GENERIC QUALITY ASSURANCE PROJECT PLAN

STANDBY ENGINEERING SERVICES
CONTRACT NO: D009812

Prepared for:

NEW YORK STATE OF OPPORTUNITY. | Department of Environmental Conservation

Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, New York 12233

Prepared by:
TRC Engineers, Inc.
1430 Broadway
New York, New York 10018

JULY 2020

RECORD OF REVISIONS

Revision No.	Revision Date	Summary of Revisions	Modified by:
0	07/02/2020	New Document	J. King

TABLE OF CONTENTS

SECTION PAGE

APPENDICES

1.0 INTRODUCTION

This Generic Quality Assurance Project Plan (QAPP) has been developed for use on work assignments issued to TRC Engineers, Inc. (TRC) under New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Remediation (DER), Standby Engineering Services Contract No. D009812. Compliance with this Generic QAPP, and associated documents, is required for all TRC personnel working on NYSDEC project sites and/or conducting NYSDEC project field work. This Generic QAPP has been prepared to meet the requirements specified in the contract and includes the following:

- Objectives of the QAPP (Section 1.1)
- Responsibilities of the Consultant (Section 1.3)
- Sampling and Custody Procedures (Sections 3.0 through 7.0 and Appendix D)
- Analytical Procedures (Section 4.0)
- Field and Laboratory Quality Control Checklist and Frequency Procedures (Sections 4.0 and 6.0)
- Preventative Maintenance Procedures (Section 7.0 and Appendix F)
- Quality Assurance Performance and System Audit Procedures (Sections 8.0 and 9.0)
- Corrective Action Procedures (Section 10.0)
- Additional information necessary to comply with the most current approved guidelines (Sections 2.0 through 10.0 and Appendices A and F)

1.1 Objective and Scope of the Generic QAPP

This QAPP was developed to outline the procedures and guidelines which TRC and its subcontractors will follow to ensure the reliable collection and handling of environmental samples and analytical data. While the full scope of environmental investigations at NYSDEC sites is not presently known, this QAPP is intended to provide the information necessary to establish general quality assurance (QA) and quality control (QC) protocols for investigations which may be conducted. It is the responsibility of TRC to adhere to the procedures and guidelines outlined herein to provide the most accurate data to the NYSDEC.

This QAPP serves as a controlling mechanism during field sampling, laboratory analysis, and data validation to ensure that data collected are valid, reliable, and legally defensible. The QAPP outlines the organization, objectives, and the QA/QC activities which will ensure achievement of desired data goals.

This QAPP provides general information and references standard operating procedures (SOPs) applicable to the sampling program detailed in each site-specific work plan. This information includes definitions and generic goals for data quality and required types and quantities of QC samples. These procedures address field documentation; sample handling, custody, and shipping; instrument calibration and maintenance; auditing; data reduction, validation, and reporting; corrective action requirements; and QC reporting specific to the analyses performed by the contracted laboratory. The field activity specific SOPs can be found in TRC's Generic Field Activities Plan (FAP).

The data generated from the field investigations may be used to determine the nature, extent, and source(s) of contamination at the site, prepare a qualitative human health risk and environmental assessment/site hazard assessment, and develop a cost-effective, environmentally sound, long-term remediation plan consistent with the planned use of the site. The data may also be utilized to monitor for the health and safety of workers at the site and potential off-site receptors.

If any of the collection procedures, sample analysis or sample matrices are modified for a specific site investigation, detailed information regarding the changes and rationale for the change will be provided in a site-specific QAPP addendum and/or in the site-specific work plan.

1.2 Generic QAPP Review and Amendments

This QAPP will be periodically reviewed for its accuracy and applicability to TRC, the NYSDEC, and their activities on project sites. As required, this QAPP will be updated and/or revised to incorporate specific analytical methodologies, modifications, or test procedures used for future environmental investigations. The individual responsible for reviewing the Generic QAPP will be the TRC Quality Assurance Officer (QAO) who is a quality professional and is aware of environmental and laboratory issues and has the authority to implement revisions/changes to the Generic QAPP, where necessary.

The Generic QAPP will undergo a complete review (and/or amendment as appropriate) at the following frequencies:

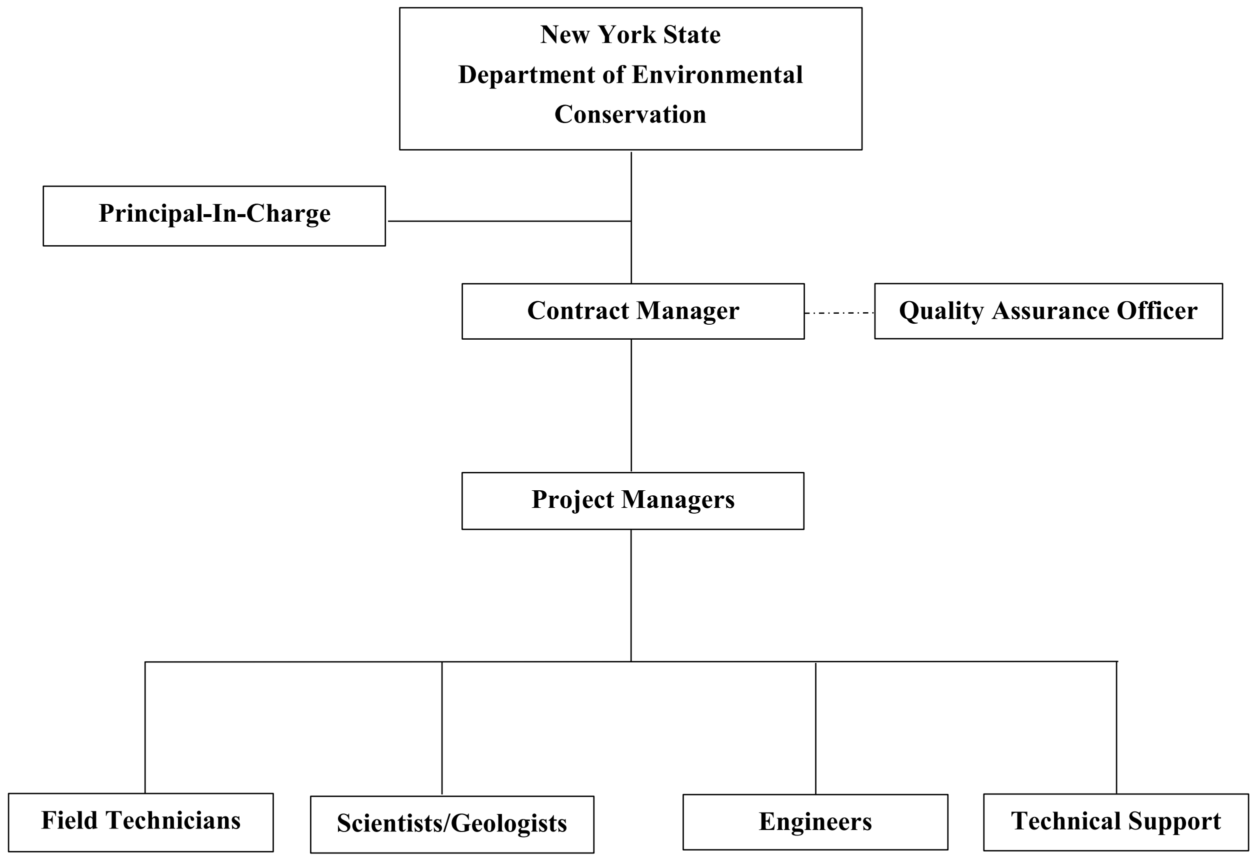
- Annually
- Change in applicable regulations, standards, guidance, policies, etc.
- Change in TRC SOPs
- Upon NYSDEC request

Generic QAPP modifications will be made within 60 calendar days after discovery, observation, or event requiring the review. If revisions and/or changes are made to the Generic QAPP, such revisions will be described in the **Record of Revisions** and provided to the NYSDEC for review and approval. Implementation of the new or modified procedures will be initiated immediately upon NYSDEC approval.

1.3 Consultant Responsibilities

TRC's organizational structure for this contract is presented on the Organizational Chart which follows this page. Project Managers and key staff (i.e., Field Technicians, Scientists/Geologists, Engineers, and

Organizational Chart
Standby Engineering Services Contract No. D009812



Technical Support) report directly to the Contract Manager for direction in connection with contract and project-related tasks. The Contract Manager, QAO, Project Managers, and majority of key staff either report to the Principal-in-Charge, to a direct report of the Principal-in-Charge, or to a subordinate of one of the Principal-in-Charge's direct reports. The Principal-in-Charge provides support directly to the Contract Manager and maintains overall corporate responsibility for ensuring all required resources are made available for the contract, that TRC's performance is of the highest quality, and that projects are properly executed and successfully completed within schedule and budget. Primary lines of communication are maintained between Project Managers and key staff. Project Managers have day-to-day decision-making authority for technical and administrative matters regarding projects. The QAO reports directly to the Principal-in-Charge but communicates directly with the Contract Manager and Project Managers on project-specific issues. The QAO has unquestionable authority to override the Project Manager's decisions on QA/QC matters and procedures. A summary of the QA/QC responsibilities for the roles represented on the organizational chart are presented below.

The following is a list of responsibilities for each of the above identified roles. Some personnel my at times fill more than one role depending on the individual assignment's tasks and the scope of the projects.

Principal-In-Charge:

- Staff and resource allocation
- Monitor and ensure performance is of the highest quality
- Provide management assistance
- Review work products

Contract Manager:

- Contract administration and compliance
- Ensure projects are completed in accordance with technical and administrative requirements
- Ensure staff and resource availability
- Assign project teams in consultation with the Principal-in-Charge
- Monitor and ensure Project Manager/Project Team performance
- Review work products
- Subcontractor review and approval

Quality Assurance Officer:

- Preparation and routine updating, as needed, of the Generic QAPP and FAP
- Conduct laboratory audits

- Conduct field audits
- Provide training regarding monitoring, sampling and QA procedures
- Review chain-of-custody forms and other field forms for accuracy and completeness
- Perform in-house data validation and supervises subcontractor data validation
- Prepare DUSRs
- Oversee inventory and maintenance of field equipment
- Interfaces on a routine basis with the Project Managers

Project Managers:

- Coordinate project activities with the NYSDEC Project Managers
- Manage day-to-day project activities
- Ensure proper implementation of the FAP and QAPP
- Continuously monitor progress with respect to schedule and budget
- Review work products
- Manage and monitor the work of subcontractors

Key Staff:

- Maintain knowledge of QA/QC policies
- Execute work as per QA/QC policies
- Collect data in accordance with approved plans using a wide range of field investigation techniques
- Review, analyze and evaluate data
- Prepare work products

2.0 DATA QUALITY

The type of data needed to meet the project quality objectives (PQOs) includes the required contaminants of concern, concentration levels, media to be sampled, analysis type, and appropriate sampling techniques. The quantity of data needed to meet the PQOs includes the number of samples for each analytical parameter of each media and a definition of the project boundaries. This information will be detailed in site-specific work plans. The quality of data needed to achieve the PQOs includes the necessary data quality indicators (precision, accuracy, representativeness, comparability, completeness, and sensitivity) required of each analytical parameter used for each media sampled. The limits set on each of these items are referred to as measurement performance criteria and define the quality of data generated. Measurement performance criteria have been established for each parameter in order to ensure the data are sound, highly defensible, and with low enough reporting limits to meet human health or ecological risk-based standards when required.

Laboratories will report reporting limits as low as technically possible and will estimate values detected below the quantitation limit. Data obtained during the site investigations will be compared to specific Standards, Criteria, and Guidelines (SCGs). The SCGs that will generally be utilized for screening purposes are provided below.

Standards, Criteria, and Guidelines

Matrix	SCG
Groundwater Surface water	NYSDEC 6 New York Codes, Rules and Regulations (NYCRR), Parts 700-706 and 750-757. NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) - Ambient Water Quality Standards and Guidance Values, dated June 1998, addendum April 2000 and June 2004. Guidelines for Sampling and Analysis of PFAS, NYSDEC Part 375 Remedial Programs, January 2020.
Soil Sediment	NYSDEC 6 NYCRR, Subpart 375-6 Remedial Program Soil Cleanup Objectives, effective December 14, 2006. NYSDEC Commissioner Policy CP-51 on Soil Cleanup Guidance, effective December 3, 2010. NYSDEC Screening and Assessment of Contaminated Sediment, June 24, 2014.

