equipment.
- Providing clean, dry storage facilities for the automated sampling equipment that is not in use in the field, and providing conditions for storage of automated pump and sample tubing that will prevent internal or external contamination of the tubing.
- Following all guidelines for equipment contamination control that are presented in Sect. 5.6.
- Checking all batteries that have been placed in the field to power the automated sampling equipment at least one time per week using an ammeter to determine if the battery is holding an adequate charge for the duration of time the equipment remains in the field.
- Replacing batteries in the field that are not fully charged or batteries that are suspected to be defective as soon as possible after any type of problem is identified.
- Ensuring the proper placement and adequate function of solar panels to maximize the charge held by the batteries operating the automated equipment in the field.
- Maintaining an adequate supply of fully charged batteries for powering the automated sampling equipment.
- Ensuring that defective or nonfunctional batteries are recycled according to all appropriate guidelines and ensuring that batteries to be recycled are stored properly until recycling can occur.
- Checking all cables that connect each piece of automated sampling equipment together and to the power source and checking the batteries that power the equipment before each expected storm event for the duration of time the equipment remains in the field.
- Providing storage for hazardous materials (i.e., desiccants, decontamination solutions) that are utilized in the maintenance and upkeep of automated equipment. (This will also include the establishment and maintenance of records of materials being stored and routine inspections of storage facilities to ensure compliance with applicable regulations.)
- Removing flowmeter recorder paper from automated flowmeters when paper supply roll is low and replacing recorder paper, as necessary.
- Recording all automated instrument repairs and other instrument maintenance activities in a logbook.
- Providing precipitation information and other weather data from the ETTP Mission System, located at storm drain basin 18102, upon request.

2.3 SAMPLE MANAGEMENT OFFICE

The Oak Ridge SMO shall coordinate the analysis of samples collected from ETTP stormwater outfalls as part of the SWPP Program. The Oak Ridge SMO is also responsible for the collection and management of analytical data for these samples. Responsibilities are as follows:

- Selecting the appropriate laboratories to conduct the analysis of samples collected in support of the ETTP SWPP Program and establishing appropriate statements of work (SOWs) with these laboratories.
- Ensuring that SWPP Program stormwater samples are analyzed using proper techniques and procedures, as specified in this SAP.
- Ensuring that analyses of SWPP Program samples are completed within required holding times.
- Following proper COC procedures for receiving SWPP Program samples in accordance with PROC-ES-2708.
- Verifying that the laboratory enters all approved analytical information in the current EIM system within seven calendar days of requested turnaround times (TATs).
- Furnishing hard copy or electronic data file(s) of SWPP Program analytical information to designated UCOR EC&P personnel in accordance with project specifications.
- Implementing screening level system in the laboratory information management system to identify analytical measurements that are outside the screening levels specified by the UCOR EC&P Program.
- Notifying UCOR EC&P personnel immediately if any approved and verified analytical result is outside the specified screening level, as described in this SAP.
- Notifying UCOR EC&P personnel immediately of any failure to comply with the sample administration requirements and conditions of this SAP, including missed holding times, failure to obtain samples, failure to analyze samples by required analytical methods, or failure to follow proper QA/QC requirements.
- Initiating the collection of replacement samples, as directed by UCOR EC&P personnel, if sample administration failures, such as missed holding times, inappropriate methods, improper preservatives, etc., are identified (if sufficient time exists to collect additional samples).
- Coordinating sampling schedules with analytical laboratories to ensure adequate coverage by the labs.
- Notifying UCOR EC&P personnel immediately of any verified analytical result that could potentially create a negative environmental impact.
- Electronically transmitting all SWPP Program monitoring data from the current EIM system to UCOR EC&P personnel in the specified format and in accordance with the required schedule.
- Implementing the program requirements with subcontract laboratory staff in regard to requested screening levels and PQLs.
- Completing a Contract Compliance Verification (CCV) scoresheet on the current EIM application within 10 calendar days of receipt of the laboratory data, when no resolution of errors is required.
- Reviewing case narratives in the forms packages on each laboratory data package and verifying that data on the hard copy of the analytical data agree with the data entered into the current EIM system.
- Sending a record copy of all laboratory data to the Document Management Center (DMC) for active local storage for a minimum of three years.
- Participating in monthly sampling coordination meetings with UCOR EC&P and Oak Ridge SSO personnel, when available.
- Ensuring that all laboratory data packages are processed according to applicable Oak Ridge SMO procedures.

2.4 UCOR FACILITY OPERATIONS AND LAND AREA MANAGEMENT

UCOR Facility Operations and Land Area Management personnel are responsible for the maintenance and upkeep of the ETTP stormwater drainage system, including the repair and replacement of stormwater infrastructure and mowing of access areas around stormwater sampling locations. Responsibilities are as follows:

- Providing adequate maintenance of stormwater outfall sampling locations to ensure safe access by sampling personnel. Maintenance includes mowing, brush cutting, etc.
- Designing, constructing, and maintaining steps, handrails, sampling platforms, and other structures to facilitate safe access to stormwater sampling locations.

2.5 UCOR DECONTAMINATION AND DEMOLITION AND REMEDIAL ACTION PROGRAMS

Decontamination and demolition (D&D)/remedial action (RA) personnel are responsible for implementing modifications to the ETTP stormwater drainage system that become necessary due to D&D and/or RA activities. Responsibilities are as follows:

- Coordinating proposed modifications to the ETTP stormwater runoff piping system with UCOR EC&P personnel.
- Coordinating outfall monitoring activities required as part of the D&D/RA efforts with UCOR EC&P personnel.

2.6 UCOR CHIEF PROGRAM AND SUSTAINABILITY OFFICE

UCOR Chief Program and Sustainability Office personnel are responsible for planning and implementing modifications to the ETTP stormwater drainage system that are necessary due to reindustrialization and closure activities. Responsibilities are as follows:

- Coordinating proposed modifications to the ETTP stormwater runoff piping system with UCOR EC&P personnel.
- Coordinating outfall monitoring activities required as part of the Beneficial Reuse and End State Management efforts with UCOR EC&P personnel.

2.7 UCOR EMERGENCY SERVICES WATCH OFFICE

The UCOR ESWO is a facilitator in the sampling effort with the following responsibilities:

- Providing assistance in obtaining access (e.g., unlocking gates) to stormwater monitoring locations, as needed.
- Compiling the Daily Activities List (DAL), which will include CWA-related visits to ETTP by TDEC or EPA personnel and ensuring that the DAL is distributed to appropriate personnel.
- Serving as the primary point of contact (POC) when spills or other unusual conditions are observed in the field during sampling activities.

- Notifying UCOR EC&P personnel immediately when spills or unusual conditions are observed in the field.
- Reporting of environmental occurrences related to the activities conducted in accordance with this SAP to appropriate federal, state, and local agencies. (Noncompliance notifications must include the TDEC Environmental Field Office in Knoxville and the TDEC Division of the U.S. Department of Energy Oversight [DOE-O] in Oak Ridge.)

3. STORMWATER MONITORING

3.1 MONITORING REQUIREMENTS

Most stormwater samples shall be collected from discharges resulting from a storm event greater than 0.1 in. that occurs within a time period of 24 hours or less, and which occurs at least 72 hours after any previous rainfall greater than 0.1 in. in 24 hours. If an intermittent rainfall occurs over a period of 24 hours and does not exceed 0.1 in., it will not be considered a storm event, and the 72-hour delay until the next rainfall that can potentially be sampled will not be in effect. Additional guidance will be issued by UCOR EC&P personnel if any of these sampling criteria are different for a particular sampling effort.

Rainfall readings from rain gauges operated by the SSO at stormwater Outfall 170 and at storm drain basin 18102 will be used for the official measurement of the magnitude of a storm event. Other alternative rainfall measurement methods must be approved by UCOR EC&P personnel. These data will be used to determine the 72-hour sampling criteria for subsequent sampling events and for contacting necessary personnel to ensure adequate support is available onsite when needed. If necessary for appropriate samples to be collected, deviation from the stated criteria must be authorized by UCOR EC&P personnel.

Many of the samples collected as part of the FY 2023 SWPP Program sampling effort will be grab samples collected manually or by automated samplers. Both manual and automated sampling methods are acceptable for collecting grab samples according to applicable sample collection guidelines. For the purposes of this SAP, a grab sample is defined as a discrete, individual sample collected manually or by automated sampler that is collected within a short period of time, usually 15 minutes or less. Both manual grab samples and grab samples collected using an automated sampler must be collected within the first 30 minutes of a discharge.

Manual grab samples shall be used for monitoring pH, temperature, total phenols, oil and grease (O&G), total cyanide, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total organic carbon (TOC), ammonia as nitrogen, total Kjeldahl nitrogen, and compounds in the volatile fraction of the organic parameters listed in 40 *Code of Federal Regulations* (*CFR*) Part 122, *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System*, Appendix D, *NPDES Permit Application Testing Requirements*. Grab samples collected by automated samplers shall be used to monitor for other compounds listed in 40 *CFR* Part 122, Appendix D unless otherwise specified by UCOR EC&P personnel. The sample collection method for each parameter (i.e., whether the sample for a specific parameter should be collected as a manual grab or if it can be collected by the use of an automated sampler) is specified by the analytical method for that parameter. Samples that have been designated in this SAP to be collected as automated grabs can be collected by manual grab if location, volume, or time constraints prohibit the practical use of automated sampling equipment; however, no parameters designated to be collected by the manual grab sampling method can be collected by an automated sampler under any circumstances.

Manual grab samples will be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Automated samplers may be used to collect grab samples according to guidelines specified in Sects. 3.1.3 and 3.3.2 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. The automated samplers should be programmed to fill the 24 sample bottles in its bottle rack sequentially beginning with the first bottle in the bottle rack. There should be no appreciable time delay between the completion of the filling of a sample bottle to the initiation of filling the next sample bottle in the sequence, other than the time it takes for the sample distribution arm to move from a filled sample bottle to the next empty bottle in the sequence. This will allow all 24 sample bottles to be filled within a 15-minute time frame, which will ensure that the sample collected by the automated sampler meets the definition of a grab sample as specified in EPA 833-B-92-001.

Composite samples shall be collected using automated sampling equipment. The composite samples shall consist of at least three aliquots taken during the first 60 minutes of a storm event discharge. Samples composited by time (equal volume aliquots collected at a constant interval) shall be used in most instances. In situations where the use of an automated sampler is not feasible or practical, a series of at least three manual grab samples of equal volume may be collected during the first 60 minutes of a storm event discharge and combined into a composite sample in accordance with applicable SSO procedures.

Because of programmatic requirements, changes in environmental conditions, or other similar situations, modifications to monitoring locations and/or analytical parameters stated in this SAP may be required. Any changes to the specifications stated in this SAP will be made at the discretion of UCOR EC&P personnel. Sampling personnel will be made aware of any changes to monitoring locations and/or analytical parameters as soon as possible by written or electronic documentation (i.e., email). Additional revisions to this SAP will not be issued except in instances where extensive modifications to sampling locations or strategies are to be implemented.

3.2 TEST PROCEDURES

General sample container, preservation, holding time, and volume requirements are listed in Table 1. All parameters shall be analyzed in accordance with the methods prescribed in 40 *CFR* Part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants*, unless otherwise noted, as shown in Table 2. PQLs, screening levels, and reference standards are listed in Table 3.

Proper QA/QC measures shall be taken in accordance with appropriate laboratory procedures. Maps showing the locations to be sampled as part of this SAP are included in Appendix A.

Table 1. General sample container, preservation, holding time, and volume requirements

Parameter	Container	Preservation	Holding time	Minimum volume/sample
TSS	P, FP, G	Cool, ≤ 6°C	7 days	2 L
pH	P, FP, G	None	15 min	200 mL
O&G	G	Cool, ≤ 6°C, H_2SO_4 or HCl to pH < 2	28 days	1 L
COD	HDPE, FP, G	Cool, ≤ 6°C, H_2SO_4 to pH < 2	28 days	125 mL
Chromium, hexavalent	P, FP, G	Cool, ≤ 6°C	28 days	500 mL
Benzidine	G, PF-lined caps	0.008% $Na_2S_2O_3$	7 days	3 – 1 L
VOCs	G, FP-lined septum	Cool, ≤ 6°C	7 days	3-40-mL vials preserved, 3-40mL vial unpreserved
PCB	G, FP-lined caps	Cool, ≤ 6°C	1 year	3-1 L
Total uranium and gross alpha/beta radiation	HDPE, FP, G	HNO_3 to pH < 2	6 months	6-1 L preserved
Radionuclides	HDPE, FP, G	Cool, ≤ 6°C	6 months	2-1 L unpreserved
Metals	HDPE, FP, G	HNO_3 to pH < 2	6 months	250 mL
Mercury	HDPE, FP, G	HCl to pH < 2	28 days (CVAA) 90 days (CVAFS)	250 mL
Anions	HDPE, FP, G	Cool, ≤ 6°C	48 hours	500 mL
Pesticides	G, FP-lined septum	Cool, ≤ 6°C	7 days	3-1 L
Herbicides	G, FP-lined septum	Cool, ≤ 6°C	7 days	3-1 L
SVOCs	G, FP-lined septum	Cool, ≤ 6°C	7 days	3-1 L
TOC	HDPE, FP, AGLS	HCl or H_2SO_4 to pH < 2, Cool, ≤ 6°C Zero head space	28 days	250 mL
Cyanide	HDPE, FP, G	Cool, ≤ 6°C, NaOH to pH > 10	14 days	250 mL
Phenols, total	AGLS	Cool, ≤ 6°C, H_2SO_4 to pH < 2	28 days	250 mL
Phosphorus, total	HDPE, FP, G	Cool, ≤ 6°C, H_2SO_4 to pH < 2	28 days	125 mL
Nitrate/nitrite	HDPE, FP, G	Cool, ≤ 6°C, H_2SO_4 to pH < 2	28 days	125 mL
Ammonia as N	HDPE, FP, G	Cool, ≤ 6°C, H_2SO_4 to pH < 2	28 days	500 mL
Kjeldahl nitrogen	HDPE, FP, G	Cool, ≤ 6°C, H_2SO_4 to pH < 2	28 days	500 mL
BOD	HDPE, FP, G	Cool, ≤ 6°C	48 hours	1 L

AGLS = amber glass
BOD = biochemical oxygen demand
COD = chemical oxygen demand
CVAA = cold vapor atomic absorption
CVAFS = cold vapor atomic fluorescence spectrometry
P = polyethylene
FP = fluoropolymer
G = glass
H_2SO_4 = sulfuric acid
HCl = hydrochloric acid
HDPE = high density polyethylene
HNO_3 = nitric acid
$Na_2S_2O_3$ = sodium dithionite
NaOH = sodium hydroxide
O&G = oil and grease
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
TOC = total organic carbon
TSS = total suspended solids
VOC = volatile organic compound

Table 2. Approved analytical methods for ETTP SWPP Program sampling

Parameter	Analytical method
Alpha/beta, gross	EPA 900.0, SM 7110 B
Ammonia as N	EPA 350.1, SM 4500-NH_3 B, C, D, E, F, G, or H
Benzidine	EPA 625.1
BOD	SM 5210 B
COD	EPA 410.3, EPA 410.4, SM 5220 C or D
Cyanide, total	EPA 335.4, SM 4500-CN C, D, E, or F
Dissolved Oxygen	SM 4500-O C or G
Hexavalent chromium	ASTM-D-5257, SM 3500-Cr C
Ion chromatography anions	EPA 300.0, EPA 300.1, SM 4110 B
Kjeldahl nitrogen	EPA 350.1, SM 4500-NH_3 C, D, E, F, G, or H
Mercury	EPA 245.1, 245.2, 245.7, EPA 1631E
Metals	EPA 200.7, EPA 200.8[1]
Nitrate/nitrite (as N)	EPA 300.0, EPA 300.1, EPA 353.2, SM 4500-NO_3 E, F, or H, SM 4110 B
O&G	EPA 1664A, SM 5520 B
PCBs/pesticides	EPA 608.3, EPA 625.1, SM 6410 B
pH	EPA 150.2, SM 4500-H^+ B
Phenols, total	EPA 420.1, EPA 420.4, SM 5530 B, SM 5530 D, ASTM-D1783-01
Phosphorus, total	EPA 365.1, EPA 365.3, EPA 365.4
SVOCs	EPA 625.1, EPA 1625B
Settleable solids	SM 2540F
Sulfate	EPA 300.0, EPA 300.1, EPA 375.2, SM 4500-SO_4^{2-} C or D, SM 4110 B
Tc-99	Tc-99 by liquid scintillation
TOC	SM 5310 B, C, or D
TSS	SM 2540 D
Uranium, isotopic	EPA 200.8, alpha spectroscopy, SW846-6020
VOCs	EPA 624.1

NOTE: Alternate methods may be used if they are listed as approved procedures in 40 *CFR* Part 136.