Standards, Criteria, and Guidelines

Matrix	**SCG**
	Guidelines for Sampling and Analysis of PFAS, NYSDEC Part 375 Remedial Programs, January 2020.
Soil Vapor Indoor Air Ambient Air Sub-slab Vapor Perimeter Air	NYSDEC DAR-1, Guidelines for the Control of Toxic Ambient Air Contaminants, dated November 1997* NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006, addendum May 2017. NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (DER-10), Appendices 1A and 1B, New York State Department of Health (NYSDOH) Generic CAMP and Fugitive Dust and Particulate Monitoring, respectively.
Waste	NYSDEC 6 NYCRR Parts 360, 364, 370, 371, 372, 375 and 376 and Subparts 373-2, 373-3, 373-4, 374-1, and 374-2. United States Environmental Protection Agency (USEPA) 40 Code of Federal Regulations (CFR) Part 761.

* Including Complete and Hazardous Air Pollutant Listings, Annual Guideline Concentrations (AGCs), SCGs and Air Quality Standards for the DAR-1 Software Program.

Final selection of SCGs for site remediation and development will be based on the intended use of the property, potential receptors and potential contaminant migration pathways. These SCGs may also consider the USEPA Regional Screening Levels.

The proposed analytical methodologies (Section 4.1) will be able to achieve the PQOs. That is, the analytical methodologies are generally capable of detecting the target analytes below the applicable SCG. These methods provide the highest level of data quality and can be used for purposes of risk assessment, evaluation of remedial systems and verification that cleanup standards have been met. However, in order to ensure that the analytical methodologies can achieve the data quality objectives, measurement performance criteria have been set for the analytical measurements in terms of accuracy, precision, representativeness, completeness, sensitivity, and comparability.

The measurement performance criteria for each parameter are further defined in this section. The analytical methods which will be used for most investigations are summarized in **Appendix A**. Laboratory SOPs are not included in this Generic QAPP but will be available upon request from the laboratory selected to perform the analyses. The laboratory will be NYSDOH Environmental Laboratory Approval Program (ELAP) certified for the required analyses.

2.1 Precision

Precision is the agreement among a set of replicate measurements without consideration of the "true" or accurate value: i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

Field precision is assessed through the collection and measurement of field duplicates (one extra sample in addition to the original field sample). In general, field duplicates will be collected at a frequency of one per 20 investigative samples per matrix per analytical parameter. Precision will be measured through the calculation of relative percent difference (RPD). The resulting information will be used to assess sample homogeneity, spatial variability at the site, sample collection reproducibility, and analytical variability. In general, field duplicate RPDs must be ≤30 for aqueous and air samples and ≤50 for solid samples. Field precision will be improved by following SOPs, utilizing experienced/trained sampling crews, and conducting field audits.

Precision in the laboratory is assessed through the calculation of RPD for laboratory duplicate samples (two samples from the same container). Laboratory precision measures both sample preparation and analysis reproducibility. For the organic analyses, laboratory precision will be assessed through the analysis of matrix spike/matrix spike duplicate (MS/MSD) samples and/or field duplicates. MS/MSD samples will be performed at a frequency of one per 20 investigative samples per matrix. For the inorganic analyses, laboratory precision will be assessed through the analysis of laboratory duplicate samples and/or field duplicates. Laboratory duplicate samples will be performed at a frequency of one per 20 investigative samples per matrix.

2.2 Accuracy

Accuracy is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

Accuracy in the field is assessed through the adherence to all field instrument calibration procedures, sample handling, preservation, and holding time requirements. Accuracy will also be evaluated through the use of trip blanks, equipment blanks, and cooler temperature blanks.

Equipment blanks will be collected by passing laboratory-supplied deionized water over and/or through the respective sampling equipment utilized during each sampling effort. One equipment blank will be collected for each type of non-dedicated field equipment used during each sampling event. One equipment blanks will be collected for each target parameter at a frequency of one per day. Trip blanks will be submitted with each cooler which includes aqueous volatile organic compound (VOC) samples. Trip blank samples will be analyzed for the same VOCs for which the associated media are being analyzed. The equipment and trip blanks will indicate any adverse effects of sample contamination from an outside source (i.e., sample collection) and could result in a positive or negative bias. The bias will be minimized by following standardized SOPs for equipment decontamination, utilizing an experienced/trained sampling crew, conducting field audits, and ensuring the purity of all chemicals.

Laboratories assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of "standards", materials of accepted reference value. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy will be measured in terms of method blank results, the percent recovery (%R) of surrogate or internal standard compounds in organic analyses, or %R of spiked compounds in MSs and/or MSDs, and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds and provides a measure of bias for the parameter of interest. The laboratory method blanks will indicate any adverse effects of sample contamination from an outside source (i.e., sample preparation or sample analysis) and could result in a positive or negative bias.

The frequency of method blanks, surrogates or internal standards, MSs, MSDs, and LCSs are defined in the analytical methods and laboratory SOPs. Laboratory accuracy will be improved by following the USEPA methods and laboratory SOPs, which include detailed requirements for each analysis, utilizing experienced/trained laboratory personnel, ensuring the purity of all chemicals, and conducting laboratory audits.

2.3 Representativeness

Representativeness is a qualitative parameter which expresses the degree to which the data and sampling design accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. The proper design of the sampling program and the laboratory quality control program ensures that the sampling is representative in the quality assurance program.

Representativeness will be satisfied by ensuring that the sampling plan and sampling methods are followed, and that proper sampling, sample handling, and sample preservation techniques are used. Representativeness may also be assessed by the use of field duplicate samples. By definition, field duplicate samples are collected so they are equally representative of a given point in space and time. In this way, they provide both precision and representativeness information. As stated previously, field duplicate samples will be collected at a frequency of one per 20 investigative samples per matrix per analytical parameter which the exception of general chemistry requirements (i.e. percent solids, pH, corrosivity, etc.).

In general, representativeness in the field will be maximized by the following methods: proper sample homogenization procedures, proper sample preservation procedures, utilizing experienced/trained sampling crews, and conducting field audits.

Representativeness in the laboratory is ensured by using the proper analytical procedures and appropriate methods, and by meeting sample holding times. Following the detailed requirements outlined in the USEPA methods and the laboratory SOPs will maximize the representativeness of the laboratory data.

2.4 Comparability

Comparability is a qualitative parameter that expresses the confidence with which one data set can be compared to another.

Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the sampling plan and QAPP are followed, sampling methods are followed, and that proper sampling and preservation techniques are used.

Comparability is dependent on the use of USEPA methods and approved laboratory SOPs, and the reporting of data in standardized units.

2.5 Sensitivity

Sensitivity is the ability of the instrument or method to detect the contaminants of concern at the level of interest. The reporting limits are generally below the SCGs, as defined by the limitations of the method. In almost all cases, USEPA methods were selected to achieve the SCGs. Several analytes may not be able to achieve the SCGs due to the limitations of the method.

Laboratories will need to adjust all reporting limits based on dilutions, sample sizes, extract/digestate volumes, percent solids and cleanup procedures. Sensitivity will be maximized by following the USEPA methods or laboratory SOPs utilizing experienced/trained laboratory personnel and conducting laboratory audits.

2.6 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. “Normal conditions” are defined as the conditions expected if the sampling plan was implemented as planned.

Field completeness is a measure of the amount of (1) valid measurements obtained from all the measurements taken in the project and (2) valid samples collected. The field completeness objective is greater than 90 percent. This allows for the potential loss of samples due to sampling problems or bottle breakage during transport.

Laboratory completeness is a measure of the amount of valid measurements obtained from all valid samples submitted to the laboratory. The laboratory completeness objective is greater than 95 percent. This allows for the potential loss of samples impossible to analyze due to unforeseen interferences and rejected data following data validation.

3.0 SAMPLING DESIGN

The following presents a general discussion of the sampling that may be conducted during field investigations for work assignments. SOPs for typical field investigation activities are provided in the Generic FAP.

- Soil Vapor - Soil vapor samples will be collected during soil vapor surveys or sub-slab sampling programs to locate/confirm the source and extent of contamination.
- Surface Soil - Surface soil samples will be collected to determine the nature and extent of surface soil contamination.
- Subsurface Soil - Subsurface soil samples will be collected during construction of monitoring wells and borings, test pits or at direct-push probe locations to determine the nature and extent of on-site subsurface soil contamination.
- Sediment/Sludge - Sediment and sludge samples will be collected from dry wells, storm drainage systems and/or wastewater disposal/sanitary systems located on-site to determine if collection/disposal systems are a source of contamination.
- Wastewater/Drainage Water - Waste water and drainage water samples will be collected from dry wells and/or wastewater disposal/sanitary systems located on-site to determine if these wells/systems are a source of contamination.
- Storm Water - Storm water samples will be collected from catch basins and storm drains located on-site to determine if the storm water system has been contaminated or is a source of contamination.
- Groundwater - Groundwater samples will be obtained from monitoring wells, direct-push probes or hydropunch sampling devices, which will be installed as part of the site investigation, or from monitoring wells, which were installed previously at the site, to determine if disposal of waste material on-site has impacted groundwater.
- Water Supply - Water supply samples will be collected from private water supply systems to determine if these systems are impacted by on-site (or off-site) contamination.
- Air - Ambient air samples will be collected on-site, particularly in structures, to determine potential exposure to vapor emissions as a result of on-site waste disposal or contaminated soil and/or groundwater underlying the site.
- Asbestos - Bulk suspect asbestos-containing material (ACM) samples of building materials will be collected from the interior and exterior of site buildings and structures to determine the locations, quantities, friability and condition of any ACM present.
- Paint Chip – Paint chip samples will be collected from the interior and exterior of site buildings and structures to determine if lead based paint is present.

- Wipes – Wipe samples will be collected from the interior and exterior surfaces of site buildings and structures to evaluate surface contamination and/or the effectiveness of decontamination activities as needed.

Environmental samples will be collected from different locations as part of the field investigation. As noted above, these may include but are not limited to: groundwater, wastewater, storm/drainage water, sediment/sludge, subsurface soil, surface soil, soil vapor and ambient air, concrete chips and/or cores, wipes. Sample locations will consist of monitoring wells, water supply wells, dry wells, wastewater disposal/sanitary systems, direct push probe locations, hydropunch locations, storm water drainage systems, soil borings, surface soils, test pits, soil vapor points and ambient air. Actual locations will be determined on a site-specific basis.

There will be several steps taken after the transfer of the soil or water sample into the sample container that are necessary to properly complete collection activities. Once the sample is transferred into the appropriate container, the container will be capped and, if necessary, the outside of the container will be wiped with a clean paper towel to remove excess sampling material. The container will not be submerged in water to clean it. Rather, if necessary, a clean paper towel moistened with distilled/deionized water will be used.

When collecting soil samples, an attempt will be made to maintain sample integrity by preserving its physical form and chemical composition to as great an extent as possible. An appropriate sampling device (i.e., decontaminated or dedicated equipment) will be utilized to transfer the sample into the sample container. Samples will contain a representative mix of the matrix from which it was collected.

The materials involved in groundwater sampling are critical to the collection of high-quality monitoring information, particularly where the analyses of volatile, pH sensitive or reduced chemical constituents are of interest. The bailers and pump parts will consist of polytetrafluoroethylene, stainless steel and/or polyethylene as applicable to the type of sampling and constituents involved in the data collection program.

Special precautions, as outlined in the SOPs in the Generic FSP will be taken when collecting samples for per- and polyfluoroalkyl substances (PFAS) analysis.

The methods utilized by TRC for decontamination of sampling equipment are outlined in ECR 010, which is included in **Appendix B.**

4.0 ANALYTICAL METHODS AND QUALITY CONTROL SAMPLES

4.1 Analytical Parameters and Procedures

Samples collected during site characterization or remedial investigation activities will be properly labeled and shipped under proper chain-of-custody (COC) to the laboratory for analysis. Unless noted otherwise, samples will be analyzed by an NYSDOH ELAP-approved laboratory for one or more of the following NYSDEC DER-10 required analytical parameters:

- Target compound list (TCL) VOCs plus the 10 highest concentration tentatively identified compounds (TICs)
- TCL semivolatile organic compounds (SVOCs) plus 20 TICs
- TCL pesticides
- Herbicides
- Polychlorinated biphenyls (PCBs, Aroclors)
- Target analyte list (TAL) metals plus mercury and cyanide
- 1,4-Dioxane
- PFAS

For investigations of known petroleum releases, the suite of contaminants in the fuel oil and gasoline tables (i.e., Tables 2 and 3) of the NYSDEC Commissioner Policy CP-51 on Soil Cleanup Guidance and Spill Guidance Manual will be utilized.

For investigations of non-petroleum releases, sample analysis will use analytical methods appropriate for the stored or discharged material.

When sampling soil vapor, sub-slab vapor, crawl space air, indoor air or outdoor air, all samples will be analyzed by an NYSDOH ELAP-approved laboratory in accordance with USEPA-approved analytical methods utilizing the most current version of NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (Issued October 2006).

When sampling biota tissue, analysis of lipid content is required for all organochlorine compounds using USEPA Method 3540C Soxhlet extraction with a 1:1 hexane/acetone ratio or other approved method. The percent lipids will be quantified by the laboratory from the same aliquot as that used to quantify organochlorine concentrations.

A summary of the analytical methods, potential sample matrices, sample container types, sample preservation methods, and holding times is included **Appendix A**. Analyte lists associated with these analytical methods are summarized in **Appendix C**. Category B deliverables are typically required for all analytical results in order to perform complete validation of the results; limited exceptions may apply (i.e., disposal analyses).

4.2 Sampling Quality Control

This section of the QAPP identifies the QC procedures, checks, and samples that will be used to monitor the quality of various aspects of the sampling event.

4.2.1 Equipment Blanks

Internal quality control checks will include analysis of equipment blanks to check for procedural contamination at the site that may cause sample contamination. Equipment blanks will be prepared by pouring deionized water through or over sampling equipment after equipment decontamination and before field sample collection. Equipment blanks will be submitted at a frequency of one per day per type of non-dedicated equipment used and per parameter. It should be noted that equipment blanks will not be collected for the following parameters:

- VOCs in soil and sediment due to the lack of equipment used in collection (i.e., limited to EnCore® samplers, TerraCore® samplers, or syringes).
- Total organic carbon and pH in soil and sediment due to the nature of the analysis and intended use of the data.
- Geotechnical parameters associated with soil/sediment samples (e.g., grain size).
- All parameters associated with surface water samples due to the lack of equipment used in collection (i.e., direct filling of samples bottles for each parameter).
- All parameters associated with biota/tissue samples.
- Wet chemistry parameters.

4.2.2 Trip Blanks

For aqueous samples, trip blanks will be prepared by filling three 40-milliliter (mL) volatile organic analysis (VOA) vials with American Society for Testing and Materials (ASTM) Type II or equivalent water and preserving the samples with hydrochloric acid to a pH <2. Generally speaking, the laboratories provide trip blanks which would accompany the coolers from shipment from the labs through sample collection and sample return. Trip blank samples will be submitted to the laboratory with every cooler containing aqueous VOC samples and will only be analyzed for VOCs. Trip blanks will be used to evaluate contamination introduced during shipment. In all cases where sampling for PFAS is included in the program, TRC will ensure PFAS free water is utilized in the Trip Blanks.

4.2.3 Cooler Temperature Blanks

Cooler temperature blanks consist of a sample container filled with non-preserved water (potable or distilled) and are included in all coolers containing samples which require temperature preservation. The laboratory uses these temperature blanks to ensure that proper preservation of the samples has been maintained during sample shipment. The temperature of these blanks must be ≤6 ºC to demonstrate that proper preservation has been maintained. The laboratory records the results of the temperature blanks on the COC or sample log-in form immediately upon receipt of the samples at the laboratory, prior to inventory and refrigeration.

4.2.4 Field Duplicates

Field duplicates, or duplicate subsamples, are an additional aliquot of the same sample submitted for the same parameters as the original sample. Field duplicates will be used to assess the sampling and analytical reproducibility. Field duplicates will be collected by alternately filling sample bottles from the source being sampled. Field duplicates will be submitted at a frequency of one per 20 investigative samples, per matrix and analytical parameter. Field duplicates will not be collected for the biota/tissue matrix.

4.3 Laboratory Analytical Quality Control

This section identifies the QC procedures, checks, and samples that will typically be used during the project to monitor the quality of various preparatory and analytical steps by the laboratory. All required QC checks and QC samples and the associated QC acceptance limits are detailed in the associated analytical methods and laboratory SOPs.

4.3.1 Method Blanks

Method blanks will be performed as part of each analytical batch for each methodology performed. Method blanks are used to evaluate contamination introduced during sample preparation and/or analysis by the laboratory.

4.3.2 Instrument Blanks

Instrument blanks are used to evaluate contamination resulting from the analytical reagents and the instrumentation. In addition, instrument blanks are sometimes used to assess potential carryover after the analysis of a highly contaminated sample. Instrument blanks are only required for select analytical parameters.

4.3.3 Matrix Spike Samples

The matrix spike samples are used to determine laboratory preparation and analysis bias for specific compounds in specific matrices (i.e., sample specific QC). Matrix spikes are typically performed at a frequency of one per 20 investigative samples. Aqueous samples submitted for MS/MSD analyses for organic parameters require collection of triplicate volume. Aqueous samples submitted for MS analyses for inorganic parameters require collection of duplicate volume.

4.3.4 Surrogate Spikes

Surrogate spikes are used to evaluate extraction efficiency or analytical bias on a sample by sample basis for organic parameters. Surrogate spikes are added to all samples for organic parameters. Surrogate spikes are another measure of sample-specific QC.

4.3.5 Laboratory Control Samples

LCSs are used to evaluate select parameters for the ability of the laboratory to accurately identify and quantitate target compounds in a reference matrix when spiked with a known concentration using a secondary source standard. LCSs are typically performed as part of each analytical batch for each methodology. LCSs are also a self-check for the laboratory to ensure the method is in compliance.

4.3.6 Laboratory Duplicate

Laboratory duplicates are used to evaluate laboratory preparation and analysis precision. These analyses are typically performed for inorganic parameters only. Laboratory duplicates are typically performed at a frequency of one per 20 samples per matrix.

4.3.7 Matrix Spike Duplicate Samples

MSDs are used to evaluate laboratory preparation and analysis bias and precision for specific compounds in specific sample matrices (i.e., sample-specific QC). MSDs are typically performed for organic parameters only at a frequency of once per 20 samples per matric type.

4.3.8 Internal Standards

Internal standards are used to assess the analytical accuracy, precision, and stability. Internal standards are typically only used for gas chromatography/mass spectrometry analyses and inductively coupled plasma/mass spectrometry analyses. Internal standards are spiked into all samples and are considered a sample-specific QC measure.

5.0 SAMPLE COLLECTION DOCUMENTATION

Proper management and documentation of field and sampling activities is essential to ensure that all necessary work is conducted in accordance with the sampling plan and QAPP in an efficient and high-quality manner. Field management procedures will include following proper COC procedures to track a sample from collection through analysis, noting when and how samples are split (if required); completing COC Forms; completing Boring, Well and Test Pit Construction Logs; maintaining a daily Field Log Book; preparing Daily Field Activity Reports; completing Field Change Forms; and filling out a Daily Air Monitoring Form. Copies of each of these forms are provided in **Appendix D**. Proper completion of these forms and the field log book are necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the samples were collected and handled properly.

5.1 Sample Identification

All samples will be identified using a unique sample identification scheme suitable to the site and sampling protocol and will be labeled with a sample identification code that is compatible with the NYSDEC EQuIS format. The code will identify the site, sample location, sample matrix and series numbers for sample locations with more than one sample. Samples will be labeled according to the following system:

Site:

Site name (i.e., Fashion Care Cleaning "FCC")

Sample Location:

MW – Monitoring Well
WS – Water Supply
SS – Surface Soil
SB – Soil Boring
DW – Dry Well
H – Hydropunch
P – Probe
TP – Test Pit
WET – Wetland

Sample Matrix (as listed in NYSDEC EQuIS reference values):

AE – Vapor Extraction Well Effluent
AI – Indoor Ambient Air
AO – Outdoor Ambient Air
AQ – Air Quality Control Matrix
AS – Soil Vapor
CA – Bottom Ash
CF – Fly Ash Cinder
SS – Surface Soil
SW – Swab or Wipe
TA – Animal Tissue
TP – Plant Tissue
TQ – Tissue Quality Control Matrix
U – Unknown
WC – Drilling Water (for well construction)

DC – Drill Cuttings
GE – Gaseous Effluent (Stack Gas)
GL – Headspace of Liquid sample
LD – Drilling Fluid
LE – Liquid Emulsion
LF – Floating/Free Product LNAPL
LS – DNAPL
SE – Sediment
SF – Filter Sand pack
SL – Sludge
SN – Miscellaneous Solid Materials
SO – Soil

WD – Well Development Water
WE – Estuary – Brackish Surface Water
WG – Groundwater
WH – Rinsate
WI – Interstitial Water
WL – Leachate
WO – Ocean Water – Saline Surface Water
WP – Drinking Water
WQ – Water Quality Control Matrix
WS – Surface Water
WW – Waste Water
WZ – Special Water Quality Control Matrix

<u>Sample Number</u>:

For circumstances where more than one sample of the same type and/or from the same location will be collected, a consecutive sample number will be assigned. When more than one sample is collected from a borehole in a sampling round at different depths, the depth will be indicated on the sample container and in the field log book.

<u>Field Duplicates:</u>

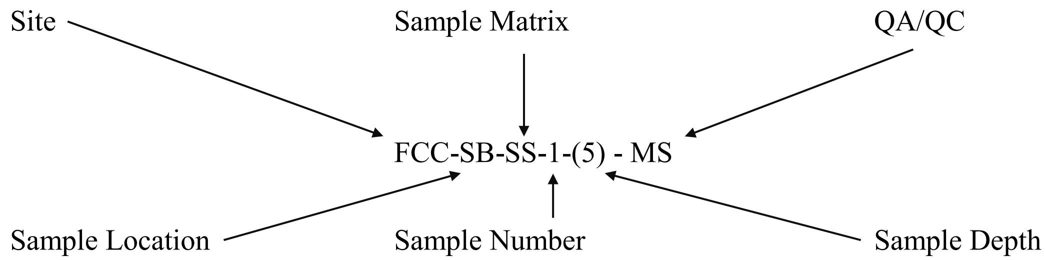
Will be submitted to the laboratory as a "blind" duplicate sample, in that a unique sample identification not tied to the primary sample identification will be assigned to the duplicate (e.g., DUP-01).

<u>QA/QC:</u>

MS – Matrix Spike
MSD – Matrix Spike Duplicate

EB – Equipment Blank
TB – Trip Blank

Based upon the above sample identification procedures, an example of a sample label may be:



5.2 Chain-of-Custody

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files.

A sample is considered to be under a person's custody if:

- The item is in the actual possession of a person;
- The item is in the view of the person after being in actual possession of the person;
- The item was in the actual physical possession of the person but is locked up to prevent tampering; and,
- The item is in a designated and identified secure area.

5.3 Field Sample Custody

Sample handling is an important part of the field investigation program, since samples that are incorrectly handled can affect the quality of data. Sample handling begins at the collection of the sample and continues until the sample has been analyzed. An overriding consideration essential for the validation of environmental measurement data is the necessity to demonstrate that samples have been obtained from the locations stated and that they have reached the laboratory without alteration. Evidence of sample tracking from collection to shipment, laboratory receipt, and laboratory custody (until proper sample disposal and the introduction of field investigation results as evidence in legal proceedings, when pertinent) must be documented.

Sample COC and packaging procedures are summarized below. These procedures will ensure that the samples will arrive at the laboratory with the COC intact. The TRC Field Team Leader (or designee) is responsible for overseeing and supervising the implementation of proper sample custody procedures in the field and up until the samples have been transferred to a courier. The COC procedures are initiated in the field immediately following sample collection. The procedures consist of: (1) preparing and attaching a unique sample label to each sample collected, (2) completing the chain-of-custody form, and (3) preparing and packing the samples for shipment, as described in more detail below.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.