[1]EPA Method 200.8 will be utilized for analysis of all metals samples collected as part of the ETTP SWPP Program SAP unless Method 200.7 is specifically requested.

ASTM = ASTM International
BOD = biochemical oxygen demand
CFR = *Code of Federal Regulations*
COD = chemical oxygen demand
EPA = Environmental Protection Agency
ETTP = East Tennessee Technology Park
O&G = oil and grease
PCB = polychlorinated biphenyl
SAP = Sampling and Analysis Plan
SM = Standard Method
SVOC = semivolatile organic compound
SWPP = Storm Water Pollution Prevention
TOC = total organic carbon
TSS = total suspended solids
VOC = volatile organic compound

Table 3. Project quantitation levels, screening levels, and reference standards for ETTP SWPP Program

Parameter	PQLs[a]	Screening level	Reference standard	Reference standard source[b]	Units
Radionuclides[c]					
Gross Alpha	5	10	15	40 *CFR* Part 141	pCi/L
Gross Beta	5	30	50	40 *CFR* Part 141	pCi/L
^{241}Americium	1	7	740	DCS	pCi/L
^{14}Carbon	1000	2480	330,000	DCS	pCi/L
^{137}Cesium	10	120	4,100	DCS	pCi/L
^{60}Cobalt	10	288	14,000	DCS	pCi/L
^{131}Iodine	10	52	2,800	DCS	pCi/L
^{237}Neptunium	1	13	1,400	DCS	pCi/L
^{238}Plutonium	1	6	430	DCS	pCi/L
$^{239/240}$Plutonium	1	6	400	DCS	pCi/L
^{226}Radium	1	4	280	DCS	pCi/L
^{90}Strontium	4	44	1,700	DCS	pCi/L
^{99}Technetium	50	1760	390,000	DCS	pCi/L
^{228}Thorium	1	14	830	DCS	pCi/L
^{230}Thorium	1	7	720	DCS	pCi/L
^{232}Thorium	1	6	620	DCS	pCi/L
^{234}Thorium	20	336	84,000	DCS	pCi/L
Tritium	1000	76,000	1,000,000	DCS	pCi/L
$^{233/234}$Uranium	1	28	1,200	DCS	pCi/L
$^{235/236}$Uranium	1	29	1,300	DCS	pCi/L
^{238}Uranium	1	30	1,400	DCS	pCi/L
Volatile organic compounds					
1,1,1-Trichloroethane	2.0	75	100	NPDES Permit	µg/L
1,1,2,2-Tetrachloroethane	2.0	1.5	30	REC OO	µg/L
			2.0	REC WO	µg/L
1,1,2-Trichloroethane	2.0	4	89	REC OO	µg/L
			5.5	REC WO	µg/L
			5	DWS	µg/L
1,1-Dichloroethane	2.0	75	100	NPDES Permit	µg/L
1,1-Dichloroethene	2.0	5	200,000	REC OO	µg/L
			300	REC WO	µg/L
			7	DWS	µg/L
1,2-Dichloroethane	2.0	4	6500	REC OO	µg/L
			99	REC WO	µg/L
			5	DWS	µg/L
1,2-Dichloropropane	2.0	4	310	REC OO	µg/L
			9.0	REC WO	µg/L
			5	DWS	µg/L
2-Butanone	10	75	100	NPDES Permit	µg/L

Table 3. Project quantitation levels, screening levels, and reference standards for ETTP SWPP Program (cont.)

Parameter	PQLs[a]	Screening level	Reference standard	Reference standard source[b]	Units
2-Hexanone	10	75	100	NPDES Permit	µg/L
4-Methyl-2-pentanone	10	75	100	NPDES Permit	µg/L
Acetone (2-propanone)	50	75	100	NPDES Permit	µg/L
Acrolein	5.0	2	3.0	CCC	µg/L
			3.0	CMC	µg/L
Acrylonitrile	5.0	Detectable	2.5	REC OO	µg/L
			0.51	REC WO	µg/L
Benzene	2.0	4	5	DWS	µg/L
			22	REC WO	µg/L
Bromodichloromethane	2.0	4	170	REC OO	µg/L
			5.5	REC WO	µg/L
Bromoform	2.0	35	1,400	REC OO	µg/L
			43	REC WO	µg/L
Bromomethane (methyl bromide)	2.0	35	1,500	REC OO	µg/L
			47	REC WO	µg/L
Carbon disulfide	10	75	100	NPDES Permit	µg/L
Carbon tetrachloride	2.0	2.2	16	REC OO	µg/L
			2.3	REC WO	µg/L
Chlorobenzene	2.0	75	1,600	REC OO	µg/L
			130	REC WO	µg/L
Chloroethane	2.0	75	100	NPDES Permit	µg/L
Chloroform	2.0	45	4,700	REC OO	µg/L
			57	REC WO	µg/L
Chloromethane (methyl chloride)	2.0	75	100	NPDES Permit	µg/L
cis-1,2-Dichloroethene	2.0	53	70	DWS	µg/L
cis-1,3-Dichloropropene	2.0	3	210	REC OO	µg/L
			3.4	REC WO	µg/L
Dibromochloromethane	2.0	6	210	REC OO	µg/L
			8.0	REC WO	µg/L
Ethylbenzene	2.0	400	2,100	REC OO	µg/L
			530	REC WO	µg/L
Methylene chloride	2.0	35	5,900	REC OO	µg/L
			46	REC WO	µg/L
Styrene	2.0	75	100	DWS	µg/L
Tetrachloroethene	2.0	4	33	REC OO	µg/L
			6.9	REC WO	µg/L
			5	DWS	µg/L
Toluene	2.0	750	15,000	REC OO	µg/L
			1,300	REC WO	µg/L
trans-1,2-Dichloroethene	2.0	75	10,000	REC OO	µg/L
			140	REC WO	µg/L

Table 3. Project quantitation levels, screening levels, and reference standards for ETTP SWPP Program (cont.)

Parameter	PQLs[a]	Screening level	Reference standard	Reference standard source[b]	Units
trans-1,3-Dichloropropene	2.0	75	100	NPDES Permit	µg/L
Trichloroethene	2.0	4	300	REC OO	µg/L
			25	REC WO	µg/L
			5	DWS	µg/L
Vinyl chloride	2.0	0.17	24	REC OO	µg/L
			0.25	REC WO	µg/L
Xylenes (dimethyl benzene)	3.0	7500	10,000	DWS	µg/L
Polychlorinated biphenyls					
PCB-1016	0.1	Detectable	0.00064	REC OO/REC WO	µg/L
PCB-1221	0.1	Detectable	0.00064	REC OO/REC WO	µg/L
PCB-1232	0.1	Detectable	0.00064	REC OO/REC WO	µg/L
PCB-1242	0.1	Detectable	0.00064	REC OO/REC WO	µg/L
PCB-1248	0.1	Detectable	0.00064	REC OO/REC WO	µg/L
PCB-1254	0.1	Detectable	0.00064	REC OO/REC WO	µg/L
PCB-1260	0.1	Detectable	0.00064	REC OO/REC WO	µg/L
PCB-1262	0.1	Detectable	0.00064	REC OO/REC WO	µg/L
PCB-1268	0.03	Detectable	0.00064	REC OO/REC WO	µg/L
Inorganics					
Aluminum	100	NA	NA	No Criteria	µg/L
Antimony	2	4.2	640	REC OO	µg/L
			5.6	REC WO	µg/L
Arsenic	5	7.5	10.0	REC OO	µg/L
			10.0	REC WO	µg/L
Barium	100	1500	2000	DWS	µg/L
Beryllium	0.5	3	4	DWS	µg/L
Boron	100	NA	NA	No Criteria	µg/L
Cadmium	0.1	Detectable	0.72	CCC	µg/L
		1.4	1.8	CMC	µg/L
Calcium	100	NA	NA	No Criteria	µg/L
Chromium, total	5	75	100	DWS	µg/L
Chromium, III	6	56	74	CCC	µg/L
			570	CMC	µg/L
Chromium, VI	6	8	11	CCC	µg/L
			16	CMC	µg/L
Cobalt	100	NA	NA	No Criteria	µg/L
Copper	3	7	9	CCC	µg/L
			13	CMC	µg/L
Cyanide	10.0	3.9	5.2	CCC	µg/L

Table 3. Project quantitation levels, screening levels, and reference standards for ETTP SWPP Program (cont.)

Parameter	PQLs[a]	Screening level	Reference standard	Reference standard source[b]	Units
			22	CMC	µg/L
Dissolved Solids, Total	100	375	500	DWS	mg/L
Iron	100	NA	NA	No Criteria	µg/L
Lead	2	1.8	2.5	CCC	µg/L
			65	CMC	µg/L
Lithium	100	NA	NA	No Criteria	µg/L
Magnesium	100	NA	NA	No Criteria	µg/L
Manganese	100	NA	NA	No Criteria	µg/L
Methylmercury	0.005	Detectable	NA	No Criteria	µg/L
Mercury	0.005	0.025	0.051	REC OO	µg/L
			0.05	REC WO	µg/L
Nickel	5	39	52	CCC	µg/L
			470	CMC	µg/L
Nitrate	20	7500	10,000	DWS	µg/L
Nitrite	20	750	1000	DWS	µg/L
Potassium	300	NA	NA	No Criteria	µg/L
Selenium	5	2.3	3.1	CCC	µg/L
			20	CMC	µg/L
Silver	1	2.4	3.2	CMC	µg/L
Sodium	250	NA	NA	No Criteria	µg/L
Thallium	0.5	0.18	0.47	REC OO	µg/L
			0.24	REC WO	µg/L
Uranium	1	NA	NA	No Criteria	µg/L
Vanadium	100	NA	NA	No Criteria	µg/L
Zinc	10	75	120	CCC	µg/L
			120	CMC	µg/L
Acid Extractables					
2-Chlorophenol	10	60	150	REC OO	µg/L
			81	REC WO	µg/L
2,4-Dichlorophenol	10	46	290	REC OO	µg/L
			77	REC WO	µg/L
2,4-Dimethylphenol	10	285	850	REC OO	µg/L
			380	REC WO	µg/L
2-Methyl-4,6-dinitrophenol	10	10	280	REC OO	µg/L
			13	REC WO	µg/L
2,4-Dinitrophenol	20	50	5,300	REC OO	µg/L
			69	REC WO	µg/L
3-Methyl-4-Chlorophenol	20	NA	NA	No Criteria	µg/L
Pentachlorophenol	10	Detectable	30	REC OO	µg/L
			2.7	REC WO	µg/L

Table 3. Project quantitation levels, screening levels, and reference standards for ETTP SWPP Program (cont.)

Parameter	PQLs[a]	Screening level	Reference standard	Reference standard source[b]	Units
			1	DWS	µg/L
Phenol	10	7,500	860,000	REC OO	µg/L
			10,000	REC WO	µg/L
2,4,6-Trichlorophenol	10	11	24	REC OO	µg/L
			14	REC WO	µg/L
Base Neutrals					
Acenaphthene	10	500	990	REC OO	µg/L
			670	REC WO	µg/L
Anthracene	10	6,225	40,000	REC OO	µg/L
			8,300	REC WO	µg/L
Benzidine	10	Detectable	0.0020	REC OO	µg/L
		Detectable	0.00086	REC WO	µg/L
Benzo(a)anthracene	10	Detectable	0.18	REC OO	µg/L
			0.038	REC WO	µg/L
Benzo(a)pyrene	10	Detectable	0.18	REC OO	µg/L
			0.038	REC WO	µg/L
Benzo(b)fluoranthene	10	Detectable	0.18	REC OO	µg/L
			0.038	REC WO	µg/L
Benzo(k)fluoranthene	10	Detectable	0.18	REC OO	µg/L
			0.038	REC WO	µg/L
Bis(2-Chloroethyl)ether	10	Detectable	5.3	REC OO	µg/L
			0.30	REC WO	µg/L
Bis(2-Chloro-isopropyl)ether	10	1,050	65,000	REC OO	µg/L
			1400	REC WO	µg/L
Bis(2-Ethylhexyl)phthalate	10	10	22	REC OO	µg/L
			12	REC WO	µg/L
Butylbenzyl phthalate	10	1,125	1,900	REC OO	µg/L
			1,500	REC WO	µg/L
2-Chloronaphthalene	10	750	1,600	REC OO	µg/L
			1,000	REC WO	µg/L
Chrysene	10	Detectable	0.18	REC OO	µg/L
			0.038	REC WO	µg/L
Dibenzo(a,h)anthracene	10	Detectable	0.18	REC OO	µg/L
			0.038	REC WO	µg/L
1,2-Dichlorobenzene	10	315	1,300	REC OO	µg/L
			420	REC WO	µg/L
1,3-Dichlorobenzene	10	240	960	REC OO	µg/L
			320	REC WO	µg/L
1,4-Dichlorobenzene	10	45	190	REC OO	µg/L
			63	REC WO	µg/L
3,3-Dichlorobenzidine	10	Detectable	0.28	REC OO	µg/L

Table 3. Project quantitation levels, screening levels, and reference standards for ETTP SWPP Program (cont.)

Parameter	PQLs[a]	Screening level	Reference standard	Reference standard source[b]	Units
			0.21	REC WO	µg/L
Diethyl phthalate	10	12,750	44,000	REC OO	µg/L
			17,000	REC WO	µg/L
Dimethyl phthalate	10	200,000	1,100,000	REC OO	µg/L
			270,000	REC WO	µg/L
Di-n-butyl phthalate	10	1,500	4,500	REC OO	µg/L
			2,000	REC WO	µg/L
2,4-Dinitrotoluene	10	Detectable	34	REC OO	µg/L
			1.1	REC WO	µg/L
1,2-Diphenylhydrazine	10	Detectable	2.0	REC OO	µg/L
			0.36	REC WO	µg/L
Fluoranthene	10	97.5	140	REC OO	µg/L
			130	REC WO	µg/L
Fluorene	10	825	5,300	REC OO	µg/L
			1,100	REC WO	µg/L
Hexachlorobenzene	10	Detectable	0.0029	REC OO	µg/L
			0.0028	REC WO	µg/L
Hexachlorobutadiene	10	Detectable	180	REC OO	µg/L
			4.4	REC WO	µg/L
Hexachlorocyclopentadiene	10	30	1,100	REC OO	µg/L
			40	REC WO	µg/L
Hexachloroethane	10	10.5	33	REC OO	µg/L
			14	REC WO	µg/L
Indeno(1,2,3-cd)pyrene	10	Detectable	0.18	REC OO	µg/L
			0.038	REC WO	µg/L
Isophorone	10	255	9,600	REC OO	µg/L
			350	REC WO	µg/L
Nitrobenzene	10	12	690	REC OO	µg/L
			17	REC WO	µg/L
Nitrosodibutylamine	10	Detectable	2.2	REC OO	µg/L
			0.063	REC WO	µg/L
Nitrosodiethylamine	10	Detectable	2.4	REC OO	µg/L
			0.008	REC WO	µg/L
Nitrosopyrrolidine	10	Detectable	340	REC OO	µg/L
			0.16	REC WO	µg/L
N-Nitrosodimethylamine	10	Detectable	30	REC OO	µg/L
			0.0069	REC WO	µg/L
N-Nitrosodi-n-propylamine	10	Detectable	5.1	REC OO	µg/L

Table 3. Project quantitation levels, screening levels, and reference standards for ETTP SWPP Program (cont.)