- All bottles will be identified by the use of pre-printed adhesive sample labels with site name and location, sample locations, date/time of collection, type of preservation, type of analysis, and sampler's initials. The sample naming/numbering system is presented in Section 5.1.

- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. In addition, with the exception of VOC vials, sample labels will be covered with clear tape to minimize water damage during transit.

- Samples will be transported in containers (coolers) which will maintain the refrigeration temperature for those parameters for which refrigeration is required. Sample aliquots which require acidification will be checked with pH paper at the time of preservation. Confirmation of preservation will include capping of the preserved sample, repeated inversion (3x), uncapping and touching pH paper to the cap to confirm the sample pH. If required, additional preservative will be added, and the procedure repeated until proper preservation is achieved. For VOCs, the sample aliquot used to confirm preservation will not be submitted for analysis.

- Samples will be accompanied by a properly completed COC form. The sample numbers and locations will be listed on the COC form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage location.

- COC records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signatures of samplers; (3) the sample number, date and time of collection, and whether the sample is grab or composite; (4) signatures of individuals involved in sampling; and (5) if applicable, air bill or other shipping number.

- All shipments will be accompanied by the COC record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.

- Samples will be shipped to the laboratory within 24 to 48 hours of sample collection using an overnight delivery service or via courier service. If analytical holding times are 24 to 48 hours from time of sample collection or if samples need to be preserved at the laboratory, samples will be shipped or picked up within 24 hours of sample collection using an overnight delivery service or courier service, respectively.

- Samples will be properly packaged for shipment and dispatched to the laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. Shipping containers will be secured for shipment to the laboratory. If an authorized laboratory courier does not pick up the samples from the project site, custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. Subsequently, the cooler will be strapped shut with strapping tape in at least two locations.

- If the samples are sent by common carrier, the air bill will be used. Air bills will be retained by the laboratory as part of the permanent documentation. Commercial carriers are not required to sign off on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.

- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory sample custodian, and signature of the laboratory sample custodian on the COC document as receiving the samples and signature of sampler as relinquishing samples.

The procedures for shipping and packaging samples are also outlined in TRC's SOP: Packaging and Shipping of Non-Hazardous Environmental Samples and provided in **Appendix E**.

5.4 Field Log Book

Field logbooks will provide the means of recording the chronology of data collection activities performed during the investigation. As such, entries will be described in as much detail as possible so that a particular situation could be reconstructed without reliance on memory.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel but will be stored in the project files when not in use. Each logbook will be identified by the project-specific document number. All logbooks will be water resistant and have sequentially numbered pages.

The title page of each logbook will contain the following:

- Person to whom the logbook is assigned,
- The logbook number,
- Project name and number,
- Site name and location,

- Site location by longitude and latitude, if known,
- Project start date, and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, and names of all sampling team members present will be entered. Each page of the logbook will be signed and dated by the person making the entry. All entries will be made in permanent ink, signed, and dated and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark which is signed and dated by the sampler. The correction shall be written adjacent to the error.

Field activities will be fully documented. Information included in the logbook will include, but may not be limited to the following:

- Chronology of activities, including entry and exit times,
- Names of all people involved in sampling activities and organizational affiliations,
- Level of personal protection used,
- Any changes made to planned protocol,
- Names of visitors to the site during sampling and reason for their visit,
- Sample location and identification,
- Weather conditions, including temperature and relative humidity,
- Dates (month/day/year) and times (military) of sample collection,
- Measurement equipment identification (model/manufacturer) and calibration information,
- Field screening results,
- Site observations,
- Sample collection methods and equipment,
- Sample collection date and time,
- Sample depths,
- Whether grab or composite sample collected,
- How sample composited, if applicable,
- Sample description (color, odor, texture, etc.),
- Sample identification code,
- Tests or analyses to be performed,

- Sample preservation and storage conditions,
- Equipment decontamination procedures,
- QC sample collection,
- Unusual observations,
- Record of photographs,
- Sketches or diagrams (using permanent references and distances to the sampling point, if possible), and
- Signature of person recording the information.

Field logbooks will be reviewed on a daily basis by the TRC Field Team Leader. Logbooks will be supported by standardized forms. Examples of the forms are presented in **Appendix D**.

Upon receipt of the field logbook for a particular activity, the designated person recording the notes will begin recording notes on a new page. The person recording the notes will indicate the date, time, and weather conditions, prior to recording information about the field activity. The field logbook will indicate whether any field forms are used. When the designated person recording the notes either relinquishes the field logbook to another team member or turns the book in at the end of the day, the person relinquishing the field logbook will affix a signature and date to the bottom of the last page used. If the page is not complete, a diagonal line will be struck across the blank portion of the page.

5.5 Daily Field Activity Report

At the end of each day of field work, the Field Team Leader, or designee, will complete this report noting personnel on-site and summarizing the work performed that day, equipment, materials and supplies used, results of field analyses, problems and resolutions.

5.6 Field Changes and Corrective Actions

Whenever there is a required or recommended investigation/sampling change or correction, a Field Change Form will be completed by the Field Team Leader and approved by the Project Manager.

6.0 LABORATORY SAMPLE CUSTODY, SAMPLE RECEIPT, STORAGE, AND DISPOSAL PROCEDURES

Upon receipt of samples at the laboratory, the laboratory's sample custodian will inspect the samples for integrity and check the shipment against the COC. Discrepancies are reported to the laboratory's project manager who contacts the TRC project manager for resolution.

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will:

- Examine the shipping containers to verify that the custody seals are intact,
- Examine all sample containers for damage,
- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the COC or sample log-in records,
- Compare samples received against those listed on the COC,
- Verify that sample holding times have not been exceeded,
- Examine all shipping records for accuracy and completeness,
- Determine sample pH (if applicable) and record on COC or sample log-in forms,
- Sign and date the COC immediately (if shipment is accepted) and attach the air bill,
- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the laboratory project manager, who will be responsible for contacting TRC,
- Attach laboratory sample container labels with unique laboratory identification and test, and
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged-in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field identification provided by field personnel.
- The laboratory project manager will be notified of sample arrival.
- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

The laboratory's sample custodian will be responsible for sample storage and security to ensure that:

- Samples and extracts are stored for 60 days after the final analytical data report has been forwarded to TRC. The samples, extracts, and sample digestion byproducts are then discarded in accordance with Occupational Safety and Health Administration guidance; and,
- Samples are not stored with standards or sample extracts.

SOPs for laboratories to be utilized under the contract will be made available upon request.

7.0 CALIBRATION PROCEDURES AND PREVENTATIVE MAINTENANCE

Periodic preventive maintenance may be required for equipment. Instrument manuals will be kept on file for reference if equipment needs repair. The troubleshooting section of factory manuals may be used in assisting personnel in performing routine/minor maintenance tasks. The frequency of preventative maintenance for field equipment is indicated in each operating instruction manual.

The following information regarding equipment will be maintained at the project site:

- Equipment calibration and operating procedures which will include provisions for documentation of frequency, conditions, standards and records reflecting the calibration procedures, methods of usage and repair history of the measurement system. Calibration of field equipment will be performed daily at the sampling site so that any background contamination can be taken into consideration and the instrument calibrated accordingly.
- A schedule of preventive maintenance tasks, consistent with the instrument manufacturer's specific operation manuals that will be carried out to minimize down time of the equipment.
- Critical spare parts, necessary tools and manuals will be on hand to facilitate equipment maintenance and repair.

Calibration procedures and preventive maintenance for laboratory equipment will be contained in the laboratory's SOPs, which will be available upon request. Further information regarding the TRC Preventative Maintenance Program is included in **Appendix F**.

8.0 FIELD AUDITS

Audits of field activities may be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the QAPP.

A system audit of field activities, including sampling and field measurements, may be conducted and documented by the TRC QAO (or his/her designee) at the start of sampling. The purpose of this audit is to verify that all established procedures are being followed as planned and documented and to allow for timely corrective action, reducing the impact of the nonconformance to the procedures described in the QAPP. The audit will ensure that all personnel have read the QAPP. The audit will cover field sampling records, field measurement results, field instrument operation and calibration records, sample collection, preservation, handling, and packaging procedures, adherence to QA procedures, personnel training, sampling procedures, decontamination procedures, review of sampling design versus the site-specific work plan, corrective action procedures, chain-of-custody, etc. Follow-up surveillance will be conducted by the TRC Field Team Leader to verify that QA procedures are maintained throughout the investigation.

Upon completion of the audit, the TRC QA Officer will prepare a written audit report, which summarizes the audit findings, identifies deficiencies and recommends corrective actions. In addition, a verbal debriefing will also be given to the TRC Field Team Leader and TRC Project Manager at the time of the audit. The written report will be submitted to the TRC Project Manager, who will be responsible for ensuring that corrective measures are implemented.

In addition to field audits, the Field Team Leader will provide oversight of any on-site subcontractors and report any issues to the TRC Project Manager.

A copy of the Field Audit Form is provided in **Appendix D**. Records of audits will be maintained in the project files.

9.0 DATA VALIDATION

An independent review of Category B laboratory data packages will be performed by TRC or a selected subcontractor, in order to determine the quality of the analytical data. Each data package will be reviewed for completeness to ensure it is in conformance with the QAPP requirements. Data validation will be performed in accordance with the guidance provided in NYSDEC DER-10, Appendix 2B, Guidance for Data Deliverables and the Development of Data Usability Summary Reports (DUSRs).

The DUSR is prepared by reviewing and evaluating the analytical data. The parameters to be evaluated in reference to compliance with analytical method protocols include all COC forms, holding times, preservation, raw data (instrument print out data and chromatograms), calibrations, blanks, spikes, surrogate recoveries, field duplicates, as applicable to the method.

The DUSR will describe the sample and analytical parameters reviewed. Data deficiencies, analytical protocol deviations and quality control problems will be described and their effect on the data discussed. The report will include the samples reviewed, a summary of associated field QC samples, and a discussion of the nonconformances with reference to the affected samples. The report will also include a discussion on how the nonconformance affects the achievement of the project objectives. Qualifiers applied to the data during preparation of the DUSR will be entered into the database. Validated data will be used to generate tables and figures.

The following data validation guidelines will be utilized for the DUSR preparation. These guidelines will be modified as needed to accommodate the specific analytical methodologies.

- USEPA National Functional Guidelines for Organic Superfund Methods Data Review (EPA-540-R-017-002), January 2017.
- USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA-540-R-2017-001), January 2017.
- USEPA National Functional Guidelines for High Resolution Superfund Methods Data Review (EPA-542-B-16-001), April 2016.
- USEPA Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537 (EPA 910-R-18-001), November 2018.
- New York State Department of Environmental Conservation Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids, January 2020.

Resampling and reanalysis recommendations will be made, if necessary.

10.0 CORRECTIVE ACTION

Corrective action for analytical work will include recalibration of instruments, reanalysis of known QC samples and, if necessary, reanalysis of actual field samples. Specific QC procedures and checklists will be in use by the analytical laboratory, designed to help analysts detect the need for corrective action. Often the person's experience will be valuable in alerting the operator to suspicious data or malfunctioning equipment.

If an immediate corrective action can be taken, as part of normal operating procedures, the collection of poor-quality data can be avoided. Instrument and equipment malfunctions are amenable to this type of action and the QC procedures include troubleshooting guides and corrective action suggestions. The actions taken will be noted in field or laboratory notebooks, but no other formal documentation is required, unless further corrective action is necessary. These on-the-spot corrective actions are an everyday part of the QA/QC system.

Corrective action during the field sampling portion of a program is most often a result of equipment failure or an operator oversight and may require recollection of a sample. Operator oversight is best avoided by having field crew members audit each other’s work before and after a test. Every effort will be made by the Field Team Leader to ensure that all QC procedures are followed.

If potential problems are not solved as an immediate corrective action, TRC will apply formalized long-term corrective action if necessary.

Documentation of the problem is important to the system. A Corrective Action Request Form will be filled out by the person finding the quality problem. This form identifies the problem, possible causes and the person responsible for action on the problem. The responsible person may be a laboratory analyst, field team leader, Laboratory QA Manager, or the TRC QAO. If no person is identified as responsible for the action, the TRC QAO investigates the situation and determines who is responsible in each case.