Parameter	PQLs[a]	Screening level	Reference standard	Reference standard source[b]	Units
			0.05	REC WO	µg/L
N-Nitrosodiphenylamine	10	25	60	REC OO	µg/L
			33	REC WO	µg/L
Pyrene	10	625	4,000	REC OO	µg/L
			830	REC WO	µg/L
Pentachlorobenzene	10	Detectable	1.5	REC OO	µg/L
			1.4	REC WO	µg/L
1,2,4,5-Tetrachlorobenzene	2.0	Detectable	1.1	REC OO	µg/L
			0.97	REC WO	µg/L
1,2,4-Trichlorobenzene	2.0	26	70	REC OO	µg/L
			35	REC WO	µg/L
2,4,5-Trichlorophenol	10	1,350	3,600	REC OO	µg/L
			1,800	REC WO	µg/L
Field readings					
Dissolved oxygen (minimum)	4.0–8.0	< 6.0	5.0	FISH	mg/L
pH (maximum)	12.0	> 8.5	9.0	FISH	Standard units
pH (minimum)	2.0	< 6.5	6.0	FISH	Standard units
Temperature	0–100	> 27	30.5	FISH	°C
Turbidity	1	NA	NA	No Criteria	NTU

[a]Estimated data with lab qualifier J are acceptable to meet the project quantitation levels.

[b]Reference standards sources are defined as follows:

FISH	TDEC Rule 0400-40-03-.03(3)(a), (b), and (e), September 2019
CMC	TDEC Rule 0400-40-03-.03(3)(g), *Criterion Maximum Concentration*, September 2019
CCC	TDEC Rule 0400-40-03-.03(3)(g), *Criterion Continuous Concentration*, September 2019
DWS	TDEC Rule 0400-40-03-.03, *Domestic Water Supply*, September 2019
REC OO	TDEC Rule 0400-40-03-.03(4)(j), *Organisms Only Criteria*, September 2019
REC WO	TDEC Rule 0400-40-03-.03(4)(j), *Water & Organisms Criteria*, September 2019
Permit	NPDES Permit TN0002950, Part
No Criteria	Sources not listed in the TDEC General Water Quality Criteria or NPDES Permit No. TN0002950.

[c]Reference standards for radionuclides equal Derived Concentration Standard (DCS) for ingested water (DOE-STD-1196-2021, *Derived Concentration Technical Standard*). Reference standards for gross alpha and gross beta measurements correspond to the national primary drinking water standard (40 *Code of Federal Regulations* [*CFR*] Part 141, *National Primary Drinking Water Regulations,* Subparts B and G).

3.3 RECORDING OF RESULTS

Field logbooks will be maintained in compliance with PROC-ES-2700, *Field Logbooks and Field Data Forms*. The field logbook will provide a daily record of all sampling activities. For each measurement or sample taken pursuant to the requirements of the SWPP Program, appropriate SSO personnel shall record the following information on an approved field data form and/or in an approved field logbook:

- The exact place, date, and time of sampling.
- The names of all person(s) participating in sample collection.
- The results of all field readings, including ambient air temperature.
- Starting and ending times of the storm event sampled.
- Duration (in hours) of the storm event sampled.
- Magnitude (in inches) of rainfall associated with the storm event sampled.
- Duration between the storm event sampled and the end of the previous measurable storm event having rainfall amounts of at least 0.1 in. This time period must be at least 72 hours (unless a shorter time period is approved by UCOR EC&P personnel).
- Any unusual conditions observed during sample collection.

Oak Ridge SMO personnel shall ensure that laboratory personnel record the following information in laboratory reports and in the current EIM system:

- Dates and times the analyses were performed.
- Times the analyses were performed (if sample holding time is less than 48 hours).
- Individual(s) performing the analyses.
- Laboratory(ies) performing the analyses.
- Analytical techniques or methods used.
- Results of all required analyses.
- Results of field blanks, field duplicates, trip blanks, and other QA analyses associated with each sample.

3.4 SAFETY REQUIREMENTS

The following safety requirements should be followed whenever timed samples are collected as part of the ETTP SWPP Program:

- All guidance found in the SSO health and safety plan should be followed carefully.
- Changing conditions in the field should be noted, and all sampling personnel involved with the SWPP Program sampling effort should be made aware of these conditions.
- No sampling will be performed after dark or during electrical storms due to safety concerns.
- All applicable rules for boat safety will be followed when collecting samples by boat.
- All appropriate RWPs will be obtained, when required, and should be followed closely.

- A first-aid kit and a portable eye bath should be present in sampling vehicle at all times in the event of a cut, insect bite, chemical burn, etc.
- Stop work authority should be utilized if a condition is noted in the field that could lead to an accident, injury, or other employee concerns.

4. STRATEGY FOR CONDUCTING SWPP PROGRAM SAMPLING

General organizational responsibilities for SSO personnel for this SWPP Program sampling program are presented in Sect. 2 of this document. However, to ensure that specific duties are defined completely, a more detailed breakdown of responsibilities is provided in this section.

Tubing replacement, bottle replacement, transportation of samplers to designated sampling locations, and installation of the samplers will be performed by SSO personnel in accordance with the following:

SSO Responsibilities

- Place new, pre-cleaned sample bottles in automated sampler.
- Program automated sampling equipment to collect samples in accordance with the guidelines in this SAP and EPA 833-B-92-001.
- Maintain adequate quantities of ice in automated samplers that have been set up and are ready to collect samples in order to maintain the temperature of collected samples at recommended levels.
- Collect samples from the automated sampler and place them into appropriate sample containers.
- Preserve the collected sample in accordance with specified requirements. (See Table 1 for additional information on sample preservation.)
- Properly package samples for transport to analytical laboratories, and ship samples in accordance with all appropriate regulations and protocols.
- Clean all automated sample collection bottles in accordance with the protocols and applicable procedures that have been developed by the SSO and EPA 833-B-92-001.
- Remove ancillary sampling equipment from the outfall after sampling has been completed and clean this equipment in accordance with the protocols and applicable procedures that have been developed by the SSO and EPA 833-B-92-001.
- Transport and install automated sampler(s) at stormwater outfalls designated by the UCOR EC&P organization.
- Place clean ancillary equipment used in the collection of stormwater samples into the designated sampling location.
- Upon completion of sampling and removal of automated sampler(s) from the field, replace all used pump tubing and sample tubing with clean, uncontaminated tubing prior to the sampler being used in another sampling location.
- Remove all ancillary sampling equipment from the sampling location for cleaning.
- Replace used bubbler tubing on automated flowmeters prior to using the flowmeter in another location.
- Relocate automated sampling equipment to other stormwater outfalls or to storage as designated by the UCOR EC&P organization.
- Maintain accurate, up-to-date inventory of all automated samplers, rain gauges, flowmeters, and other equipment, and track the location of this equipment as it is being used in the field or returned to the equipment storage area.

SSO personnel will install all sampling equipment (flowmeters, samplers, ancillary equipment, etc.), as required, at stormwater outfall drain locations designated by UCOR EC&P organization personnel. SSO personnel will also be responsible for turning the equipment on and off, programming the equipment to collect the appropriate samples, collecting information (rainfall, water level changes, etc.) from the equipment, changing bottles in the samplers, maintaining the ice in the samplers, collecting the appropriate samples from the samplers, and cleaning ancillary sampling equipment after it has been used.

Prior to an expected storm event, SSO personnel will visit each deployed automated sampler and place ice in the sampler as needed for sample preservation. If the expected rainfall event does not occur, or the rainfall is of an insufficient quantity to allow the automated sampler to collect the required sample volume, SSO personnel will remove the ice from each sampler that had been prepared previously. The automated sampler will remain in place at that sampling location in anticipation of the next storm event.

In each specific storm event where the automated sampler does not collect an adequate volume of water from a storm drain to fill all of the required sample containers because of an equipment malfunction or inadequate rainfall amounts, any sample collected from that storm drain will be discarded. The sample container used in the automated sampler will be rinsed with deionized water and put back in place in the sampler for use in sampling the next qualifying storm event. The pump tubing, sample tubing, and flowmeter bubbler tubing do not have to be replaced and may be reused at the same location for sampling the next qualifying storm event. The automated sampling equipment will remain at the designated sampling location until all required samples are collected.

If possible, all grab samples to be collected at a specific sampling location using automated samplers should be collected during a single storm event. A period of at least 72 hours must elapse between the occurrence of a storm event greater than 0.1 in., in which the automated sampler did not collect adequate sample volume, and the next storm event in which the automated sampler is set up to collect samples.

After all of the specified samples that are to be collected using automated sampling equipment have been collected at a designated stormwater outfall, SSO personnel will move the automated sampling equipment to other stormwater outfall location(s) designated by UCOR EC&P organization personnel or will place it in storage in a clean, dry location. SSO personnel will install new pump tubing and sample tubing before an automated sampler is deployed again. Clean bubbler tubing will be installed on the bubbler-type flowmeters before they are deployed again.

5. ADDITIONAL REQUIREMENTS FOR SWPP PROGRAM SAMPLING

5.1 FIELD READINGS AND CALIBRATION OF FIELD INSTRUMENTATION

In the event that a pH field measurement is outside the screening limits specified in Table 3 of this SAP, the accuracy of the pH meter will be tested in the field by using the instrument to measure a buffer solution of known pH. If the pH meter measurement matches the known pH of the buffer solution (within the tolerance of the instrument), then the pH reading is documented as the measurement of record and UCOR EC&P personnel shall be notified of the screening level exceedance. If the measurement does not match the known pH of the buffer solution (within the tolerance of the instrument), the field pH meter shall be recalibrated in the laboratory using accepted calibration procedures, and the field measurement shall be repeated. The measurement collected after this calibration should be considered to be the measurement of record. If the measurement shows that an NPDES permit noncompliance has occurred, the noncompliance will be reported by the appropriate means.

5.2 SAMPLE PRESERVATION, CONTAINER MATERIALS, AND HOLDING TIMES

Sampling requirements (container type, preservation, minimum volume) that are anticipated for most analyses are listed in Table 1. Sample holding times are also listed. Minimum required sample volumes can vary between laboratories. Sample containers shall be received pre-cleaned by the laboratory and/or certified clean by the container manufacturer. Required preservatives will either already be in the sample bottles, or the preservatives will need to be added to the samples at the time of collection.

Sample preservation, container materials, and holding times shall be in accordance with the requirements specified in 40 *CFR* Sect. 136.3, "Identification of test procedures," and other relevant procedures, which are presented in Table 1. Holding time is defined as the period of time from when the sample is collected until the chemical analysis is begun. The samples shall be maintained at $\leq 6°C$ from the time they are collected until they are shipped from the sample shipping facility to the analytical laboratory. The samples shall be refrigerated at $\leq 6°C$ in the sample shipping facility as well. Samples that are to be shipped to the laboratory for analysis must be maintained at $\leq 6°C$ during transport and must be stored by the laboratory at $\leq 6°C$ from the time they are received until they are analyzed. When required by the analytical method, chemical preservation of samples shall be done in the field immediately upon collection of the sample. Notification to the Oak Ridge SMO should be made as soon as possible if the sample shipping temperature requirements are not met. The Oak Ridge SMO must inform UCOR EC&P personnel as soon as they become aware that shipping temperature requirements have not been met.

Approved analytical methods that shall be used for all monitoring described in this SAP are listed in Table 2. In accordance with the NPDES permit, these methods are prescribed in 40 *CFR* Part 136, as amended, promulgated pursuant to Sect. 304(h) of the CWA.

5.3 REQUESTS FOR SAMPLING OUTSIDE THE COVERAGE OF THE SWPP SAP

Requests for sampling that are not captured in the SWPP Program SAP or other approved SAPs are often sent to the SSO from multiple projects and persons. The SSO has historically accommodated these requests for additional sampling. However, the following considerations should be taken into account when new sampling activities are requested:

a. SAPs are intended to be the primary guidance documents for planning and conducting sampling efforts. SAPs provide the methods for long-term planning of sampling activities to ensure that these activities are conducted according to accepted procedures. Email requests for sampling are often issued with little forewarning and may require modification or elimination of elements of the accepted procedures. This can cause delays and increases the potential for error in documentation and sample collection activities.

b. Receiving sampling requests or instructions from multiple sources often requires the sampling team to make multiple contacts to project leads, UCOR EC&P personnel, Oak Ridge SMO personnel, etc., to ensure their guidance for collecting and submitting the samples is complete and clear. The necessity of making these multiple contacts may lead to valuable time wasted and increases the potential for error in the sampling instructions.

c. A pathway does not exist for documenting emails and phone calls made to request additional guidance for sample collection or analytical guidance. This can lead to a gap in documentation as to why a sample was or was not collected. Email requests and clarification are not maintained with sampling documents as noted above.

d. Small changes provided at the last minute can require major changes for the sampling procedure. Changes that require modifications to already populated databases, paperwork, and laboratory agreements increase the risk of an error in the collection and analysis of the samples.

To avoid the above concerns, it is highly preferable that all requests for sample collection outside the SWPP SAP, or other approved SAP, be forwarded to appropriate UCOR EC&P personnel who will then contact the SSO concerning the sampling request.

5.4 CHAIN OF CUSTODY

The integrity of samples collected in accordance with the requirements of the SWPP Program shall be ensured by maintaining proper COC. The COC protocol is specified in applicable Oak Ridge SMO and SSO procedures, including PROC-ES-2708, *Chain of Custody Protocol for Environmental Sampling*.

A COC form shall be completed in accordance with the requirements of PROC-ES-2708. The COC shall meet the following requirements:

- Shall be generated by Project Environmental Measurements System (PEMS).
- Shall clearly reference the sample number assigned and sample matrix.
- Shall indicate the required analytical TAT.
- Shall be completed with the sampler's initials, date and time of collection, signature, and date and time sample custody is transferred or relinquished.

The COC shall be placed in the shipping container with the sample, and the shipping container shall be sealed with custody tape.

5.5 FIELD LOGBOOKS

Field logbooks will be maintained in compliance with PROC-ES-2700, *Field Logbooks and Field Data Forms*. The field logbook will provide a daily record of all sampling activities. All logs will contain, at a minimum, the following information:

- Name of individual collecting the sample.
- Sample location.
- Description of the sample collected, including the parameters to be analyzed.
- Date and time of the start and completion of the sample collection.

Changes to, or deviations from, established sampling plans that are made in the field must be communicated to and approved by UCOR EC&P personnel prior to proceeding. All changes or deviations will be documented in the field logbook. All original, recorded data shall be written in indelible ink. No accountable, serialized documents shall be destroyed or discarded, even if they are illegible or contain inaccuracies that require a replacement document. If an error is made, it will be corrected by making a single line through the error, entering the correct information, initialing, and dating. The erroneous information will remain visible.

5.6 SAMPLE TRANSPORTATION

Transportation of samples to onsite or offsite laboratories will be performed in accordance with relevant SSO, U.S. Department of Transportation (DOT), and other applicable procedures. Transportation of samples from radiological areas will also be performed according to SSO and other applicable procedures.

5.7 CONTAMINATION CONTROL

All sampling equipment and samples must be kept free from sources of contamination that could bias sampling results. In order to minimize the possibility of contamination, the following steps should be taken:

- All bottles utilized in the automated sampling equipment, as well as ancillary sample collection equipment used to direct water flow (includes equipment such as weir boxes, invert funnels, and sample strainers), must be cleaned by SSO personnel before each use. Decontamination of bottles and ancillary sample collection equipment shall be performed in accordance with established EPA protocol, SSO procedures, and other applicable guidelines.
- After bottles utilized in the automated sampling equipment have been cleaned according to established protocol, SSO personnel will cover each bottle with aluminum foil and the bottles will be placed into boxes or new, heavy-duty plastic bags to prevent contamination. After ancillary sample collection equipment has been cleaned according to established protocol, SSO personnel shall place the equipment in new, heavy-duty plastic bags. All boxes or plastic bags used for the storage of bottles or ancillary sample collection equipment shall be free of contamination and must be sealed to prevent the intrusion of contamination.
- SSO personnel shall transport the cleaned equipment to the sampling location in a manner that prevents the plastic bags containing the equipment from being ruptured and exposed to contaminants. Cleaned equipment shall not be stored for extended periods of time before it is installed. If the cleaned sampling equipment cannot be installed on the day it is cleaned by SSO personnel, it shall be stored in a clean, dry location. If a plastic bag in which sampling equipment is contained is ruptured and the equipment is exposed to the environment, the equipment stored inside shall be re-cleaned.
- Latex, nitrile, or other similar type gloves shall be worn by SSO personnel when handling cleaned sampling equipment in order to protect the equipment from being contaminated.