The Corrective Action Request Form includes a description of the corrective action planned and the date it was taken, and space for follow-up. The TRC QAO checks to be sure that initial action has been taken and appears effective and, at an appropriate later date, checks again to see if the problem has been fully solved. The TRC QAO receives a copy of all Corrective Action Request Forms. This permanent record aids the TRC QAO in follow-up and makes any quality problems visible to management; the log may also prove valuable in listing a similar problem and its solution.

10.1 Field Non-Conformances

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the QAPP), or when sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. The field team may identify the need for corrective action. The TRC Field Team Leader will approve the corrective action and notify the TRC Project Manager. The TRC Field Team Leader will ensure that the corrective measure is implemented by the field team. Corrective actions will be implemented and documented in the field logbook. Documentation will include:

- A description of the circumstances that initiated the corrective action,
- The action taken in response,
- The final resolution, and
- Any necessary approvals.

No staff member will initiate corrective action without prior communication of findings through the proper channels. If necessary, a problem resolution audit will be conducted.

10.2 Laboratory Non-Conformances

Corrective action in the laboratory may occur prior to, during, and after initial analyses. Several conditions such as broken sample containers, omissions or discrepancies with chain-of-custody documentation, low/high pH readings, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The USEPA methods, and laboratory SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to TRC. If the corrective action does not rectify the situation, the laboratory will contact the TRC QAO, who will determine the action to be taken and inform the appropriate personnel. If necessary, a problem resolution audit will be conducted.

10.3 Data Validation and Data Assessment Non-Conformances

The need for corrective action may be identified during either data validation or data assessment. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory. These actions are dependent upon the ability to mobilize the field team and whether the data to be collected are necessary to meet the required QA objectives. If the data validator or data assessor identifies a corrective action situation, the TRC Project Manager will be responsible for informing the appropriate personnel. All corrective actions of this type will be documented by the TRC Project Manager and maintained in the project files.

Appendix A
Summary of Monitoring Parameters

Appendix A: Analytical Methods, Preservation, Holding Times and Sample Containers					
Field Sample Matrix	**Parameter**	**Analytical Method References**	**Sample Preservation**	**Holding Time from Collection**	**Container**
Soil/Sediment	PFAS	Laboratory's specific PFAS SOP based on EPA Method 537.1 (isotope dilution)	Cool, 4ºC, not frozen and samples must not exceed 10ºC during the first 48 hours after collection.	14 days to extraction; 28 days from extraction to analysis	2-4 oz HDPE bottles with HDPE screw caps
Soil/Sediment	TCL VOCs	SW-846 5035A/8260C	Methanol-preserved in the field and cool to 4°C (high-level); and water-preserved in the field and cool to 4ºC (low-level). (Soil/preservative ratio: 1:1)	High-level: 14 days to analysis Low-level: 48 hours to freezing at < -7ºC; 14 days to analysis	2-40 mL methanol-preserved VOA vials (high-level); or 2-40 mL vials with laboratory reagent water and magnetic stir bar (low-level)
Soil/Sediment	TCL SVOCs	SW-846 8270D	Cool to 4°C	14 days to extraction; 40 days from extraction to analysis	1-4 oz amber glass jar with Teflon-lined cap
Soil/Sediment	TPH-DRO	SW-846 8015C	Cool to 4°C	14 days to extraction; 40 days from extraction to analysis	1-4 oz amber glass jar with Teflon-lined cap
Soil/Sediment	TPH-GRO	SW-846 8015C	Methanol-preserved in the field and cool to 4°C	14 days to analysis	2-40 ml methanol-preserved VOA vials
Soil/Sediment	TCL Pesticides	SW-846 8081B	Cool to 4°C	14 days to extraction; 40 days from extraction to analysis	1-4 oz amber glass jar with Teflon-lined cap
Soil/Sediment	PCB Aroclors	SW-846 8082A	Cool to 4°C	14 days to extraction; 40 days from extraction to analysis	1-4 oz amber glass jar with Teflon-lined cap
Soil/Sediment	Herbicides	SW-846 8151A	Cool to 4°C	14 days to extraction; 40 days from extraction to analysis	1-4 oz amber glass jar with Teflon-lined cap
Soil/Sediment	TAL Metals	SW-846 6010C/6020A/7471B	Cool to 4°C	Mercury: 28 days to analysis Other Metals: 180 days to analysis	1-8 oz polyethylene/ glass bottle and cap
Soil/Sediment	Cyanide	SW-846 9010C/9014	Cool to 4°C	14 days to analysis	1-8 oz polyethylene/glass bottle and cap
Soil/Sediment	Hexavalent Chromium	SW-846 3060A/7196A	Cool to 4°C	30 days to extraction; 7 days from extraction to analysis	1-4 oz glass jar with Teflon-lined cap
Soil/Sediment	pH	SW-846 9045D	Cool to 4°C	24 hours to analysis	1-4 oz glass jar with Teflon-lined cap
Soil/Sediment	ORP	ASTM Method D 1498-00, modified	Cool to 4°C	24 hours to analysis	1-4 oz glass jar with Teflon-lined cap

Appendix A: Analytical Methods, Preservation, Holding Times and Sample Containers					
Field Sample Matrix	**Parameter**	**Analytical Method References**	**Sample Preservation**	**Holding Time from Collection**	**Container**
Soil/Sediment	Corrosivity	SW-846 9045D	Cool to 4°C	24 hours to analysis	1-4 oz amber glass jar with Teflon-lined cap
Soil/Sediment	Ignitability	SW-846 1030/ASTM Method D93-12	Cool to 4°C	None	1-4 oz amber glass jar with Teflon-lined cap
Soil/Sediment	TCLP or SPLP VOCs	SW-846 1311 or 1312/5030B/8260C	Cool to 4°C No headspace	14 days to analysis	1-4 oz glass jar with Teflon-lined cap
Soil/Sediment	TCLP or SPLP SVOCs	SW-846 1311 or 1312/3510C/8270D	Cool to 4°C	14 days to TCLP/SPLP extraction; 7 days from TCLP/SPLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis	1-8 oz glass jar with Teflon-lined cap
Soil/Sediment	TCLP or SPLP Metals	SW-846 1311 or 1312/3005A, 3015A/6010C/7470A	Cool to 4°C	Mercury: 28 days Other metals: 180 days to analysis	1-8 oz glass bottle and cap
Soil/Sediment	Reactive Cyanide	SW-846 Update III Chapter 7, Section 7.3.4	Cool to 4°C; no headspace	3 days to analysis	1-4 oz amber glass jar with Teflon-lined cap
Soil/Sediment	Reactive Sulfide	SW-846 Update III Chapter 7, Section 7.3.3	Cool to 4°C; no headspace	3 days to analysis	1-4 oz amber glass jar with Teflon-lined cap
Groundwater/ Surface water	PFAS	Laboratory's specific PFAS SOP based on EPA Method 537.1 (isotope dilution)	Cool, 4ºC, not frozen and samples must not exceed 10ºC during the first 48 hours after collection.	14 days to extraction; 28 days from extraction to analysis	2-250 mL HDPE bottles with HDPE screw caps
Groundwater/ Surface water	TCL VOCs	SW-846 5030B/8260C	Cool to 4°C HCl to pH<2	14 days to analysis	2-40 mL VOA vials
Groundwater/ Surface water	TCL SVOCs	SW-846 8270D	Cool to 4°C	7 days to extraction; 40 days from extraction to analysis	2-1 L amber glass bottles with Teflon-lined cap
Groundwater/ Surface water	1,4-Dioxane	SW-846 8270D with SIM/isotope dilution	Cool to 4°C	7 days to extraction; 40 days from extraction to analysis	2-1 L amber glass bottles with Teflon-lined cap
Groundwater/ Surface water	TPH-DRO	SW-846 8015C	pH <2 with HCl; cool to 4°C	14 days to extraction; 40 days from extraction to analysis	2-1 L amber glass bottles with Teflon-lined cap
Groundwater/ Surface water	TPH-GRO	SW-846 8015C	Cool to 4°C HCl to pH<2	14 days to analysis	2-40 mL VOA vials

Appendix A: Analytical Methods, Preservation, Holding Times and Sample Containers					
Field Sample Matrix	**Parameter**	**Analytical Method References**	**Sample Preservation**	**Holding Time from Collection**	**Container**
Groundwater/ Surface water	TCL Pesticides	SW-846 8081B	Cool to 4°C	7 days to extraction; 40 days from extraction to analysis	2-1 L amber glass bottles with Teflon-lined cap
Groundwater/ Surface water	PCB Aroclors	SW-846 8082A	Cool to 4°C	7 days to extraction; 40 days from extraction to analysis	2-1 L amber glass bottles with Teflon-lined cap
Groundwater/ Surface water	Herbicides	SW-846 8151A	Cool to 4°C	7 days to extraction; 40 days from extraction to analysis	2-1 L amber glass bottles with Teflon-lined cap
Groundwater/ Surface water	Metals	SW-846 6010C/6020A/7470A	pH <2 with HNO_3; cool to 4°C	Mercury: 28 days to analysis Other Metals: 180 days to analysis	1-1 L polyethylene/glass container
Groundwater/ Surface water	Cyanide	SW-846 9010C/9014	Cool to 4°C; NaOH to pH >12	14 days to analysis	1-1 L glass or polyethylene bottle and cap
Groundwater/ Surface water	Hexavalent Chromium	SW-846 7196A	Cool to 4°C	24 hours to analysis	1-1 L glass or polyethylene bottle and cap
Air	VOCs	EPA Method TO-15	None	30 days to analysis	1 pre-cleaned, evacuated, passivated stainless steel canister
Air	PAHs	EPA Method TO-13A	Cool to 4°C	7 days to extraction; 40 days from extraction to analysis	1 quartz-fiber filter/PUF plug/XAD-2 resin
Bulk	Asbestos	EPA/600/R-93/116 (July 1993)	None	None	1 Ziploc bag
Paint Chips	Lead	SW-846 7000B	None	None	1 Ziploc bag

Appendix B
TRC SOP ECR010 – Equipment Decontamination

Title: **Equipment Decontamination**	Procedure Number: **ECR 010**
	Revision Number: **1**
	Effective Date: **December 2016**

Authorization Signatures

Technical Reviewer	Date	ECR Practice Quality Coordinator	Date
James Peronto	12/15/16	Elizabeth Denly	12/15/16

TABLE OF CONTENTS

Page No.

ATTACHMENTS

1.0 INTRODUCTION

1.1 Scope & Applicability

This Standard Operating Procedure (SOP) was prepared to direct TRC personnel in the procedures needed for decontamination of equipment used in the field during environmental investigations (e.g., sediment, soil, groundwater investigations). Other state or federal requirements may be above and beyond the scope of this SOP and will be followed, if applicable. In all instances, the actual procedures used should be documented and described in the field notes. Preventing or minimizing potential cross-contamination of samples is important for the collection of representative samples, avoiding the possible introduction of sampling error into sample results, and for protecting the health and safety of site personnel.

Removing or neutralizing potential contaminants that may have accumulated on equipment and vehicles ensures protection of personnel, reduces or eliminates potential transfer of contaminants to clean areas, and minimizes the likelihood of sample cross-contamination.

The use of dedicated, disposable, new sampling equipment (e.g., disposable liners, plastic spoons, plastic or aluminum bowls) should be considered as an alternative to equipment decontamination and the subsequent generation of decontamination fluids.

1.2 Summary of Method

Equipment decontamination is used to remove potential contaminants from a sampling device or piece of field equipment prior to and between the collection of samples and is also used to limit personnel exposure to residual contamination that may be present on used field equipment.

Contaminants can be physically removed from equipment or deactivated by sterilization or disinfection. Gross contamination of equipment requires physical decontamination, including abrasive and nonabrasive methods. These include the use of brushes, air and wet blasting, and high-pressure water, followed by a wash/rinse process using appropriate cleaning solutions. A solvent rinse may be required when organic contamination is present, and an acid rinse may be required when metals are parameters of interest. Equipment decontamination procedures can vary depending on the media being sampled and the type of sampling equipment being used. Disposal of decontamination fluids will be handled on a project-specific basis and will be in accordance with all applicable regulations.