- All pump tubing and sample tubing utilized in the SWPP sampling program shall be maintained in a clean storage location in new, contaminant-free plastic bags or other appropriate containers. The tubing container should not be opened, nor should the tubing be handled, until it is to be installed in an automated sampler that is to immediately be placed into the field. Periodic tubing rinse blank samples may be collected by SSO personnel, at the request of the UCOR EC&P organization, to ensure that the tubing is being stored and handled properly.

In order to avoid potential contamination of stormwater samples, no type of chemical agent—including insect repellents, insecticides, herbicides, petroleum products, or solvents—shall be used on or in the vicinity of automated samplers, flowmeters, or any of the ancillary equipment used in this sampling program. Extreme care should be taken when transporting or handling the sampling equipment to prevent gasoline, oil, grease, or other materials from vehicles or boats from coming into contact with the sampling equipment in any way. If any piece of sampling equipment may have been contaminated during transportation or installation, it shall be re-cleaned by SSO personnel.

6. QUALITY ASSURANCE/QUALITY CONTROL

6.1 DATA QUALITY OBJECTIVES

The DQOs for the SWPP sampling program were developed in accordance with PROC-ES-1004, *Implementing and Documenting the Data Quality Objectives (DQO) Process.* The objective is to provide analytical data that are indicative of the water quality of stormwater discharges from ETTP and meets the requirements of the NPDES permit. The data will be used to identify potential sources of stormwater pollution, types of pollutants being discharged, and opportunities for pollutant discharge elimination/minimization. The data collected as part of this program will also be used to evaluate the long-term effectiveness of the ETTP SWPP Program. Additionally, the analytical data from the SWPP Program sampling effort will provide information that may be used in the permit renewal application process for the ETTP NPDES Permit No. TN0002950.

Samples and measurements collected in accordance with this SAP shall be representative of the volume and nature of the monitored discharge and shall be collected prior to mixing with the receiving stream. Analytical procedures for the analysis of pollutants are promulgated in Sect. 304(h) of the CWA, as amended. Individual analytical methods that are approved under the authority of the CWA are described in 40 *CFR* Part 136.

All aspects of the monitoring program will be consistent with the requirements of the *UCOR LLC Quality Assurance Program Plan*, *Oak Ridge, Tennessee* (UCOR-4141). Sampling, laboratory, and data handling procedures will be standardized to the extent feasible. Qualifiers will be utilized to indicate special data evaluation considerations. Sample parameters and frequencies will be evaluated each year at a minimum and more frequently if conditions are found to have changed. Selection of sample parameters, frequencies, and monitoring locations is based upon a combination of process knowledge, history of operations, results of previous monitoring, regulatory requirements, improvements in analytical methodology, and remediation project needs. As a result, this document is designed to be flexible and to be modified to accommodate changing conditions and requirements.

Any events of noncompliance will be reported in accordance with NPDES Permit No. TN0002950, Part II, Sect. III.

6.2 QUALITY CONTROL SAMPLES

Duplicates of grab samples shall be taken in a random manner at a rate of 5% (one per 20 samples) of the total number of samples required in Sect. 7 of this SAP. Alternatively, at least one duplicate must be collected per year for each parameter that is analyzed if fewer than 20 samples for a parameter are collected over a one-year period. Duplicate sampling will be random and unbiased. Duplicate sampling locations will be selected by SSO personnel with approval from UCOR EC&P personnel. These samples will be designated as duplicates in the field record logbook and other documentation, and will be submitted for analysis in the same manner as other required samples. The required number of trip blanks is designated in each specific analytical method. Trip blanks are required only for VOC analyses. The following laboratory QC samples will be analyzed, as appropriate, for the analytical methods:

- Method blanks—One per 20 samples or one per sample batch, whichever is more frequent.
- Matrix spike—One per 20 samples or one per analytical batch, whichever is more frequent.
- Matrix spike duplicate—One per 20 samples or one per analytical batch, whichever is more frequent.

- Laboratory control sample—One per 20 samples or one per sample batch, whichever is more frequent.

The laboratory shall be responsible for all QC and corrective actions (CAs), as defined per the referenced analytical methods and SOW.

6.2.1 O&G Matrix Spike Samples

At the laboratory, O&G samples are batched in groups of up to 20 samples of a similar matrix for analysis. If ETTP does not send the laboratory 20 samples at one time, the ETTP samples are batched with O&G samples from other clients. Per the analytical method, each batch of 20 samples requires at least one matrix spike to be performed for QA purposes. According to guidance provided by the laboratory, if a single client has a sufficient volume to run a matrix spike, then that client's O&G sample may be selected for spike purposes. If two or more clients within the 20-sample batch provide enough volume to run spikes, then a spike will be run for each client's group of samples within the 20-sample batch. Those clients who have spikes run for their samples will have their results reported with respect to their spike. Other client's samples without sufficient volume available to run a spike will have their sample results reported with respect to another client's spike. This is known as "shared QC."

O&G samples are unique in that the entire volume from a sample bottle must be used (regardless of volume) in a single analysis. This is because the walls of the sample bottle must be rinsed and the rinse water included with the sample for analysis. Given this, using a larger bottle will not allow for the additional volume required for a QA-spike analysis. Instead, a separate volume of sample must be submitted.

Therefore, a second 1-liter sample bottle from a single location per sample run must be collected. This sample will be utilized for the matrix-spike sample. Sampling personnel will indicate on the field sheet that the sample volume for this location is 2 × 1-liter, and both sample volumes will have the same sample identification number.

6.3 RECORDING OF RESULTS

Field logbooks will be maintained as described in Sect. 5.5.

Oak Ridge SMO personnel shall ensure that laboratory personnel record the following information in laboratory reports and in the current EIM system:

- The dates and times the analyses were performed.
- The person(s) and/or laboratory(ies) who performed the analyses.
- The analytical techniques or methods used.
- The results of all required analyses.

6.4 DATA EVALUATION AND REPORTING

Stormwater data for ETTP is managed and reported in accordance with UCOR procedure, *Handling and Reporting Environmental Data* (PROC-EC-3510).

6.4.1 Laboratory Submittals

On receipt, the contracted laboratory assigns an internal tracking number, or sample delivery group (SDG) number, to each sample set submitted. This SDG number is used to identify the samples as they are processed through the laboratory and subsequently reported.

Upon completion of the requested analyses, electronic (portable document format [PDF]) data packages are uploaded to the Oak Ridge SMO Sample File Transfer Protocol (FTP) site. In addition, the laboratory uploads an electronic data deliverable (EDD) for each SDG directly to the PEMS database. The EDD must be in Analytical Master Specification Electronic Deliverable (AMSED) format. For TAT determinations, both data submittals are electronically recorded as received when they are uploaded to the FTP site and PEMS.

In addition, the laboratory uploads an EDD for each SDG directly to the PEMS database. The EDD must be in AMSED format.

Required formats for the AMSED EDD and the data package deliverables are defined in the following documents, which are available on the UCOR Procedures and Documents websites:

- AMSED EDD Format, UCOR-4413*, Analytical Master Specifications for Analytical Laboratory Services, UCOR, an AECOM-led partnership with Jacobs, Oak Ridge, Tennessee*, latest revision, UCOR LLC, Oak Ridge, TN.
- "Analytical Data Deliverable Requirements," Sect. 4, UCOR-4413, latest revision, UCOR LLC, Oak Ridge, TN.
- PROC-ES-5000, *Oak Ridge Sample Management Office Procurement of Analytical Services,* latest revision, UCOR LLC, Oak Ridge, TN.

6.4.2 Data Verification

All analytical data submitted by the contract laboratories are subjected to CCV by qualified Oak Ridge SMO personnel according to PROC-ES-5002, *Oak Ridge Sample Management Office Laboratory Contract Compliance Verification and Invoicing.* During this review, the EDD is verified against the record copy of the data package using a printout of sample information from PEMS. The CCV process verifies:

- All samples were analyzed and reported for all requested parameters.
- Correct sample identifications were reported.
- COC documentation is complete and defensible.
- Specified TATs were met.

In addition, the Oak Ridge SMO verifies:

- Correct methods were used.
- Requested reporting limits were met.
- Appropriate units were reported.
- Analytical holding times were achieved.

Results of the CCV are documented on the Baseline CCV Scoresheet in the Tracker database. As needed, the Oak Ridge SMO resolves any data discrepancies with the laboratory. Emails between the Oak Ridge SMO and the laboratory serve as documentation of the issues identified and subsequent resolution, and are filed with the record copy data packages.

CCV is routinely completed within 10 days of receipt of all required laboratory data package documentation by the Oak Ridge SMO. This schedule may be delayed when resolution of discrepancies is required.

6.4.3 Data Validation

Validation of the analytical data generated in support of the ETTP SWPP Program is not routinely performed. At the discretion of the EC&P Program Manager, or when further review of a particular data set is suggested by the Oak Ridge SMO, data validation may be performed to ensure that the quality of the analytical data is adequate for their intended use. Level 4 (comprehensive review) or Level 3 (limited review) validation will be performed as deemed necessary.

Validation is performed according to PROC-ES-5005, *Oak Ridge Sample Management Office Laboratory Data Validation for Inorganic and Organic Analyses*, and PROC-ES-5006, *Oak Ridge Sample Management Office Laboratory Data Validation for Radiochemical Analyses*, and the current EPA National Functional Guidelines (https://www.epa.gov/clp/superfund-clp-national-functional-guidelines-data-review). Routine TAT for completion of data validation is two weeks from when it is assigned.

6.4.4 Data Storage

Upon completion of all required reviews, the record copy of each data package is maintained in secured storage in the Oak Ridge SMO offices or as electronic records on a restricted folder on the Q:\ drive. Ultimately, all record copy data packages are submitted to the UCOR DMC, where they are maintained and readily available in active, local storage for three years.

6.4.5 Review of Data by UCOR EC&P Organization

After determining that the analytical results are complete, EC&P personnel will evaluate the data in the following manner:

- UCOR EC&P personnel will compare the analytical results from field duplicate samples to the corresponding analytical results from the required effluent samples. If UCOR EC&P personnel determine that significant discrepancies exist between these results (relative percent difference between field duplicates and original results ≥ 20% for water), then appropriate personnel will be notified. The sample collection protocol and analytical methods will be reviewed for potential problems. If no problems in sample collection protocol or analytical methods are found, additional sampling and/or analytical measurement studies may be required to further clarify the discrepancies.
- The results of trip blanks will be reviewed to determine if any samples may have been contaminated during their handling. If any significant levels of contaminants are identified in the trip blanks, the original sample results will be flagged. If significant levels of contaminants are identified in a large number of trip blanks, the appropriate SSO or Oak Ridge SMO personnel will be notified, and the sample collection methods and procedures will be reviewed.

On at least a semiannual basis, UCOR EC&P personnel will submit NPDES results from the current EIM system to OREIS in accordance with PROC-ES-1001, *Transmitting Environmental and Geographic Data to the Oak Ridge Environmental Information System (OREIS)*.

6.5 SCREENING LEVELS AND REFERENCE STANDARDS

Screening levels have been established for parameters monitored at the stormwater outfalls. A screening level is a value that has been assigned for a particular analytical parameter that is less than the reference standard. Screening levels have been set up to provide laboratory and sampling personnel advance notification that an analytical result or field reading for a particular parameter may be a concern. Notification of stormwater screening level exceedances should be sent automatically from designated subcontract laboratories to the Oak Ridge SMO upon completion of sample analysis and verification of analytical results. The Oak Ridge SMO is responsible for immediately notifying UCOR EC&P personnel that the screening level exceedance has occurred.

Reference standards are established based on the following applicable criteria:

- Reference standards for gross alpha and gross beta are based on 40 *CFR* Part 141, *National Primary Drinking Water Regulations,* Subparts B and G.

- Reference standards for radionuclides are based on DOE Standard DOE-STD-1196-2021, *Derived Concentration Technical Standard.*

- Reference standards for all other parameters are based on the following:

    - Tennessee Ambient Water Quality Criteria as set forth in the Rules of the TDEC Division of Water Resources Chap. 0400-40-03.02 (TDEC 2019).

    - Criteria listed in the ETTP NPDES Permit No. TN0002950, Section 3.1, *Toxic Pollutants.*

Exceedances of reference standards do not indicate a violation of the ETTP NPDES permit. If a reference standard is exceeded, then EC&P personnel investigate to determine the cause of the exceedance. EC&P personnel may observe the stormwater outfalls or drainage areas where the exceedance occurred to determine if best management practices (BMPs) or other corrective measures may be required.

6.6 OUTLIER DATA

Outlier data include analytical results that may be false. Determination of the validity of results is based on operational knowledge and a properly implemented QA program. False results may include laboratory artifacts, potential sample tampering, broken or suspect sample containers, sample contamination, or similarly demonstrated QC flaws.

Outlier data are identified through a properly implemented QA program, and according to ASTM International standards (e.g., Grubbs' test, Mandel's h and k statistics). Outliers should be verified, corrected, or removed, based on further inquiries into the matter. If an outlier was verified through repeated testing and/or analysis, it shall remain in the preliminary data set. If an outlier resulted from a transcription or similar clerical error, it shall be corrected and reported. Oak Ridge SMO personnel are responsible for identifying outlier data and notifying the UCOR EC&P organization of its existence. Oak Ridge SMO personnel are also responsible for determining whether the outlier data should be removed from the data set or verified and reported.

If an outlier was associated with problems in the collection or analysis of the samples and, as such, does not conform with 40 *CFR* Part 136, it can be removed from the data set and not reported in the DMR. Otherwise, all results, including monitoring of pollutants more frequently than required at the location(s) designated, using approved analytical methods as specified in the permit, etc., shall be included in the calculation and reporting of the values required in the DMR form. The "comment" section of the DMR form can be used to explain any potential outliers or dubious results, or additional pages may be attached to the DMR.

6.7 RECORDS RETENTION

All records and information resulting from the monitoring required by the ETTP SWPP Program, including all sampling records, flow calculations, instrument calibration and maintenance records, laboratory data packages, and data verification checklists, shall be retained locally for a minimum of three years or longer if requested by the TDEC Division of Water Resources (DWR). Activity-specific files that contain all project-related documents and information shall be submitted to the UCOR DMC.

All laboratory data from the previous FY shall be submitted to the UCOR DMC each January. For example, in January 2023, all laboratory data for sampling conducted through FY 2022 shall be submitted to the UCOR DMC. Laboratory data shall be grouped separately by FY and by program (such as SWPP Program). All records submitted to the UCOR DMC shall be marked as "active records," to be maintained locally for a minimum of three years.

6.8 INCLUSION OF SWPP PROGRAM DATA IN THE ETTP DMR

The DMR required by NPDES Permit No. TN0002950 must be submitted to TDEC by the 15th day of the month following the completion of the annual reporting period.

The laboratory provides analytical data to the Oak Ridge SMO, and the Oak Ridge SMO provides the analytical data to the UCOR EC&P personnel as soon as it is available. After analytical results have been received by UCOR EC&P personnel, they will be evaluated against this SAP to ensure that all required outfalls have been sampled, analytical results have been received for all required parameters, PQLs have been met, screening level exceedances have been reported, and duplicate samples have been collected and analyzed as required. The DMR record copy, and all information utilized in the preparation of the DMR, are stored in the UCOR Environmental Compliance Document Center. Should any inconsistencies between the analytical results and the requirements of the NPDES SAP be noted, the Oak Ridge SMO will be contacted. If it is determined that a correction of the analytical results is warranted, Oak Ridge SMO personnel will provide corrected results to UCOR EC&P personnel in the approved file format.

6.8.1 Reporting of NPDES Permit Noncompliances

In the case of any noncompliance that could cause a threat to public drinking supplies, or any other discharge that could constitute a threat to human health or the environment, the required notice of noncompliance shall be provided to the Tennessee DWR in the Knoxville Environmental Field Office. The notification must be made within 24 hours from the time the permittee becomes aware of the circumstances. The Knoxville Environmental Field Office will be contacted for names and phone numbers of environmental response personnel. A written submission must be provided within 5 days of the time the permittee becomes aware of the circumstances unless this requirement is waived by the director of TDEC on a case-by-case basis. The permittee shall provide the director with the following information:

- A description of the discharge and cause of noncompliance.
- The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue.
- The steps being taken to reduce, eliminate, and prevent recurrence of the noncompliant discharge.