1.3 Equipment

The following equipment may be utilized when decontaminating equipment. Project-specific conditions or requirements may warrant the use of additional equipment or deletion of items from this list. For specialized sampling programs involving per- and polyfluorinated alkyl substances (PFAS), refer to Attachment B for further details.

- Appropriate level of personal protective equipment (PPE) as specified in the site-specific Health and Safety Plan (HASP)

- Alconox®, Liquinox® or other nonphosphate concentrated laboratory-grade soap
- Simple Green® or other nontoxic biodegradable cleaner
- Deionized, distilled, or organic-free water, as appropriate (may be supplied by the laboratory or purchased from commercial vendors depending on project requirements)
- Pump sprayer
- Pressure sprayer
- Squeeze bottle filled with pesticide-grade hexane (option for organic analyses)
- Squeeze bottle filled with pesticide-grade methanol (option for organic analyses)
- Squeeze bottle filled with pesticide-grade isopropanol (option for organic analyses)
- Squeeze bottle filled with 10 percent nitric acid (option for metals analyses and stainless-steel equipment)
- Squeeze bottle filled with 1 percent nitric acid (option for metals analyses)
- Container (squeeze bottle to 5-gallon bucket) filled with potable water and a nonphosphate, laboratory-grade soap (approximately 1 tablespoon of soap to 5 gallons of water)
- Extra quantities of above listed liquids
- Potable water
- Containers, such as buckets or wash basins (the type and number of containers is dependent on the procedure)
- Scrub brushes
- Small wire brush
- Aluminum foil
- Polyethylene sheeting
- A container for decontamination of pumps and associated tubing.

1.4 Health & Safety Considerations

TRC personnel will be on site when implementing this SOP. Therefore, TRC personnel shall follow the site-specific HASP. TRC personnel will use the appropriate level of PPE as defined in the HASP.

Samples containing chemical contaminants may be handled during implementation of this SOP. Certain decontamination fluids, including solvents and/or acids, are considered hazardous materials, and TRC employees will appropriately handle and store them at all times. Appropriately manage chemicals that pose specific toxicity or safety concerns, and follow any other relevant requirements as appropriate. Hazardous substances may be incompatible or may react to produce heat, chemical reactions, or toxic products. Some hazardous substances may be incompatible with clothing or equipment and can permeate or degrade protective clothing or equipment. Also, hazardous substances may pose a direct health hazard to workers through inhalation or skin contact or if exposed to heat/flame and they combust. Safety data sheets for chemicals handled by TRC personnel should be maintained in a designated location at the project site.

1.5 Cautions and Potential Problems

Special care should be taken when decontaminating equipment used for sampling for PFAS. Please refer to Attachment B for details.

- The use of deionized, distilled or organic-free water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment provided that it has been certified by the vendor as analyte-free and/or meets the project-specific requirements.

- Alconox®, Liquinox®, or other nonphosphate, concentrated, laboratory-grade soap may contain trace quantities of perchlorate.

- Avoid using an excessive amount of soap during decontamination procedures, as this could result in difficulty rinsing the soap residue off of the equipment. Typically the soap solution is prepared using 1 tablespoon of soap to 5 gallons of water.

- Use sufficient amount of decontamination fluid (e.g., acid or solvent rinses) so that the fluid flows over the equipment and runs off. Spraying the equipment with a minimal amount of decontamination fluid that does not run off is ineffective.

- Spent decontamination solutions are considered investigation-derived waste (IDW) and must be managed as directed by the site-specific field program. Project and regulatory requirements, chemical compatibility, ambient conditions and professional judgment should be used to determine the appropriate decontamination process with respect to combining and/or segregating decontamination fluids. Section 3 of this SOP provides more guidance on the disposal procedures.

- Several procedures can be established to minimize the potential for cross-contamination or analytical interference by decontamination fluids. For example:

  - The use of methanol in the decontamination procedure may not be appropriate if methanol is a contaminant of concern.

  - Isopropanol may be used as a substitute for methanol but may not be appropriate when collecting samples for volatile organic compound (VOC) analyses. Residual isopropanol on the equipment may cause substantial interferences in subsequent VOC analyses and may result in unnecessary dilutions and/or false positive results if isopropanol is not removed in subsequent decontamination steps. It should also be noted that the application of isopropanol to hot metal surfaces (e.g., a steam-cleaned split spoon) may cause oxidation of the isopropanol to acetone.

- If hexane is used in the decontamination procedure, caution should be used to ensure that the hexane is completely volatilized and the equipment is subsequently rinsed when samples are to be analyzed for VOCs and volatile petroleum hydrocarbons (VPH). Residual hexane on equipment could interfere with the VOC and VPH analyses and may result in unnecessary dilutions and/or false positive results.

- Cover monitoring and sampling equipment with protective material (i.e., aluminum foil, polyethylene sheeting, or Ziploc® bags) to minimize potential re-contamination after decontamination.

- Use disposable sampling equipment when appropriate to minimize the need for decontamination. Although disposable sampling tools are encouraged in order to minimize the generation of decontamination fluids, it should be noted that plastic tools may not be appropriate for collection of samples to be analyzed for semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs). Potential phthalate contamination may cause significant interferences in the subsequent analyses and may result in unnecessary dilutions and/or false positive results.

- After decontamination, equipment should be handled only by personnel wearing clean disposable powder-free nitrile gloves to prevent recontamination.
- If equipment decontamination is performed in the field, the equipment should be moved away (preferably upwind) from the decontamination area to prevent recontamination.
- Equipment that is not decontaminated properly may result in potentially high biased results in field samples. **Note:** Equipment blank collection may be appropriate after decontamination of equipment used to collect highly contaminated samples.

1.6 Personnel Qualifications

Since this SOP will be implemented at sites or in work areas that entail potential exposure to toxic chemicals or hazardous environments, all TRC personnel must be adequately trained. Project and client-specific training requirements for samplers and other personnel on site should be developed in project planning documents, such as the sampling plan or project work plan. These requirements may include:

- Occupational Safety and Health Administration (OSHA) 40-hour Health and Safety Training for Hazardous Waste Operations and Emergency Response (HAZWOPER) workers
- 8-hour annual HAZWOPER refresher training.

2.0 PROCEDURES

Refer to the site-specific sampling plan and/or Quality Assurance Project Plan (QAPP), if applicable, for site-specific procedures. Other state or federal requirements may be above and beyond the scope of this SOP and will be followed if applicable. In all instances, the actual procedures used should be documented and described in the field notes.

2.1 General

All personnel, sample containers, and equipment leaving the contaminated area of a site must be decontaminated. Various decontamination methods will either physically remove contaminants by abrasive and/or washing actions, inactivate contaminants by disinfection or sterilization, or both. Decontamination procedures should be documented in the field book.

2.2 Physical Decontamination Procedures

In many cases, gross contamination can be removed by physical means. The physical decontamination techniques appropriate for equipment decontamination can be grouped into two categories: abrasive methods and nonabrasive methods. In general, heavy equipment decontamination is conducted by drilling and construction subcontractors and not by TRC personnel. However, TRC personnel will typically need to document such decontamination efforts as part of project work.

ABRASIVE CLEANING METHODS APPROPRIATE FOR DRILLING EQUIPMENT (DRILLING RIGS, ETC.)

Abrasive cleaning methods involve rubbing and wearing away the top layer of the surface containing the contaminant. The following abrasive methods are available but are not commonly used:

- *Mechanical:* Mechanical cleaning methods use brushes of metal or nylon. The amount and type of contaminants removed will vary with the hardness of bristles, length of brushing time, and degree of brush contact.

- *Air Blasting:* Air blasting is used for cleaning large equipment, such as bulldozers, drilling rigs, or auger bits. The equipment used in air blasting employs compressed air to force abrasive material through a nozzle at high velocities. The distance between the nozzle and the surface cleaned, as well as the pressure of air, the time of application, and the angle at which the abrasive material strikes the surface, determines cleaning efficiency. Air blasting has several disadvantages, including it is unable to control the amount of materials removed, it can aerate contaminants, and it generates large amounts of waste.

- *Wet Blasting:* Wet blasting, also used to clean large equipment, involves use of a suspended fine abrasive delivered by compressed air to the contaminated area. The amount of materials removed can be carefully controlled by using very fine abrasives. One disadvantage of this method is the generation of a large amount of waste.

NONABRASIVE CLEANING METHODS APPROPRIATE FOR FIELD EQUIPMENT (DRILLING AUGERS AND RIGS, ETC.)

Nonabrasive cleaning methods involve forcing the contaminant off of a surface with pressure. In general, less of the equipment surface is removed using nonabrasive methods. Special care should be taken during decontamination procedures following sampling for PFAS. Please refer to Attachment B for details. The following non-abrasive methods are available:

- *High-pressure Potable Water:* This method consists of a high-pressure pump, an operator-controlled directional nozzle, and a high-pressure hose. Flow rates typically range from 20 to 140 liters per minute.

  This procedure is used the majority of the time and is more appropriate for equipment with painted surfaces.

- *Ultrahigh-Pressure Potable Water:* This system produces a pressurized water jet. The ultrahigh-pressure spray removes tightly adhered surface film. The water velocity ranges from 500 meters per second (m/sec) to 900 m/sec. Additives can enhance the method. This method is not applicable for hand-held sampling equipment.

  This procedure is not commonly used but would be appropriate for carbon steel drilling rods and augers.

2.3 Procedure for Sampling Equipment

Sampling equipment, such as split-spoon samplers, shovels, hand augers, trowels, spoons, spatulas, bailers, tethers, dippers, and pumps, will be cleaned using the following procedure. Special care should be taken during decontamination procedures following sampling for PFAS. Please refer to Attachment B for details. **Note:** The overall number of containers needed for collection of decontamination fluids may vary depending on chemical compatibilities, project and regulatory requirements, and ultimate disposal methods for these fluids.

1. Lay out sufficient polyethylene sheeting on the ground or floor to allow placement of the necessary number of containers (e.g., plastic wash basins or buckets) and an air drying area. The number of decontamination steps and designated containers should be determined prior to field sampling based on the site-specific sampling plan. At a minimum, one container should be designated for the detergent wash. A second container should be designated for water rinsing. A third container may be designated for nonwater rinsing. If more than one, the nonwater rinsate fluids may need to be separated. Nonwater rinsate fluids should not be combined with the detergent wash during decontamination. Place the containers on the polyethylene sheeting. The decontamination line should progress from “dirty” to “clean”.

   Note: In instances where acid or solvent rinses are required, additional containers may be needed to manage collection and subsequent disposal of the spent decontamination fluids.

2. Fill the first container with potable water. Add sufficient nonphosphate concentrated laboratory-grade soap to cause suds to form in the container. Do not use an excessive amount of the soap (approximately 1 tablespoon of soap to 5 gallons of water), or rinsing the soap residue off of the equipment will be difficult.

3. Brush any visible dirt off of the sampling equipment into a designated area before getting equipment wet.

4. Using a clean, coarse scrub brush, submerge and wash the sampling equipment in the soap solution in the first container, removing all dirt or visible hydrocarbons. Allow excess soap to drain off the equipment into the container when finished. If cleaning a pump that is not completely disassembled, run the submerged pump in the container long enough to allow sufficient contact time with the internal components of the pump.

5. Rinse the equipment with potable water over an appropriate container, using a coarse scrub brush or pressure sprayer to aid in the rinse if necessary. If an additional acid or solvent rinse is not required, proceed to Step 8.

6. ******If sampling for metals and if required by the project, rinse the equipment with nitric acid over an appropriate container. Consider using a container dedicated to acidic solutions to minimize the volume of liquid that needs to be neutralized later. A 10 percent nitric acid solution is used on stainless steel equipment. A 1 percent nitric acid solution is used on all other equipment. If not required, this step may be omitted.

   Rinse the equipment over an appropriate container using deionized, distilled or organic-free water. If cleaning a pump that is not completely disassembled, run the submerged pump in the container long enough to allow sufficient contact time with the internal components of the pump.