For instances of noncompliance that are not required to be reported within 24 hours, the noncompliance shall be reported in the DMR. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

6.9 REPORTING OF ADDITIONAL MONITORING DATA IN DMR

If any parameter specifically limited by the NPDES permit is monitored or sampled at the designated NPDES sampling point more frequently than required by the ETTP NPDES permit, and if the monitoring data is obtained or the samples are analyzed using EPA-approved analytical methods as specified in the ETTP NPDES permit, the monitoring data or analytical results shall be included in the calculation and reporting of the values required in the DMR. Deviations from the frequency of sampling or monitoring that are specified in the NPDES SAP should not be implemented without approval from UCOR EC&P personnel; however, it is recognized that data from remedial investigations or emergency situations may necessitate increased sampling. All analytical and field monitoring data obtained by the SSO at a frequency greater than that specified in the NPDES SAP and analyzed by the test procedures specified in the ETTP NPDES permit must be reported to UCOR EC&P personnel. This will allow these data to be included in the DMR. The increased frequency of data collection will be documented on the DMR. Also, all associated QA data collected in association with the additional sampling or monitoring activities will be reviewed for proper use in calculations and will be used in the preparation of the DMR.

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7. SPECIFIC SAMPLING AND ANALYTICAL GUIDELINES FOR THE ETTP SWPP PROGRAM

7.1 STREAM IMPAIRMENT MONITORING

Stream impairment monitoring is conducted to evaluate stormwater discharges for the parameters for which the receiving waters are listed as impaired. Samples from representative outfalls are collected semiannually and analyzed for dissolved oxygen, mercury, PCBs, and/or chlordane. Representative outfalls 142, 150, 170, 180, 190, 195, 198, and 210 discharge to Mitchell Branch, which is impaired for dissolved oxygen and PCBs. Outfalls 05A, 100, 230, 280, 294, 350, 430, 490, 690, and 992 discharge to Poplar Creek, which is impaired for mercury and PCBs. Outfalls 724 and 890 discharge to the Clinch River, which is impaired for chlordane, mercury, and PCBs.

Stormwater samples collected to support stream impairment monitoring should be manual grabs. Manual grab samples will be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of the EPA's *NPDES Storm Water Sampling Guidance Document* (EPA 833-B-92-001) and applicable procedures that have been developed by the SSO. Stream impairment monitoring is not weather dependent. These samples can be collected at any time stormwater runoff is observable from the representative outfalls. Stream impairment monitoring requirements are provided in Table 4.

Table 4. Stream Impairment Monitoring Requirements

Sampling Locations	Sampling Frequency	Collection Method	Dissolved Oxygen	Mercury	Chlordane	PCBs
Outfalls 142, 150, 170, 180, 190, 195, 198, 210 (Mitchell Branch)	Semiannual	Grab	X			X
Outfalls 05A, 100, 230, 280, 294, 350, 430, 490, 690, 992 (Poplar Creek)	Semiannual	Grab		X		X
Outfalls 724, 890 (Clinch River)	Semiannual	Grab		X	X	X

PCB = polychlorinated biphenyl

7.2 RADIOLOGICAL MONITORING OF STORMWATER DISCHARGES

Radiological monitoring of stormwater discharges is conducted to determine compliance with applicable dose standards. Samples from select outfalls are collected following a qualifying rain event and analyzed for gross alpha and beta activity and specific radionuclides. The analytical results are used to estimate the total discharge of each radionuclide from ETTP via the stormwater discharge system.

Stormwater samples collected to support radiological monitoring shall be composite samples. Stormwater samples shall be collected from discharges resulting from a storm event greater than 0.1 in. that occurs within a 24-hour time period. No specified dry period is required before these samples may be collected. A series of at least three aliquots of equal volume spaced at equal time intervals and collected during the first 60 minutes of a storm event discharge shall be combined into a single composite sample. Composite samples can be collected at any time during a storm event discharge. Radiological monitoring requirements for FY 2023 are provided in Table 5.

Table 5. Radiological Monitoring Requirements for FY 2023

Sampling Locations	Sampling Frequency	Collection Method	Gross Alpha/ Gross Beta	U Isotopic[a]	Tc-99
Outfalls 142, 170, 180, 195, 280, 292, 740	Once	Composite Sample	X	X	X

[a]U isotopic analysis includes: U-233/234, U-235/236, and U-238.

FY = fiscal year

7.2 STORMWATER MONITORING TO BE PERFORMED IN CONJUNCTION WITH REMEDIAL ACTION ACTIVITIES

Remedial action monitoring is conducted to evaluate the effectiveness of RAs. Samples are collected from catch basins and outfalls that could be impacted by RA activities at ETTP. Stormwater samples are collected before, during, and after RA activities and analyzed for select parameters based on known or suspected contaminants. Details regarding qualifying rain events, sampling frequency, and analytical parameters are based on historical monitoring results and guidance provided by ETTP project personnel. A graded approach is used to determine stormwater monitoring requirements, as summarized in the following bullets:

- Low-risk facilities/areas (i.e., no radiological concerns, no polychlorinated biphenyls [PCBs]), where historical baseline stormwater monitoring data are available—no additional monitoring will be conducted, and BMPs and other stormwater control actions will be implemented.
- Low-risk facilities/areas (i.e., no radiological concerns, no PCBs), where no historical baseline data exists for non-representative stormwater outfalls—baseline stormwater monitoring will be conducted during demolition and post-demolition activities.
- Facilities/areas where a wide range of contamination issues that have been through Resource Conservation and Recovery Act of 1976 (RCRA) decontamination and closure, but encapsulated radiological contamination/PCBs remain to a limited degree—a baseline stormwater sampling event will be conducted prior to the start of RA activities, a single stormwater sampling event will be conducted during the RA, and a final sampling event will be conducted following completion of the RA.
- Facilities/areas where a wide range of contamination issues exist and little or no prior decontamination/closure activities have been conducted—a baseline stormwater sampling event will be conducted prior to the start of RA activities, sampling will be conducted after each qualifying rain event (typically 1 in. or more), and a final stormwater sampling event will be conducted following completion of the RA.

Stormwater samples collected to support post-demolition monitoring shall be manual grab samples. Manual grab samples shall be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of

EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Automated samplers may be used to collect grab samples according to guidelines specified in Sects. 3.1.3 and 3.3.2 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Where specified, runoff samples shall be collected after qualifying rainfall events.

Stormwater monitoring is a dynamic process where sampling needs may suddenly change to evaluate and investigate changing conditions. Changes in sampling locations and parameters will be determined by UCOR EC&P personnel and coordinated with SSO personnel and Oak Ridge SMO representatives.

7.2.1 EU-16 Soil Remedial Action

The Exposure Unit (EU)-16 area is located north of the former K-802 Basin area and adjacent to Poplar Creek. The EU-16 area was primarily used for drum storage and a scrap yard for K-25 operations. Excavation is planned for the following four areas at EU-16: K-1064 Salvage Material Yard, K-1064-H Shed Area, K-1064-M North Trash Slope, and Z2-EU16B-277 Sample Area. The K-1064 Salvage Material Yard was used to stage radiologically contaminated and uncontaminated equipment and materials. The K-1064-H Shed Area was part of the Drum Storage and Burn Area. The K-1064-M North Trash Slope was used for unofficial dumping of construction materials, oils, and solvents. There are no known activities that occurred within the Z2-EU16B-277 Area.

Prior to excavation, lined berms will be installed around excavation footprints to prevent sediment and runoff from reaching Poplar Creek directly or via the storm drain network discharging at Outfalls 292, 294, and 296 on the west side of the site. Catch basins and drainage pipes outside the footprints will be protected with sediment socks or other controls. As the K-1064 North Trash Slope is adjacent to but higher than Poplar Creek, excavations will be covered with polyethylene sheeting (when not actively being worked or rain is forecasted) and/or sloped away from the creek.

Outfalls 292, 294, and 296 will be monitored to determine the effectiveness of stormwater controls in preventing the discharge of sediment and contaminants from the excavation area to Poplar Creek. Samples should be collected during a qualifying rain event and at the discretion of the EC&P Lead (based on field conditions and the location of remedial activities). A qualifying rain event is defined as a rain event that: 1) produces 1 in. or greater measured rainfall within a 24-hour period, 2) causes runoff to be present at the outfall, and 3) occurs after a dry period of at least 72 hours. A dry period means no measurable rainfall (0.1 in. or greater) occurs within a 24-hour period. A final monitoring event will occur as determined by the EC&P Lead at the respective outfall associated with area completion if flow is available. Stormwater sampling requirements for the EU-16 soil RA are provided in Table 6.

Table 6. Monitoring Requirements for the EU-16 Soil Remedial Action

Sampling Locations	Sampling Frequency	Collection Method	U-Isotopic Th-Isotopic Tc-99 Np-237	Gross Alpha/ Beta	VOCs	Metals[a]	Hg	PCBs	TSS
Outfalls 292 294 296	After each qualifying rain event during RA -and- Once after completion of soil removal/slab demolition/waste shipment	Grab	X	X	X (292 only)	X	X	X	X

[a]Metals analysis includes: Al, Ag, As, Ba, Be, B, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn.

EU = exposure unit
Hg = mercury
RA = remedial action
PCB = polychlorinated biphenyl
TSS = total suspended solids
VOC = volatile organic compound

7.2.2 EU-21 Soil Remedial Action

The EU-21 area is located between the east and west wings of the former K-25 Building and includes the slab associated with the former K-1024 Maintenance Shop. K-1024 was built in 1944 as a maintenance shop for the repair and calibration of instruments used in the K-25 uranium enrichment process. The maintenance shop used solvents, including trichloroethylene (TCE), for cleaning instruments and equipment. As an accepted practice at the time, solvents were frequently discharged into the floor drains and entered the storm drain network. Catch basin 7097, located on the south side of the form K-1024 building, is presumed to be the main source of TCE contamination. Although TCE is the primarily contaminant of concern for the EU-21 soil RA, mercury droplets were discovered during removal of buried pipe. K-1024 was also used for cleaning mercury from line recorder chemical traps between 1946 and 1947, and the equipment shop had a problem with spilled mercury and mercury vapors.

Prior to the soil RA, the storm drain system within the proposed excavation and clean layback footprints was isolated from the active system in order to prevent sediment and contaminants from discharging to Poplar Creek via Outfalls 230 and 240. The main northern trunk lines heading towards Outfalls 230 and 240 (east and west legs respectively) were excavated, intentionally broken, and filled with concrete. Catch basins within the footprints were either plugged with concrete or had the gratings sealed to prevent water from entering. Catch basins closest to the intentional breaks were plugged with concrete to act as a second isolation. Outfall 210 receives water from the storm drain system located on the east side of the K-25 east wing (well outside the excavation and layback footprints); all of the catch basins located on the west side of the K-25 west wing were previously plugged under a separate program. Excavation began at the existing elevated grade in the center of the "U" and will continue to approximately 25 ft below the slab grade or wherever groundwater is encountered. Following excavation, disturbed areas will be graded and revegetated.

Outfalls 210, 230, and 240 will be monitored in order to determine the effectiveness of stormwater controls in preventing the discharge of sediment and contaminants from the excavation area to Poplar Creek. Samples should be collected during a qualifying rain event and at the discretion of the EC&P Lead (based on field conditions and the location of remedial activities). A qualifying rain event is defined as a rain event that: 1) produces 1 in. or greater measured rainfall within a 24-hour period; 2) causes runoff to be present at the outfall; and 3) occurs after a dry period of at least 72 hours. A dry period means no measurable rainfall (0.1 in. or greater) occurs within a 24-hour period. A final monitoring event will occur as determined by the EC&P Lead at the respective outfall associated with area completion if flow is available. Stormwater sampling requirements for the EU-21 soil RA are provided in Table 7.

Table 7. Monitoring Requirements for the EU-21 Soil Remedial Action

Sampling Locations	Sampling Frequency	Collection Method	VOCs	Mercury	Metals[a]	TSS
Outfalls 210 230 240	After each qualifying rain event during RA -and- Once after completion of soil removal/slab demolition/waste shipment	Grab	X	X	X	X

[a]Metals analysis includes: Al, Ag, As, Ba, Be, B, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn.

EU = exposure unit
RA = remedial action
TSS = total suspended solids
VOC = volatile organic compound

7.2.3 EU-35 Soil Remedial Action

The EU-35 Soil Remedial Action 3 area is located in the area of the former K-1407-B Pond. The K-1407-B Pond was primarily used as a settling pond for metal hydroxide sludge and other waste streams that were precipitated/neutralized in the adjacent K-1407-A Neutralization Pit Facility, but also received waste from many other nearby facilities. The pond was Resource Conservation and Recovery Act of 1976 (RCRA) clean closed in 1994 and covered with 4–10 ft of fill above the contaminated soil. Approximately 1,000 cubic yards of backfill material will be removed from three excavation areas and stockpiled for use as fill. An estimated 2–3 ft of contaminated soil is located between the fill layer and the water table in these areas.

Prior to the soil removal remedial action, lined berms will be installed around open excavations, contaminated soil stockpiles, and any debris to minimize water run-on and to contain contaminated water, debris, sediment, and particulates within the excavation areas. The stormwater pipes in the northwestern corner of K-1407-B will be temporarily plugged prior to excavation. Stormwater samples will be obtained from Outfall 180, which is located downstream from the project area.

Outfall 180 will be monitored to determine the effectiveness of stormwater controls in preventing the discharge of sediment and contaminants from the excavation area to Mitchell Branch. Samples should be collected during a qualifying rain event and at the discretion of the EC&P Lead (based on field conditions and the location of remedial activities). A qualifying rain event is defined as a rain event that: 1) produces 1 in. or greater measured rainfall within a 24-hour period, 2) causes runoff to be present at the outfall, and 3) occurs after a dry period of at least 72 hours. A dry period means no measurable rainfall (0.1 in. or greater) occurs within a 24-hour period. A final monitoring event will occur as determined by the EC&P Lead at the respective outfall associated with area completion if flow is available. Stormwater sampling requirements for the EU-21 soil RA are provided in Table 8.

Table 8. Monitoring Requirements for the EU-35 Soil Remedial Action

Sampling Locations	Sampling Frequency	Collection Method	U Th	Cs-137	Tc-99	Gross Alpha/ Beta	VOCs	PCBs	Metals[a]	Hg	TSS
Outfall 180	After each qualifying rain event during RA -and- Once after completion of soil removal/slab demolition/waste shipment	Grab	X	X	X	X	X	X	X	X	X

[a]Metals analysis includes: Al, Ag, As, Ba, Be, B, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn.

EU = exposure unit
Hg = mercury
RA = remedial action
PCB = polychlorinated biphenyl
TSS = total suspended solids
VOC = volatile organic compound

7.2.4 EU-39 Soil Remedial Action

The EU-39 area includes the concrete slabs for the former K-1420 Decontamination and Uranium Recovery Facility, K-1421 Incinerator, and K-1422 Storage Building. The former K-1420 Decontamination and Uranium Recovery Facility provided radiological decontamination, uranium recovery, and metal plating capabilities and served as a storage area for drums of uranium-cascade motor lubricant oil containing PCBs and uranium. The K-1421 Incinerator was used to burn waste oil sludge and low-level contaminated combustibles such as gloves, coveralls, wood, paper, and plastic. The K-1422 Storage Building was used for storage of fissile materials and, reportedly, for UF_6 cylinder charging or emptying.

Before the slab removal remedial action, lined berms were installed around the K-1420, K-1421, and K-1422 slab to contain sediment, particulates, and debris within the excavation area and to divert sheet flow during rain events. The catch basin leading to Outfall 158, located northeast of the K-1420 pad, was plugged prior to slab demolition. The stormwater pipes leading to Outfall 160, north of K-1420 were cut and capped north of the catch basin. There is no discharge pipe in the project area to Outfall 168. Only sheet flow would potentially impact these three outfalls during the slab removal remedial action. Therefore, stormwater samples are obtained from Outfall 170, which is located downstream from the project area.

Outfall 170 will be monitored to determine the effectiveness of stormwater controls in preventing the discharge of sediment and contaminants from the excavation area to Mitchell Branch. Samples should be collected during a qualifying rain event and at the discretion of the EC&P Lead (based on field conditions and the location of remedial activities). A qualifying rain event is defined as a rain event that: 1) produces 1 in. or greater measured rainfall within a 24-hour period, 2) causes runoff to be present at the outfall, and 3) occurs after a dry period of at least 72 hours. A dry period means no measurable rainfall (0.1 in. or greater) occurs within a 24-hour period. A final monitoring event will occur as determined by the EC&P Lead at the respective outfall associated with area completion if flow is available. Stormwater sampling requirements for the EU-21 soil RA are provided in Table 9.

Table 9. Monitoring Requirements for the EU-39 Soil Remedial Action

Sampling Locations	Sampling Frequency	Collection Method	U Isotopic	Ra-Th	Tc-99	Gross Alpha/ Beta	VOCs	PCBs	Mercury Metals[a]	TSS
Outfall 170	After each qualifying rain event during RA -and- Once after completion of soil removal/slab demolition/waste shipment	Grab	X	X	X	X	X	X	X	X

[a]Metals analysis includes: Al, Ag, As, Ba, Be, B, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn.

EU = exposure unit
RA = remedial action
PCB = polychlorinated biphenyl
TSS = total suspended solids
VOC = volatile organic compound

7.2.5 Additional Post-Demolition Sampling Activities to be conducted in FY 2023

Plans for additional FY 2023 remedial action projects at ETTP have not been finalized. Therefore, requirements for additional sampling efforts to be conducted as part of the SWPP Program will be provided to the SSO, the Oak Ridge SMO, and other personnel as they become available in accordance with Sect. 3.1.

7.3 SAMPLING OF OUTFALLS DESIGNATED IN THE CERCLA PCCRS

Over the past several years, most of the CERCLA actions at ETTP focused on completion of building demolition documented by various PCCRs. Some of these PCCRs include interim requirements for monitoring and access controls because slabs or portions of foundations were left in place. If radiological surveys indicated a slab exceeded the release criteria of DOE Order 5400.5, Chg. 2, *Radiation Protection of the Public and the Environment,* then interim access controls were implemented, and the slab was posted and became part of the radiological surveillance and monitoring program.

Post-decision documents for the various demolition projects include the following requirements:

- Annual radiological surveillance—Storm drain characterization and surface water monitoring results are used to verify the effectiveness of the radiological controls. If radiological contamination is found to be migrating outside the contamination area, then additional controls are implemented.
- Storm drain characterization—Storm drain discharges are characterized at least once during each NPDES permitting period, a maximum of five years, for a minimum of gross alpha, gross beta, isotopic uranium, and Tc-99 for representative outfalls in each storm grouping.

- Annual surface water monitoring—As part of the ETTP Environmental Monitoring Program, instream water monitoring is conducted at least annually at Mitchell Branch Weir, K-1007-P1 Holding Ponds Weir (K-1007-B4), K-901-A Pond Weir, upstream of ETTP in Poplar Creek, downstream of ETTP at Clinch River Kilometer (CRK) 9.5 (Brashear Island), and at Poplar Creek location K-716. Samples are collected from these locations and analyzed for a minimum of gross alpha, gross beta, isotopic uranium, and Tc-99. Data are compared to screening levels established at 4% of DOE Order 5400.5 Derived Concentration Guide to maintain discharges ALARA.

Stormwater samples collected to support CERCLA PCCR requirements shall be manual grabs. Manual grab samples will be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of the EPA's *NPDES Storm Water Sampling Guidance Document* (EPA 833-B-92-001) and applicable procedures that have been developed by the SSO. CERCLA PCCR sampling is not weather-dependent. These samples can be collected at any time stormwater runoff is observable from the specified facility or building slab that drains to these outfalls. CERCLA PCCR monitoring requirements are provided in Table 10.

Table 10. CERCLA PCCR Monitoring Requirements for FY 2023

Sampling Locations	Sampling Frequency	Collection Method	Gross Alpha/ Gross Beta	U Isotopic[a]	Tc-99
Outfalls 270 280 294 296 297 490	Once	Grab	X	X	X

[a]U isotopic analysis includes: U-233/234, U-235/236, and U-238.

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
PCCR = Phased Construction Completion Report

7.4 LEGACY CHROMIUM GROUNDWATER PLUME DISCHARGE SAMPLING

Legacy chromium contamination monitoring is conducted to measure concentrations of total chromium and hexavalent chromium within and downgradient of the groundwater plume. Samples collected at Monitoring Well TP-289 provide for the direct monitoring of the concentrations of chromium in the contaminated groundwater plume. Samples collected from the chromium collection system wells provide for the monitoring of chromium in the water recovered by the groundwater collection system. Samples collected at Outfall 170 monitor the concentrations of chromium in groundwater leaching into Mitchell Branch. Samples at Mitchell Branch kilometer (MIK) 0.79 provide for monitoring of chromium concentrations in Mitchell Branch downstream of Outfall 170. Total chromium and hexavalent chromium are analyzed in samples collected at Outfall 170 as part of the current NPDES permit compliance program. The results from NPDES permit compliance sampling will be evaluated in determining the need for additional SWPP Program investigative efforts in the Outfall 170 network. In addition, the NPDES permit compliance samples will also be utilized in the analysis of total and hexavalent chromium discharge trends from Outfall 170.

Additional monitoring of the Chromium Water Treatment System (CWTS) is conducted at the Clinch River discharge sampling point in accordance with the CWTS SAP (UCOR-4259, *East Tennessee Technology Park Chromium Water Treatment System Sampling and Analysis Plan, Oak Ridge, Tennessee*). Stormwater

samples collected to support legacy chromium contamination monitoring shall be grab samples. Manual grab samples will be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Samples shall be collected on a quarterly basis in wet or dry weather conditions on a varying basis. Legacy chromium contamination monitoring requirements associated with the CWTS are provided in Table 11.

Table 11. Legacy Chromium Contamination Monitoring Requirements for FY 2023

Sampling Locations	Sampling Frequency	Collection Method	Total Chromium	Hexavalent Chromium
Monitoring Well TP-289 Cr Collection System Wells Outfall 170[a] MIK 0.79	Quarterly	Grab	X	X

[a]Chromium monitoring at Outfall 170 is conducted for compliance with the ETTP NPDES Permit (TN0002950).

Cr = chromium
ETTP = East Tennessee Technology Park
MIK = Mitchell Branch kilometer
NPDES = National Pollutant Discharge Elimination System

7.5 LEGACY MERCURY MONITORING

Mercury levels that exceed the state of Tennessee ambient water quality criterion of 51 nanograms per liter (ng/L) at ETTP have been identified in the Mitchell Branch watershed, as well as in a number of stormwater outfalls, surface water locations, and groundwater monitoring wells. As part of a previous NPDES permit compliance program, samples were collected and analyzed for mercury on a quarterly basis at Outfalls 05A, 170, 180, and 190. Quarterly sampling and analysis for mercury at these outfalls is not required under the current ETTP NPDES permit. However, quarterly sampling and analysis for mercury will be conducted at Outfalls 180 and 190 as part of the ETTP SWPP Program, in order to continue analyzing trends in mercury concentrations at these two outfalls. Data from this sampling effort will be included in the Remediation Effectiveness Report (RER) and may provide information that will be used in upcoming CERCLA cleanup decisions.

In addition to the quarterly monitoring of mercury at these outfalls, a sample for Tc-99 will be collected at Outfall 190 each time a quarterly sample for mercury analysis is collected at this outfall. The analytical data from this sample will assist in determining if groundwater contaminated with Tc-99 from the K-25 demolition and post-demolition project could be migrating and discharging into Mitchell Branch via Outfall 190.

Legacy mercury monitoring requirements are provided in Table 12.

Table 12. Legacy Mercury Monitoring Requirements for FY 2023

Sampling Locations	Sampling Frequency	Collection Method	Mercury	Tc-99
Outfall 180	Quarterly	Grab	X	
Outfall 190	Quarterly	Grab	X	X

7.6 SAMPLING FOR TC-99 AT OUTFALL 490

As part of the ETTP Environmental Monitoring Program sampling effort, samples are collected at the K-1007-B sampling location (discharge point for the K-1007-P1 pond) on a semiannual basis. These samples will be collected in the first and third quarters of FY 2023 (October–December 2022 and April–June 2023).

In conjunction with the collection of samples at K-1007-B, a corresponding grab sample shall be collected at Outfall 490 and analyzed for Tc-99. This sample is collected to determine what contribution discharges from the Outfall 490 watershed make to the total Tc-99 discharge from the K-1007-P1 pond. Manual grab samples will be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of EPA 833-B-92-001 and applicable procedures developed by the SSO. The Outfall 490 Tc-99 monitoring requirements are provided in Table 13.

Table 13. Tc-99 Monitoring Requirements for Outfall 490 for FY 2023

Sampling Locations	Sampling Frequency[a]	Collection Method	Tc-99
Outfall 490	October–December 2022 -and- April–June 2023	Grab	X

[a]Sample from Outfall 490 to be collected concurrently with sample from K-1007-B.

7.7 INVESTIGATIVE MONITORING

Investigative monitoring is conducted based on elevated analytical results, CERCLA requirements, and/or changes in site conditions.

7.7.1 Outfall 690

PCBs have been detected in Outfall 690 and several locations in the Outfall 690 drainage network. The Outfall 690 network was sampled several times between 2019 through 2021 to evaluate the source and extent of PCB contamination. A remedial action is planned to address the remaining PCB contamination. Additional sampling will be conducted once the remedial action is complete to verify that PCB contamination has been addressed.

Manual grab samples should be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Automated samplers may be used to collect grab samples according to guidelines specified in Sects. 3.1.3 and 3.3.2 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Stormwater samples should be collected after a qualifying rainfall event of at least 0.1 in. and flow is observed.

Investigative monitoring requirements for Outfall 690 are provided in Table 14.

Table 14. Investigative Monitoring Requirements for Outfall 690

Sampling Locations	Sampling Frequency	Collection Method	PCBs	TSS
Outfall 690	Quarterly	Grab	X	X

PCB = polychlorinated biphenyl
TSS = total suspended solids

7.7.2 Outfall 780

Outfall 780 is located in the Powerhouse area. In 2018, a select group of nonrepresentative outfalls were sampled to determine if they were contributing mercury and PCBs to site waterways. Outfall 780 had elevated concentrations of mercury and PCBs. Activities being conducted in the area were not suspected as the cause of the elevated mercury and PCB concentrations, although process knowledge indicated that they could be legacy contaminants. Outfall 780 once carried stormwater runoff from former Buildings K-724 and K-725. These buildings were originally part of the S-50 thermal diffusion plant; Building K-725 was later used for beryllium processing. Building K-725 contained mercury traps that occasionally released mercury. In addition, mercury was reportedly "swept down the floor drains" and into the storm drain system during cleanup activities in the 1970s. Mercury may also have been present in the dust collection system and transported to the storm drain system via stormwater runoff during demolition of K-725 in the 1990s. Outfall 780 also received stormwater from the K-722 area, where approximately 1,000 gallons of oil was land farmed for dust suppression in the 1980s.

Oak Ridge Forest Products (ORFP) operates a wood yard and chipping facility at the K-722 site. While ORFP operations are unlikely to have caused an increase in mercury or PCBs in the Outfall 780 drainage network, ORFP appears to discharge water from an unknown source. This discharge is dark brown and appears in relatively small quantities on an ongoing basis. Before ORFP began operation, Outfall 780 was dry and did not discharge water to the Clinch River except during substantial storm events. It is possible that discharge from ORFP may be mobilizing contaminants that have been dormant in the Outfall 780 network for years. During FY 2022, dark brown discharge from ORFP was observed frequently, and elevated concentrations of PCBs, metals (arsenic, copper, lead, and mercury), and TSS were detected in a sample from Outfall 780.

In an effort to determine the impact of ORFP operations on discharges from Outfall 780, follow-up sampling is recommended for FY 2023. Manual grab samples shall be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Automated samplers may be used to collect grab samples according to guidelines specified in Sects. 3.1.3 and 3.3.2 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Stormwater samples shall be collected after a qualifying rainfall event of at least 0.1 in. and that flow is observed. Stormwater samples must also be collected during winter pool, when the water level in the Clinch River is sufficiently low to allow access to the end of the outfall piping network.

Investigative monitoring requirements for Outfall 780 are provided in Table 15.

Table 15. Investigation Monitoring Requirements for Outfall 780

Sampling Locations	Sampling Frequency	Collection Method	Rad[a]	VOCs	PCBs	Metals[c]	Mercury	TSS
Outfall 780	Once	Grab	X	X	X	X	X	X

[a]Rad includes Gross Alpha/Gross Beta and U isotopic. U isotopic analysis includes: U-233/234, U-235/236, and U-238.

[c]Metals analysis includes: Al, Ag, As, Ba, Be, B, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn.

PCB = polychlorinated biphenyl

TSS = total suspended solids

VOC = volatile organic compound

7.7.3 Outfall 992

Outfall 992 receives discharge from the K-720 Fly Ash Pile and discharges into the K-720 Slough. The K-720 Fly Ash Pile consists of fly ash derived from operations at the former K-701 Powerhouse. A total of 5.97 million tons of coal were burned at the K-701 Powerhouse during its operation from 1944 to 1962. Bottom ash, coal fines, slag, and other coal combustion by-products were buried at the K-720 Fly Ash Pile. Runoff and leachate from the K-720 Fly Ash Pile resulted in occasional low pH readings, and elevated levels of metals (arsenic, selenium) were detected in stormwater discharges from Outfall 992. Several remedial actions were completed during the 1990s to reduce stormwater contact with the fly ash and minimize leaching into the surrounding surface waters. Additional actions were taken in 2011 to remediate the area near the ash sluice pond drainage channel. Subsequent stormwater monitoring of the Outfall 992 drainage area in 2019 indicated that the remedial actions were effective.

The K-720 Slough area is currently being investigated as part of the ETTP Remaining Media Project. The investigation will support development of a Record of Decision for media at ETTP that is not addressed in previous or planned CERCLA decisions. Although extensive data is available for most of the Remaining Media investigation areas, some updated environmental data is necessary to adequately evaluate potential contaminant and potential exposures to associated human and ecological receptors.

In an effort to evaluate the potential for ongoing releases from the K-720 Fly Ash Pile, additional sampling is requested for Outfall 992. Manual grab samples should be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Automated samplers may be used to collect grab samples according to guidelines specified in Sects. 3.1.3 and 3.3.2 of EPA 833-B-92-001 and applicable procedures that have been developed by the SSO. Stormwater samples should be collected after a steady rainfall event of approximately 0.25–0.5 in. Stormwater samples should be collected in both wet season and dry season consistent with the designation of these periods under Water Resources Restoration Program guidance.

Investigative monitoring requirements for Outfall 992 are provided in Table 16.

Table 16. Investigation Monitoring Requirements for Outfall 992

Sampling Locations	Sampling Frequency	Collection Method	Rad[a]	VOCs	SVOCs	PCBs	Pesticides	Metals[b]	Mercury[c]
Outfall 992	Once during wet season Once during dry season	Grab	X	X	X	X	X	X	X

[a]Rad analysis includes Gross Alpha/Gross Beta and U isotopic. U isotopic analysis includes: U-233/234, U-235/236, and U-238.

[b]Metals analysis includes Al, Ag, As, Ba, Be, B, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn.

[c]Mercury analysis includes low-level and regular.

PCB = polychlorinated biphenyl

SVOC = semi-volatile organic compound
VOC = volatile organic compound

7.8 EVALUATION OF OUTFALLS FOR POTENTIAL REMOVAL FROM ETTP NPDES PERMIT

As part of the ETTP NPDES permit application that was submitted in September 2019, stormwater outfalls permitted by NPDES Permit No. TN0002950 were evaluated for proposal for exclusion from the NPDES permit during the current permit renewal cycle. Each outfall was compared against a set of criteria published in the NPDES Permit Rationale Sect. III.B.1.4. This comparison was conducted to determine which stormwater outfalls could be proposed for exclusion.