7. ******If sampling for organic parameters and if required by the project, rinse the equipment over an appropriate container using pesticide-grade methanol or isopropanol (see Cautions and Potential Problems). If oily, a pesticide-grade hexane rinse should follow the methanol/isopropanol rinse, or as an alternative, Simple Green® can be used if approved by the Project Manager. Consider using an appropriate container dedicated to volatile solvents to minimize the volume of liquid that subsequently needs to be managed as IDW. If not required, this step may be omitted.

   Allow the equipment to completely air dry prior to proceeding to the next step.

   **** Steps 6 and 7 are optional and may be used on a site-specific basis. The site-specific sampling plan or QAPP, if available, should be consulted. In the absence of a sampling plan or QAPP, the Project Manager will decide upon the necessity of these steps.**

8. Rinse the equipment over an appropriate container using deionized, distilled or organic-free water. If cleaning a pump that is not completely disassembled, run the submerged pump in the container long enough to allow sufficient contact time with the internal components of the pump.

9. Allow the equipment to completely air dry on a clean surface (e.g., polyethylene sheeting or a clean container) (See*NOTE).

   ***NOTE** that if temperature or humidity conditions preclude air drying equipment, sufficient spares, if possible, should be available so that no item of sampling equipment need be used more than once. If an ample amount of spare equipment is not available and the equipment will not completely air dry, additional rinses with deionized, distilled or organic-free water should be used. The inability of equipment to air dry and the usage of additional rinses should be recorded in the field book or on the appropriate form.

10. Reassemble equipment, if necessary, and wrap completely in clean, unused, protective material. Reuse of equipment on the same day without wrapping in protective material is acceptable.

11. Spent decontamination fluids are considered IDW and must be managed as directed by the site-specific field program.

12. Record the decontamination procedure in the field book or on the appropriate form.

2.4 Procedure for Measuring Equipment

Measuring equipment, such as pressure transducers, water level indicators, oil/water interface probes, and soil moisture/pH meters will be cleaned using the following procedure, unless it conflicts with the manufacturer's recommendations. Special care should be taken during decontamination procedures following sampling for PFAS. Please refer to Attachment B for details.

1. Fill two clean containers (e.g., plastic wash basins or buckets) with potable water.

2. Add sufficient nonphosphate concentrated laboratory-grade soap to one container to form a thin layer of soap suds. If oily residues are apparent, the use of Simple Green® may be required.

3. Brush any visible dirt off of the measuring equipment before getting the equipment wet.

4. Either spray rinse the device with the soap solution over the first container, or for heavily soiled equipment, immerse the device in the container containing soap and gently agitate. Scrub device if it is soiled. Do not submerse any electrical controls or take-up reels. Submerse only that portion of the device that came in contact with potential contaminants.

5. Immerse the device in the container containing the potable water and gently agitate. Do not submerse any electrical connectors or take-up reels. Submerse only that portion of the device that came in contact with potential contaminants.

6. Spray rinse equipment with deionized, distilled, or organic-free water over the last container used.

7. Allow the equipment to air dry if time allows.

8. Record the decontamination procedure in the field book or on the appropriate form.

3.0 INVESTIGATION-DERIVED WASTE DISPOSAL

Field personnel should discuss specific documentation and containerization requirements for IDW disposal with the Project Manager.

Each project must consider IDW disposal methods and have a plan in place prior to performing the field work. Provisions must be in place regarding what will be done with IDW. If IDW cannot be returned to the site, consider material containment, such as a composite drum, proper labeling, on-site storage by the client, testing for disposal approval of the materials, and ultimately the pickup and disposal of the materials by appropriately licensed vendors.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

One type of quality control sample specific to the field decontamination process is the equipment blank. The equipment blank provides information about the effectiveness of the decontamination process employed in the field. An equipment blank can detect contamination that may arise from potentially contaminated equipment or equipment that has not been decontaminated effectively.

Equipment blanks consist of a sample of analyte-free (i.e., deionized, distilled, organic-free) water that is poured over and through a decontaminated sampling device and placed in a clean sample container. Ideally, the reagent water should come from the laboratory and be certified as clean. If the blank water is not certified as clean and/or not supplied by the laboratory performing the analyses, a separate water blank that has not run through the sampling equipment should also be sent to the laboratory for analysis.

Equipment blanks are typically collected for all parameters of interest at a minimum rate of 1 per 20 samples for each parameter. The frequency of equipment blank collection will vary from project to project, depending upon the data quality objectives, and will be specified in either the site-specific sampling plan or QAPP. Equipment blanks are typically not required if dedicated sampling equipment is used.

5.0 DATA MANAGEMENT AND RECORDS MANAGEMENT

All reagents used must be documented in the field book or on the appropriate form. Any deviations from the decontamination procedures specified in the sampling plan or QAPP must be approved by the Quality Assurance (QA) Officer and Project Manager and documented in the field book. The lot number and vendor of each reagent used should be documented in the field book. Refer to RMD SOP 001 for field documentation procedures.

6.0 REFERENCES

USEPA. December 1987. *A Compendium of Superfund Field Operations Methods*. EPA/540/P-87/001.

USEPA. January 1991. *Compendium of ERT Groundwater Sampling Procedures*. OSWER Directive 9360.4-06. PB91-9211275.

USEPA. November 1992. *RCRA Ground-Water Monitoring: Draft Technical Guidance*. EPA/530-R-93-001. USEPA Office of Solid Waste.

USEPA. January 1999. *Compendium of ERT Groundwater Sampling Procedures*. EPA/540/P-91/007. OSWER Directive 9360.4-06. PB91-921275.

USEPA. December 20, 2011. *Field Equipment Cleaning and Decontamination*. SESDPROC-205-R2. Region 4. Science and Ecosystems Support Division. Athens, Georgia.

7.0 SOP REVISION HISTORY

REVISION NUMBER	REVISION DATE	REASON FOR REVISION
1	DECEMBER 2016	ADDED ATTACHMENT B TO ACCOMMODATE SOP MODIFICATIONS REQUIRED WHEN SAMPLING FOR PFAS; CHANGED NAMING CONVENTION FOR SOP FROM RMD TO ECR.

Attachment A: SOP Fact Sheet

EQUIPMENT DECONTAMINATION

Purpose and Objective

Removing or neutralizing potential contaminants that may have accumulated on equipment and vehicles ensures protection of personnel, reduces or eliminates potential transfer of contaminants to clean areas, and minimizes the likelihood of sample cross-contamination. Preventing or minimizing potential cross-contamination of samples is important for the collection of representative samples, avoiding the possible introduction of sampling error into sample results, and for protecting the health and safety of site personnel.

What to Bring

- Field book
- Appropriate PPE
- Site-specific HASP
- Alconox®, Liquinox® or other nonphosphate concentrated laboratory-grade soap
- Simple Green® or other nontoxic biodegradable cleaner
- Deionized, distilled, or organic-free water, as appropriate
- Potable water (or water containers if potable water source on site or nearby)
- Pump or pressure sprayer
- Squeeze bottles filled with appropriate decontamination chemicals (e.g., organic solvents, nitric acid)
- Containers, such as buckets or wash basins (type and number is dependent on the procedure)
- Scrub brushes
- Aluminum foil
- Polyethylene sheeting

Office

- Prepare/update the site-specific HASP; make sure the field team is familiar with the latest version.
- Review site-specific sampling plan/QAPP for decontamination procedures and procedures for management of investigation-derived waste (IDW) (e.g., used decontamination solutions).
- Confirm all required decontamination supplies are in stock or order as needed.

On-Site

- Verify project HASP including safety data sheets for decontamination chemicals used on site.
- Conduct daily Health & Safety tailgate meetings, as appropriate.
- Establish a designated equipment and personnel decontamination area.
- Provide for the proper collection and management of all IDW.
- Verify that appropriate PPE is worn by all site personnel (including subcontractors) and the work area is safe.

Sampling Equipment Decontamination - Procedures

Sampling equipment, such as split-spoon samplers, shovels, hand augers, trowels, spoons, spatulas, bailers, tethers, dippers, and pumps, will be cleaned using the following procedure. **A more simplified procedure for decontamination of measuring equipment is presented in the SOP.** Note: The overall number of containers needed for collection of decontamination fluids may vary depending on chemical compatibilities, project and regulatory requirements, and ultimate disposal methods for these fluids.

1. Lay out sufficient polyethylene sheeting on the ground or floor and the necessary number of containers (e.g., plastic wash basins or buckets) and an air drying area. At a minimum, one container should be designated for the detergent wash. A second container should be designated for water rinsing. A third container may be designated for nonwater rinsing. Nonwater rinsate fluids should not be combined with the detergent wash during decontamination. The decontamination line should progress from "dirty" to "clean".
   Note: In instances where acid or solvent rinses are required, additional containers may be needed to manage collection and subsequent disposal of the spent decontamination fluids.
2. Fill the first container with potable water. Add sufficient nonphosphate concentrated laboratory-grade soap to cause suds to form in the container.
3. Brush any visible dirt off of the sampling equipment before getting equipment wet.
4. Using a clean, coarse scrub brush, submerge and wash the sampling equipment in the soap solution in the first container.

EQUIPMENT DECONTAMINATION

5. Rinse the equipment with potable water over an appropriate container. If an additional acid or solvent rinse is not required, proceed to Step 8.
6. **If sampling for metals and if required by the project, rinse the equipment with nitric acid over an appropriate container. Consider using a container dedicated to acidic solutions to minimize the volume of liquid that needs to be neutralized later. A 10 percent nitric acid solution is used on stainless steel equipment. A 1 percent nitric acid solution is used on all other equipment. If not required, this step may be omitted.
7. **If sampling for organic parameters and if required by the project, rinse the equipment over an appropriate container using pesticide-grade methanol or isopropanol (see Caution and Potential Problems). If oily, a pesticide-grade hexane rinse should follow the methanol/isopropanol rinse, or as an alternative, Simple Green® can be used if approved by the Project Manager. Consider using an appropriate container dedicated to volatile solvents to minimize the volume of liquid that subsequently needs to be managed as IDW. If not required, this step may be omitted.
   Allow the equipment to completely air dry prior to proceeding to the next step.
   ** Steps 6 and 7 are optional and may be used on a site-specific basis. The site-specific sampling plan or QAPP, if available, should be consulted. In the absence of a sampling plan or QAPP, the Project Manager will decide upon the necessity of these steps.
8. Rinse the equipment over an appropriate container using deionized, distilled or organic-free water.
9. Allow the equipment to completely air dry on a clean surface (e.g., polyethylene sheeting or a clean container).
   *NOTE that if temperature or humidity conditions preclude air drying equipment, sufficient spares, if possible, should be available so that no item of sampling equipment need be used more than once. If an ample amount of spare equipment is not available and the equipment will not completely air dry, additional rinses with deionized, distilled or organic-free water should be used. The inability of equipment to air dry and the usage of additional rinses should be recorded in the field logbook or on the appropriate form.
10. Reassemble equipment, if necessary, and wrap completely in clean, unused, protective material. Reuse of equipment on the same day without wrapping in protective material is acceptable.
11. Spent decontamination fluids are considered IDW and must be managed as directed by the site-specific field program.

INVESTIGATION DERIVED WASTE (IDW) DISPOSAL

Field personnel should review the project work plan and ensure project-specific IDW management documentation and containerization requirements are specified or discussed with the Project Manager before going to the project site.

DATA MANAGEMENT AND RECORDS MANAGEMENT

All reagents used must be documented in the field book or an appropriate field form. Any deviations from the decontamination procedures specified in the work plan, sampling plan or QAPP must be approved by the Quality Assurance (QA) Officer and Project Manager and documented in the field book. The lot number and vendor of each reagent used should be documented in the field logbook. Refer to RMD SOP 001 for field documentation procedures.

DOs AND DO NOTs OF EQUIPMENT DECONTAMINATION

DOs:

- DO call the Project Manager or field team leader if unexpected conditions are encountered or at least daily to update them on site work.
- DO manage and collect IDW in accordance with project requirements.
- DO use deionized, distilled or analyte free water that is provided by the laboratory, is certified analyte-free, and/or meets project requirements.
- DO use sufficient amount of decontamination fluids so that the fluid flows over the equipment and runs off.
- DO use new wrapped disposable dedicated sampling equipment when appropriate to minimize the need for decontamination.

DO NOTs:

- DO NOT use an excessive amount of soap during decontamination.
- DO NOT sign anything in the field unless authorized in writing by client. This includes waste disposal documentation, statements, etc.; call PM if this issue arises.