Since the permit was renewed in April 2022, several additional outfalls are being evaluated for removal from the ETTP NPDES permit. This evaluation is based on the following criteria:

- Drainage area from which the storm drain system receives runoff
- Whether D&D/RA activities have taken place or are planned in the drainage area
- Ongoing industrial activities being conducted in the drainage area
- Available analytical data for the outfalls considered for removal
- Presence or absence of flow
- Presence or absence of contaminants in stormwater discharge samples collected from the outfall drainage area

Based on this evaluation, a need was indicated for additional samples to be collected at several stormwater outfalls to provide analytical data. Many of the stormwater outfalls being considered for removal from the ETTP NPDES permit are not representative outfalls. For most of these outfalls, samples have not been collected in the past several years, so current data are not available for them. Additional sampling is required to obtain more recent and complete analytical data for the outfalls being considered for removal from the ETTP NPDES permit.

Manual grab samples or grab-by-compositor samples shall be collected for each of the parameters listed in Table 16. Manual grab samples shall be collected according to the guidelines specified in Sects. 3.1.2 and 3.3.1 of the EPA's *NPDES Storm Water Sampling Guidance Document* (EPA 833-B-92-001) and applicable procedures that have been developed by the SSO. Because these outfalls may be difficult to sample, requested samples can be collected at any time they are observed to be flowing. No dry weather period is specified for this sampling effort. Monitoring requirements for the outfalls being evaluated for potential removal from the NPDES permit are provided in Table 17.

Table 17. Monitoring Requirements for outfalls being evaluated for potential removal from the ETTP NPDES permit

Sampling Locations	Sampling Frequency	Collection Method	Gross Alpha/ Gross Beta	U Isotopic[a]	Tc-99	PCBs	Metals[c]	Mercury	TSS
Outfalls 144, 146, 148, 220, 310, 320, 322, 326, 330, 332	Once	Grab	X	X	X	X	X	X	X

[a]U isotopic analysis includes: U-233/234, U-235/236, and U-238.
[c]Metals analysis includes: Al, Ag, As, Ba, Be, B, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn.
ETTP = East Tennessee Technology Park
PCB = polychlorinated biphenyl
NPDES = National Pollutant Discharge Elimination System
TSS = total suspended solids

7.9 FLOW-PACED SAMPLING AT OUTFALLS 180 AND 190

Monitoring of pollutant loading (flux monitoring) has been conducted as part of past SWPP Program SAPs to support the mercury investigation defined in the rationale portion of the ETTP NPDES permit. To properly monitor mercury flux, accurate flow estimates and mercury concentrations measured during storm events are needed.

As part of the flow-paced sampling effort at these outfalls, aliquots must be collected during a representative storm for the first 3 hours, or for the duration of the storm if it is less than 3 hours in duration. Each aliquot collection should be separated by a minimum of 15 minutes. A minimum of three sample aliquots must be collected within each hour of discharge. A single glass sample jug can be utilized in the automatic sampler to contain the sample aliquots. The sample in this jug should be composited thoroughly before pouring it into the individual sample containers for shipment to the laboratory. In order to ensure that flow measurements are as accurate as possible, the flumes at Outfalls 180 and 190 must be thoroughly cleaned and all sediment and debris removed while flow-paced sampling is being conducted. Total rainfall in inches for the duration of each sampling event must be recorded.

Each of the flow-paced composite mercury samples will be analyzed using the low-level mercury detection method (EPA-1631, Revision E, *Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry*). The samples should be removed from the automatic sampler as soon as possible after they have been collected to avoid any potential cross-contamination issues.

Flow-proportional sampling will be performed at discrete intervals over the first 3 hours of three separate qualifying storm events. The sampler will collect a sample of the discharge at intervals proportional to the discharge from the outfall. Sampling will be initiated after the rain gauge measures 0.1 in. of rainfall.

Mercury flux monitoring requirements are provided in Table 18.

Table 18. Flow-Paced Mercury Monitoring Requirements

Sampling Location	Sampling Frequency	Collection Method	Mercury (Analyzed by EPA-1631)
Outfall 180	Three separate storm events	Flow-paced composite over the first 3 hours of a storm event	X
Outfall 190	Three separate storm events	Flow-paced composite over the first 3 hours of a storm event	X

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8. REFERENCES

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40 *CFR* Part 136. *Guidelines Establishing Test Procedures for the Analysis of Pollutants*, Sect. 136.3, "Identification of test procedures," Washington, D.C.

40 *CFR* Part 141. *National Primary Drinking Water Regulations*; Subpart B, *Maximum Contaminant Levels*, U.S. Department of Energy, Washington, D.C.

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APPENDIX A.
SAMPLING LOCATION MAPS

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APPENDIX A CONTENTS

FIGURES

TABLES

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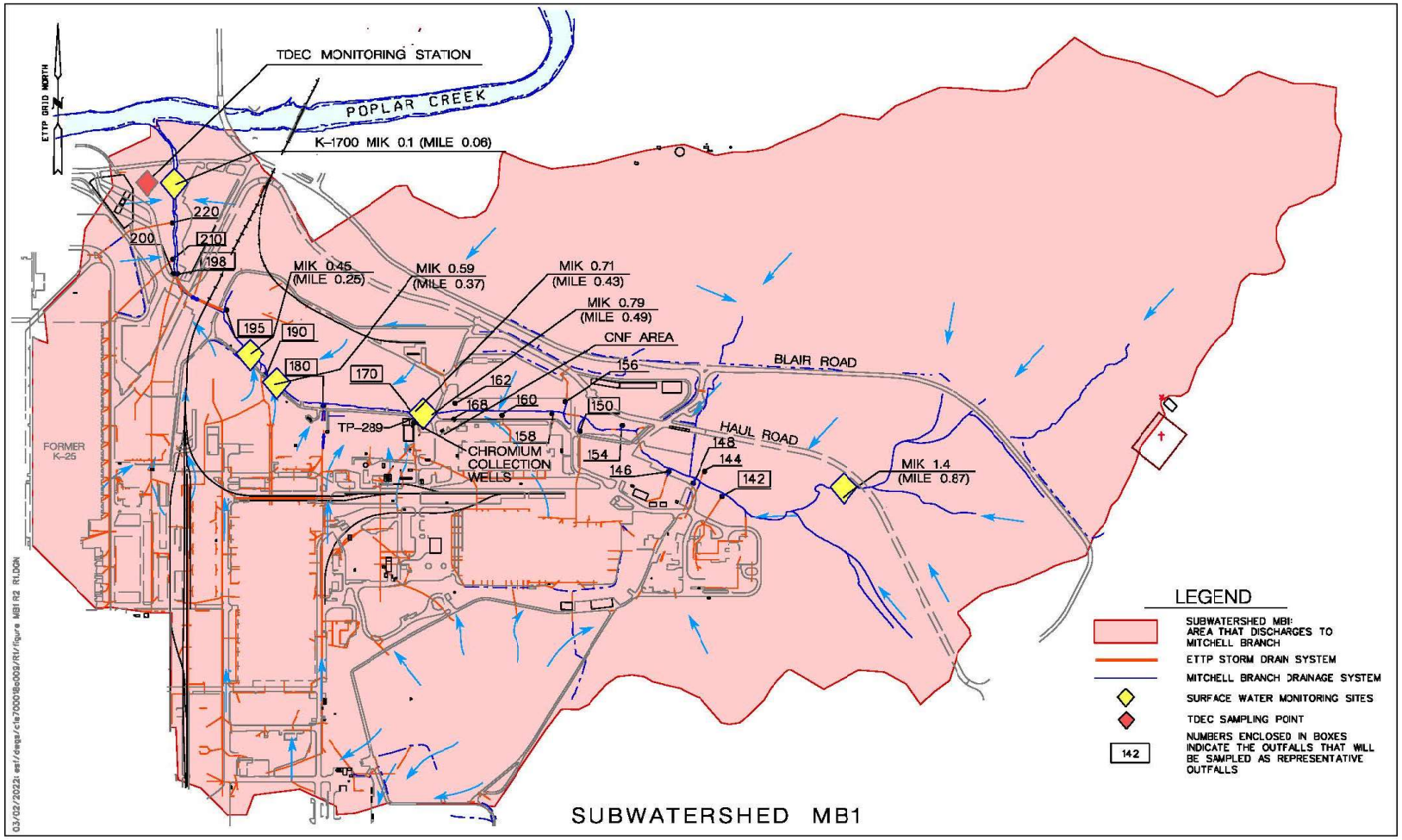

Fig. A.1. Subwatershed MB1 sampling location map.

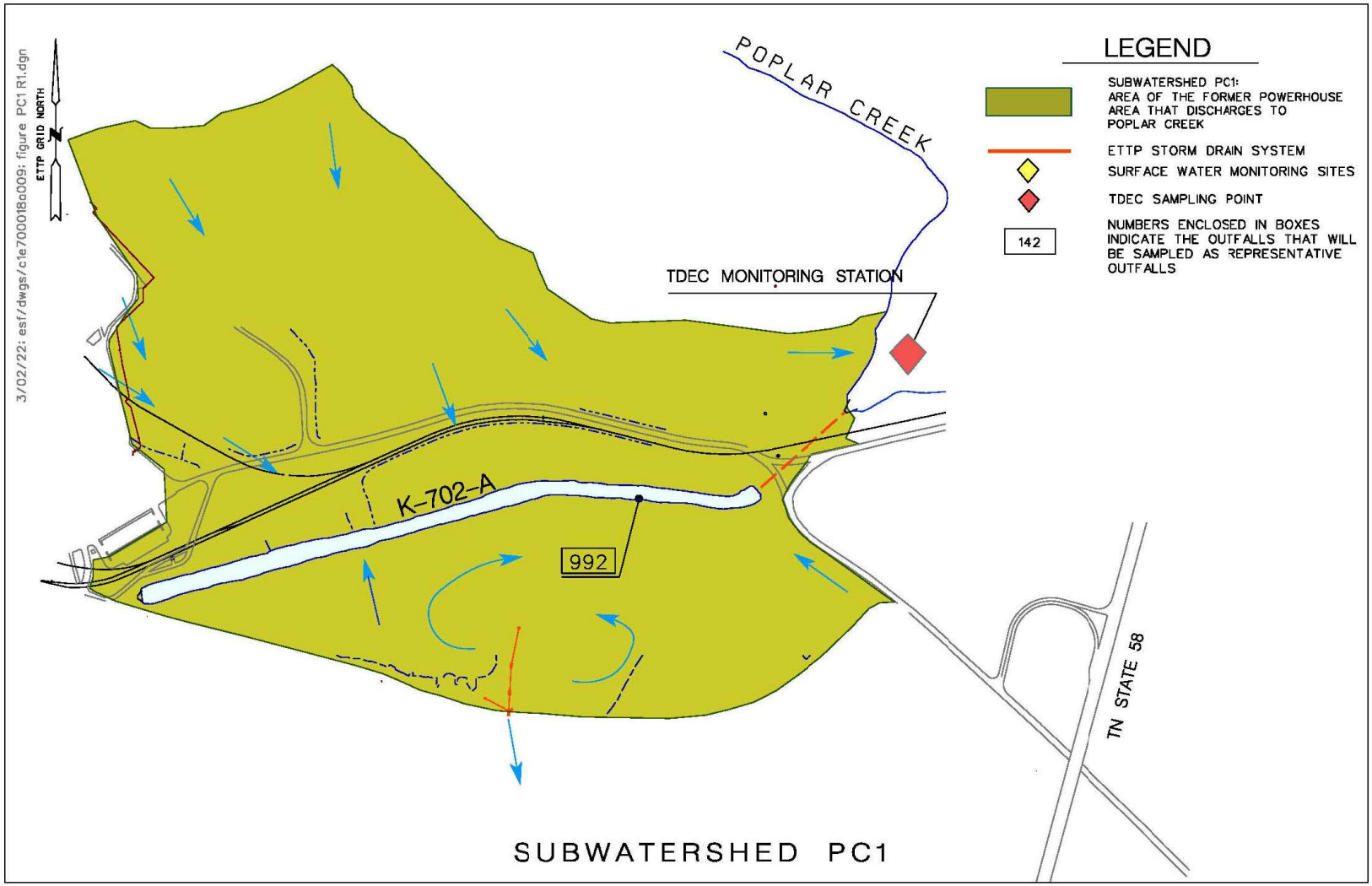

Fig. A.2. Subwatershed PC1 sampling location map.

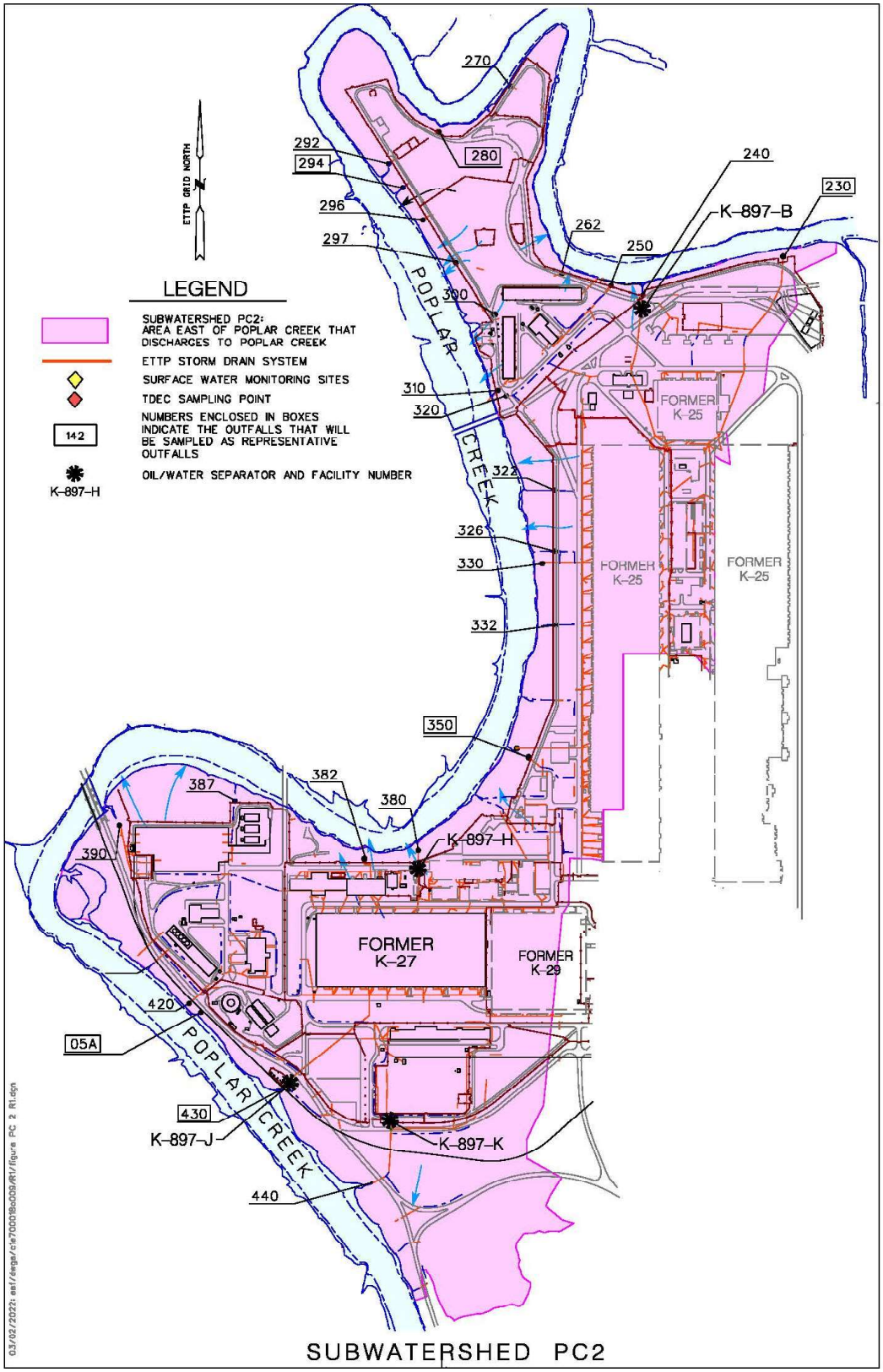

Fig. A.3. Subwatershed PC2 sampling location map.

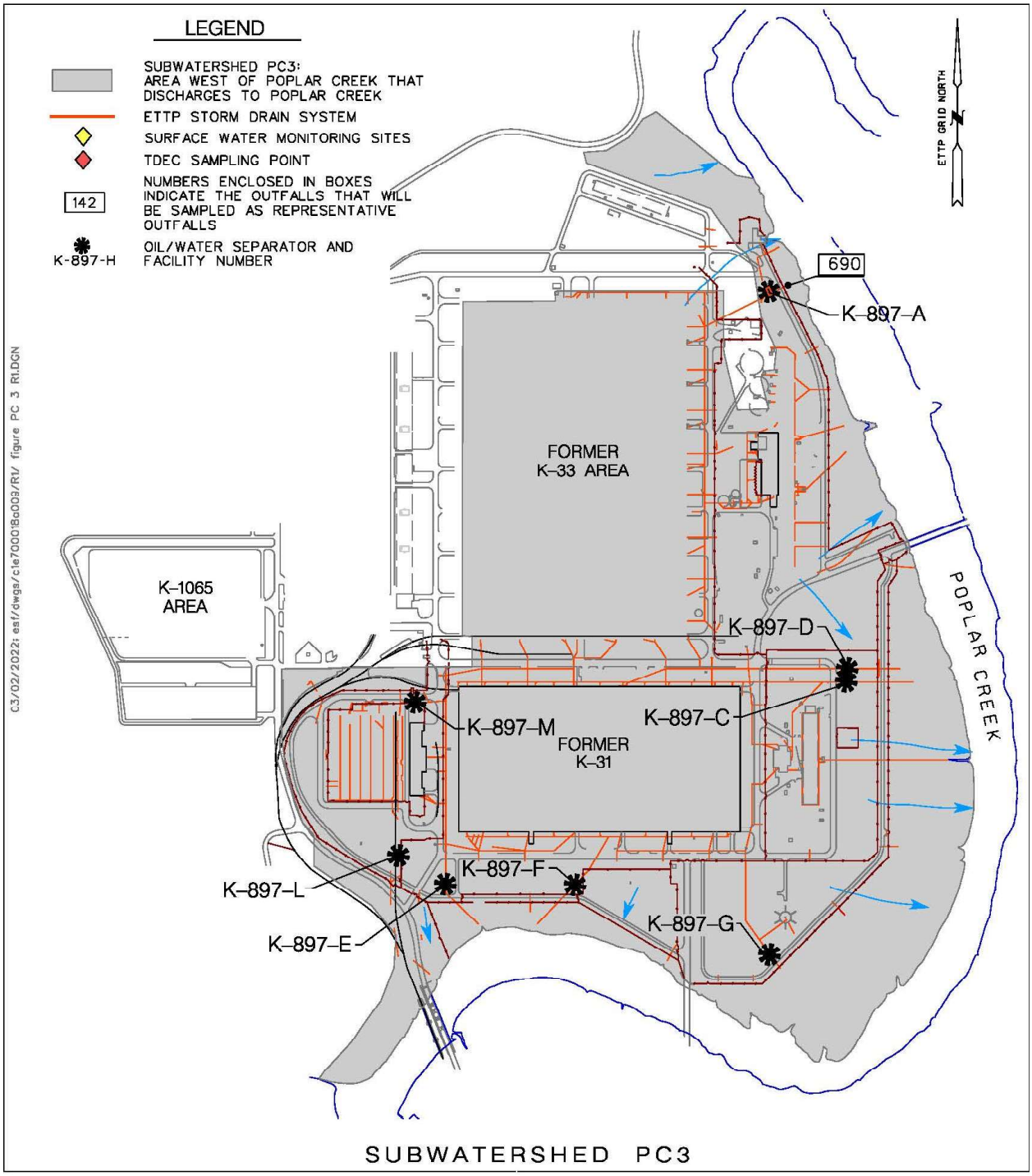

Fig. A.4. Subwatershed PC3 sampling location map.

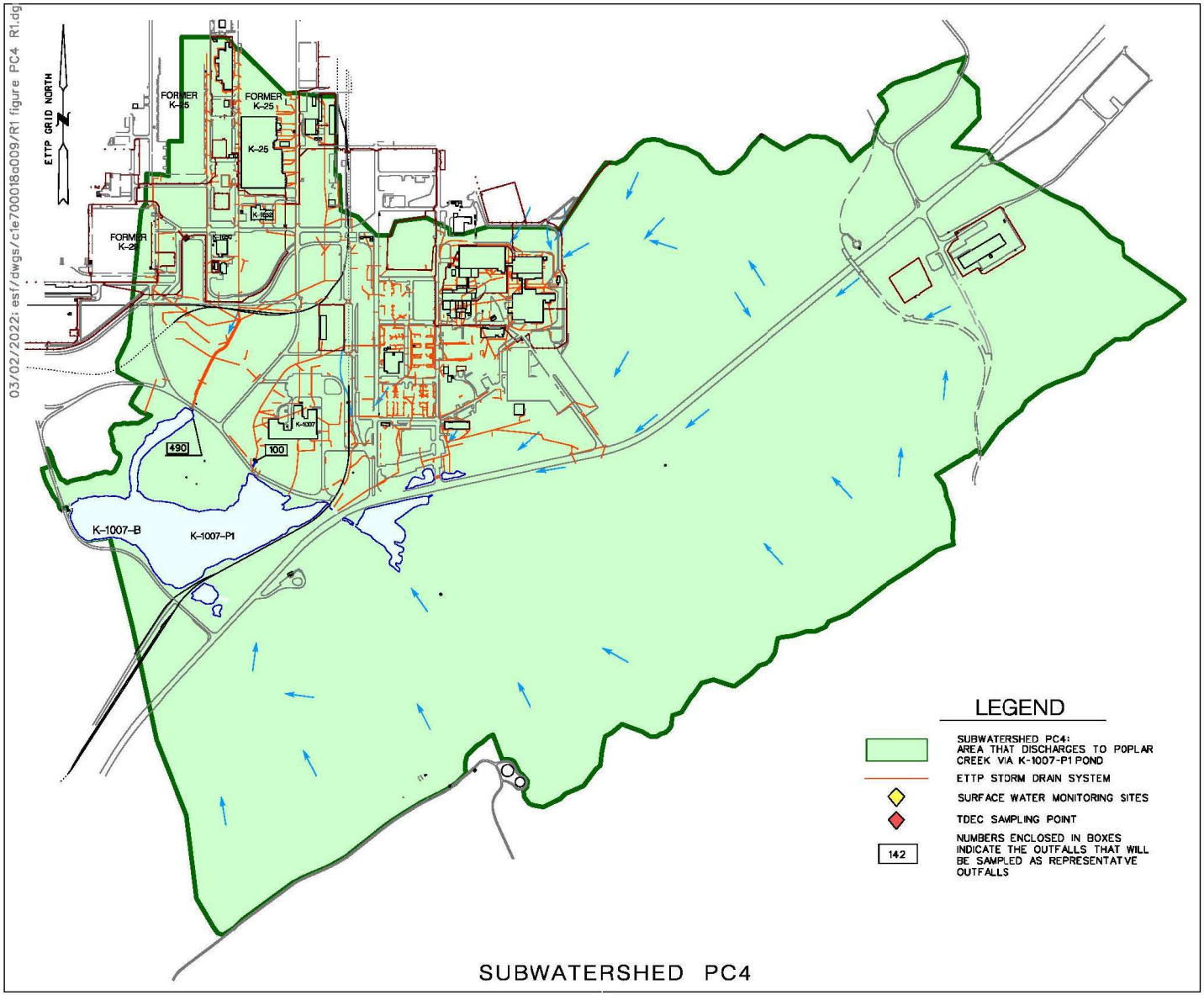

Fig. A.5. Subwatershed PC4 sampling location map.

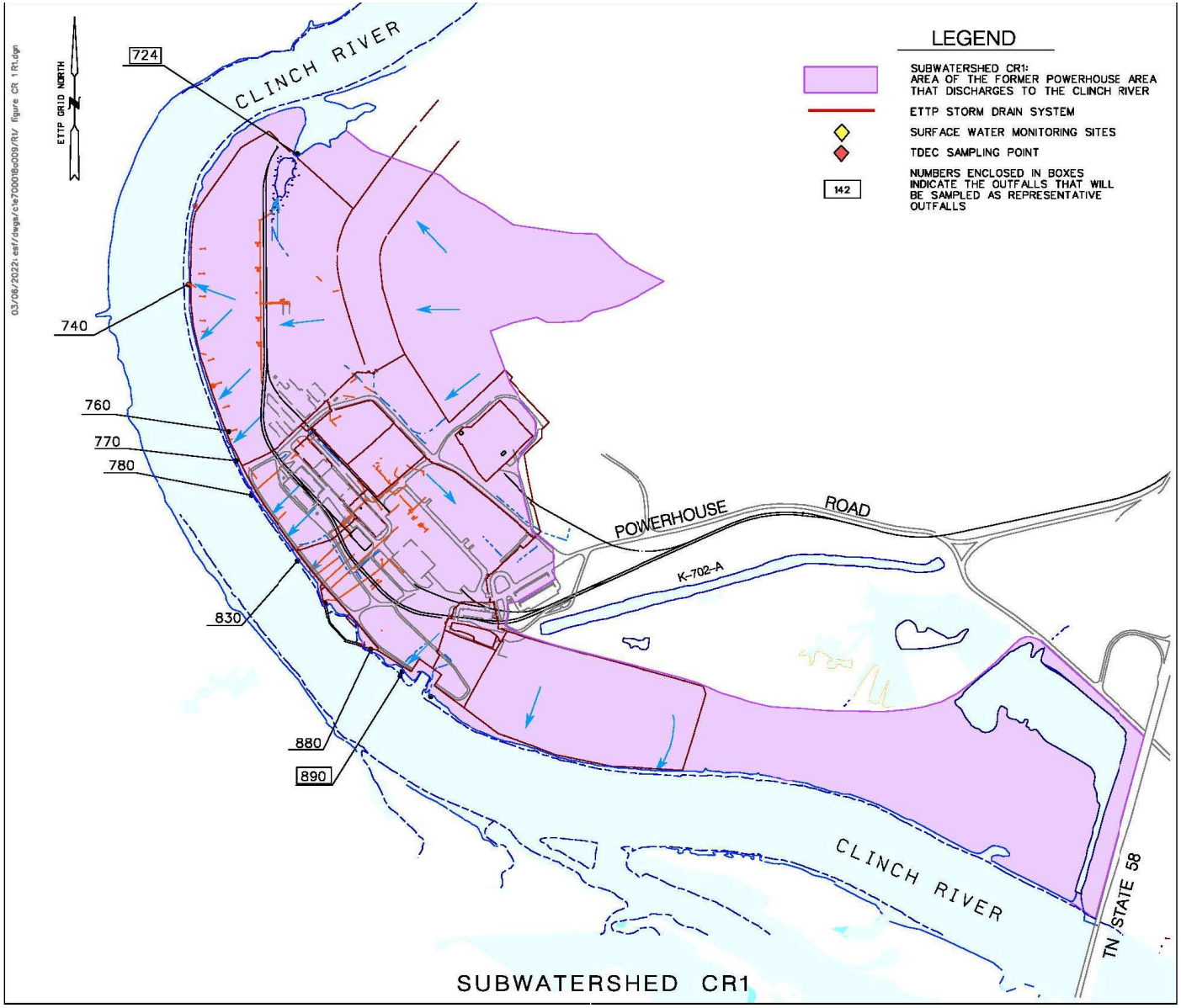

Fig. A.6. Subwatershed CR1 sampling location map.

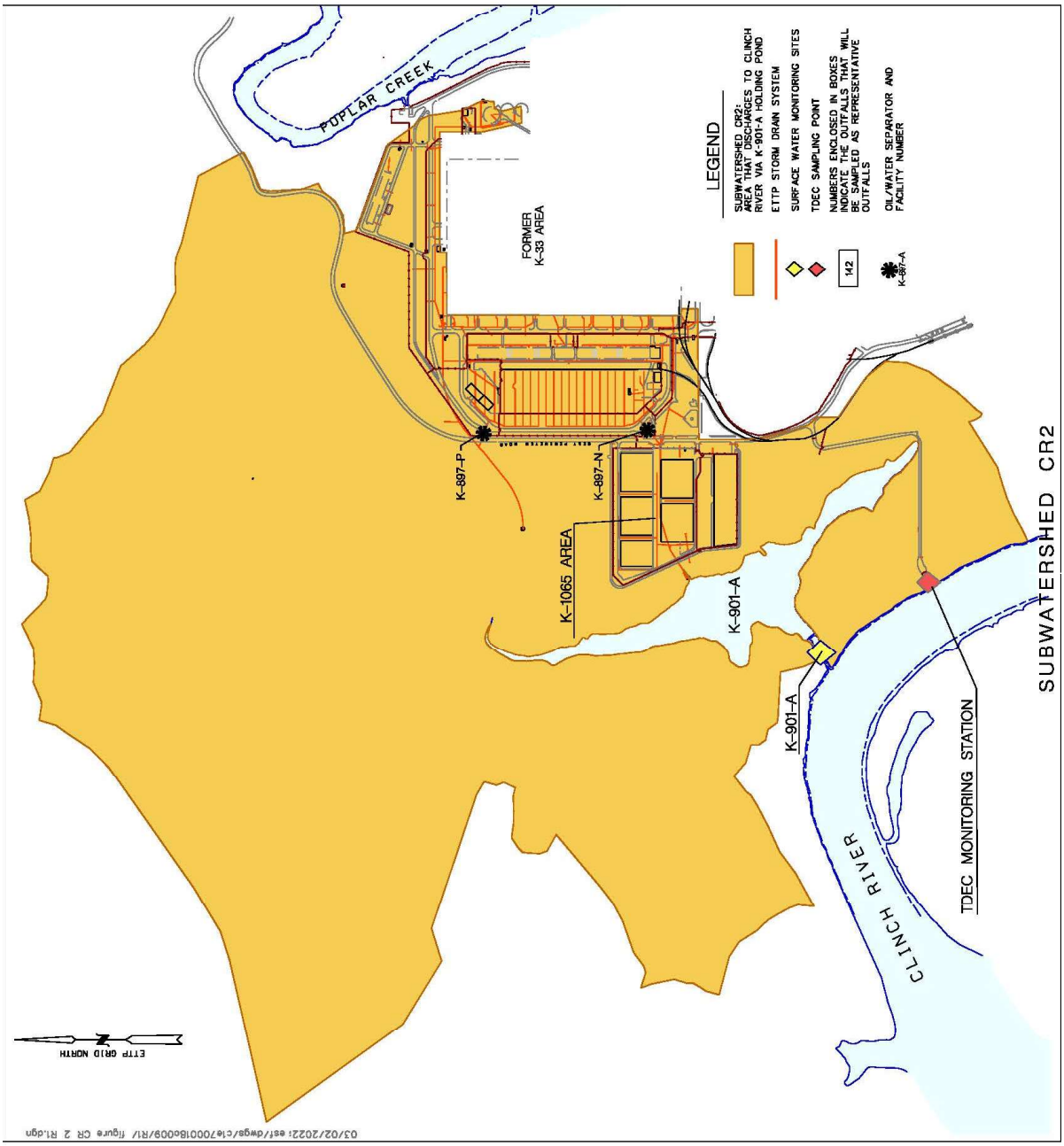

Fig. A.7. Subwatershed CR2 sampling location map.

Table A.1. Information by SAP table number for SWPP Program maps

Table in SWPP Program SAP	Corresponding subwatershed map	Locations to be sampled in each subwatershed
4	MB1	142, 150, 170, 180, 190, 195, 198, 210
	PC1	992
	PC2	05A, 230, 280, 294, 350, 430
	PC3	690
	PC4	100, 490
	CR1	724, 890
5	MB1	142, 170, 180, 195
	PC2	250, 280, 292, 430
	CR1	740
6	PC2	292, 294, 296
7	MB1	210
	PC2	230, 240
8	MB1	180
9	MB1	170
10	PC2	270, 280, 294, 296, 297
	PC4	490
11	MB1	MIK 0.79, 170, TP-289, Cr collection system wells
12	MB1	180, 190
13	PC4	490
14	PC3	690
15	CR1	780
17	PC1	992
17	MB1	144, 146, 148, 220
	PC2	310, 320, 322, 326, 330, 332
18	MB1	180, 190

Cr = chromium
MIK = Mitchell Branch kilometer
SAP = Sampling and Analysis Plan
SWPP = Storm Water Pollution Prevention

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