Attachment B: SOP Modifications for PFAS

Due to the pervasive nature of PFAS in various substances routinely used during sampling and the need to mitigate potential cross-contamination or sampling bias to ensure representative data are collected, special care should be taken when sampling for PFAS. The following table highlights the required modifications to this SOP when sampling for PFAS.

PFAS Equipment Decontamination Protocols	
SOP Section Number	**Modifications to SOP**
1.3	• Use only Alconox® or Liquinox® soap; do not use Decon 90. • Use new plastic buckets for wash and rinse water. • Ensure that PFAS-free water is used during the decontamination procedure. • Do not use aluminum foil.
1.5	Always consult the Site-specific Health and Safety Plan prior to conducting field work. The following considerations should be made with regards to decontamination procedures: • Tyvek® suits should not be worn. Cotton coveralls may be worn. • Boots and other field clothing containing Gore-Tex™ or other waterproof/resistant material should not be worn. This includes rain gear. Boots made with polyurethane and polyvinyl chloride (PVC) are acceptable. • Food and drink should not be allowed within the decontamination area. Bottled water and hydration drinks (e.g., Gatorade®) may be consumed in the staging area only. • Personnel involved with decontamination should wear a new pair of nitrile gloves after each decontamination procedure when handling equipment to avoid re-contamination. Avoid handling unnecessary items with nitrile gloves. • Do not store on or cover equipment with aluminum foil after decontamination. Use of polyethylene sheeting is acceptable. • Avoid wearing clothing laundered with fabric softeners. • Avoid wearing new clothing (recommended six washings since purchase). Clothing made of cotton is preferred. • Avoid using cosmetics, moisturizers, hand creams, or other related products as part of cleaning/showering the morning of sampling and decontamination field work.
2.2	• New nylon or metal bristle brushes should be used for mechanical cleaning methods. • If high-pressure water is used, it must be tested prior to use for presence of PFAS.
2.3	• Ensure that PFAS-free water is used during the decontamination procedure.
2.4	• Ensure that PFAS-free water is used during the decontamination procedure.

Appendix C
Summary of Constituents Included in Analyses

Appendix C: Summary of Constituents Included in Analyses - Emerging Contaminants			
Method (Matrix)	**Chemical Name**	**Abbreviation**	**CAS Number**
Modified 537.1/ Lab SOP (AQ) Lab SOP (SO)	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
	Perfluororoctanesulfonamide	FOSA	754-91-6
	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6
8270D SIM (AQ) 8270D (SO)	1,4-Dioxane	-	123-91-1

Appendix C: Summary of Constituents Included in Analyses - TCL VOCs		
Method (Matrix)	**Chemical Name**	**CAS Number**
8260C/D (AQ and SO)	1,1,1-Trichloroethane	71-55-6
	1,1,2,2-Tetrachloroethane	79-34-5
	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1
	1,1,2-Trichloroethane	79-00-5
	1,1-Dichloroethane	75-34-3
	1,1-Dichloroethene	75-35-4
	1,2,3-Trichlorobenzene	87-61-6
	1,2,4-Trichlorobenzene	120-82-1
	1,2-Dibromo-3-Chloropropane	96-12-8
	1,2-Dibromoethane	106-93-4
	1,2-Dichlorobenzene	95-50-1
	1,2-Dichloroethane	107-06-2
	1,2-Dichloropropane	78-87-5
	1,3-Dichlorobenzene	541-73-1
	1,4-Dichlorobenzene	106-46-7
	2-Hexanone	591-78-6
	Acetone	67-64-1
	Benzene	71-43-2
	Bromodichloromethane	75-27-4
	Bromochloromethane	74-97-5
	Bromoform	75-25-2
	Bromomethane	74-83-9
	Carbon Disulfide	75-15-0
	Carbon Tetrachloride	56-23-5
	Chlorobenzene	108-90-7
	Chloroethane	75-00-3
	Chloroform	67-66-3
	Chloromethane	74-87-3
	Cis-1,2-Dichloroethylene	156-59-2
	Cis-1,3-Dichloropropene	10061-01-5
	Cyclohexane	110-82-7
	Dibromochloromethane	124-48-1
	Dichlorodifluoromethane	75-71-8
	Ethylbenzene	100-41-4
	Isopropylbenzene	98-82-8
	Methyl Acetate	79-20-9
	2-Butanone	78-93-3
	4-Methyl-2-Pentanone	108-10-1
	Methylcyclohexane	108-87-2
	Methylene Chloride	75-09-2
	Styrene	100-42-5
	Methyl Tert-Butyl Ether	1634-04-4
	Tetrachloroethylene	127-18-4
	Toluene	108-88-3
	Trans-1,2-Dichloroethene	156-60-5
	Trans-1,3-Dichloropropene	10061-02-6
	Trichloroethylene	79-01-6
	Trichlorofluoromethane	75-69-4
	o-Xylene	95-47-6
	m,p-Xylene	179601-23-1
	Vinyl Chloride	75-01-4

Appendix C: Summary of Constituents Included in Analyses - TCL SVOCs		
Method (Matrix)	**Chemical Name**	**CAS Number**
8270D/E (AQ and SO)	1,4-Dioxane	123-91-1
	2,4,5-Trichlorophenol	95-95-4
	2,4,6-Trichlorophenol	88-06-2
	2,4-Dichlorophenol	120-83-2
	2,4-Dimethylphenol	105-67-9
	2,4-Dinitrophenol	51-28-5
	2,4-Dinitrotoluene	121-14-2
	2,6-Dinitrotoluene	606-20-2
	2-Chloronaphthalene	91-58-7
	2-Chlorophenol	95-57-8
	2-Methylnaphthalene	91-57-6
	2-Methylphenol	95-48-7
	2-Nitroaniline	88-74-4
	2-Nitrophenol	88-75-5
	3,3'-Dichlorobenzidine	91-94-1
	3-Nitroaniline	99-09-2
	4,6-Dinitro-2-Methylphenol	534-52-1
	4-Bromophenyl Phenyl Ether	101-55-3
	4-Chloro-3-Methylphenol	59-50-7
	4-Chloroaniline	106-47-8
	4-Chlorophenyl Phenyl Ether	7005-72-3
	3/4-Methylphenol	108-39-4/106-44-5
	4-Nitroaniline	100-01-6
	4-Nitrophenol	100-02-7
	Acenaphthene	83-32-9
	Acenaphthylene	208-96-8
	Acetophenone	98-86-2
	Anthracene	120-12-7
	Atrazine	1912-24-9
	Benzaldehyde	100-52-7
	Benzo(a)Anthracene	56-55-3
	Benzo(a)Pyrene	50-32-8
	Benzo(b)Fluoranthene	205-99-2
	Benzo(g,h,i)Perylene	191-24-2
	Benzo(k)Fluoranthene	207-08-9
	Butyl Benzyl Phthalate	85-68-7
	1,1'-Biphenyl	92-52-4
	Bis(2-Chloroethoxy) Methane	111-91-1
	Bis(2-Chloroethyl) Ether	111-44-4
	2,2'-Oxybis (1-chloropropane) (bis-[2-chloroisopropyl]ether)	108-60-1
	Bis(2-Ethylhexyl) Phthalate	117-81-7
	Caprolactam	105-60-2
	Carbazole	86-74-8
	Chrysene	218-01-9
	Dibenz(a,h)anthracene	53-70-3
	Dibenzofuran	132-64-9
	Diethyl Phthalate	84-66-2
	Dimethyl Phthalate	131-11-3
	Di-n-Butyl Phthalate	84-74-2
	Di-n-Octylphthalate	117-84-0

Appendix C: Summary of Constituents Included in Analyses - TCL SVOCs		
Method (Matrix)	**Chemical Name**	**CAS Number**
8270D/E (AQ and SO)	Fluoranthene	206-44-0
	Fluorene	86-73-7
	Hexachlorobenzene	118-74-1
	Hexachlorobutadiene	87-68-3
	Hexachlorocyclopentadiene	77-47-4
	Hexachloroethane	67-72-1
	Indeno(1,2,3-c,d)Pyrene	193-39-5
	Isophorone	78-59-1
	Naphthalene	91-20-3
	Nitrobenzene	98-95-3
	N-Nitrosodi-N-Propylamine	621-64-7
	N-Nitrosodiphenylamine	86-30-6
	Pentachlorophenol	87-86-5
	Phenanthrene	85-01-8
	Phenol	108-95-2
	Pyrene	129-00-0
	1,2,4,5-Tetrachlorobenzene	95-94-3
	2,3,4,6-Tetrachlorophenol	58-90-2

Appendix C: Summary of Constituents Included in Analyses - PCB Aroclors		
Method (Matrix)	**Chemical Name**	**CAS Number**
8082A (AQ and SO)	Aroclor-1016	12674-11-2
	Aroclor-1221	11104-28-2
	Aroclor-1232	11141-16-5
	Aroclor-1242	53469-21-9
	Aroclor-1248	12672-29-6
	Aroclor-1254	11097-69-1
	Aroclor-1260	11096-82-5
	Aroclor-1262	37324-23-5
	Aroclor-1268	11100-14-4

Appendix C: Summary of Constituents Included in Analyses - TCL Pesticides		
Method (Matrix)	**Chemical Name**	**CAS Number**
8081B (AQ and SO)	alpha-BHC	319-84-6
	beta-BHC	319-85-7
	delta-BHC	319-86-8
	gamma-BHC (Lindane)	58-89-9
	Heptachlor	76-44-8
	Aldrin	309-00-2
	Heptachlor epoxide	1024-57-3
	Endosulfan I	959-98-8
	Dieldrin	60-57-1
	4,4'-DDE	72-55-9
	Endrin	72-20-8
	Endosulfan II	33213-65-9
	4,4'-DDD	72-54-8
	Endosulfan sulfate	1031-07-8
	4,4'-DDT	50-29-3
	Methoxychlor	72-43-5
	Endrin ketone	53494-70-5
	Endrin aldehyde	7421-93-4
	cis-Chlordane (alpha-Chlordane)	5103-71-9
	trans-Chlordane (gamma-Chlordane)	5103-74-2
	Toxaphene	8001-35-2

Appendix C: Summary of Constituents Included in Analyses - TAL Metals and Cyanide		
Method(s) (Matrix)	**Chemical Name**	**CAS Number**
6010C/D, 6020B (SO and AQ)	Aluminum	7429-90-5
	Antimony	7440-36-0
	Arsenic	7440-38-2
	Barium	7440-39-3
	Beryllium	7440-41-7
	Cadmium	7440-43-9
	Calcium	7440-70-2
	Chromium	7440-47-3
	Cobalt	7440-48-4
	Copper	7440-50-8
	Iron	7439-89-6
	Lead	7439-92-1
	Magnesium	7439-95-4
	Manganese	7439-96-5
	Nickel	7440-02-0
	Potassium	7440-09-7
	Selenium	7782-49-2
	Silver	7440-22-4
	Sodium	7440-23-5
	Thallium	7440-28-0
	Vanadium	7440-62-2
	Zinc	7440-66-6
7470A (AQ) 7471B (SO)	Mercury	7439-97-6
9012B (AQ and SO)	Cyanide	57-12-5

Appendix D
Field Forms

Field Audit Form

Project: Site Location: Auditor:
1. Was project-specific training held?
2. Are copies of project plan on site and available to personnel?
3. Are samples being collected in accordance with the project plan?
4. Do the numbers and locations of samples conform to the project plan?
5. Are sample locations flagged, staked, or otherwise marked?
6. Are samples labeled in accordance with the project plan?
7. Is equipment decontamination in accordance with the project plan?
8. Is field instrumentation being operated and calibrated in accordance with the project plan?
9. Are samples being preserved and containerized in accordance with the project plan?
10. Are QC samples in accordance with the types, collection procedures, and frequencies specified in the project plan?
11. Are chain-of-custody procedures and documents in conformance with the project plan?
12. Are field records complete, accurate, up-to-date, and in conformance to good record keeping procedures?
13. Are modifications to the project plan being communicated, approved, and documented appropriately?
Additional Comments:

Auditor:	Date:

Date: ________________

AIR MONITORING FORM

Project Name: ____

Project Number: ____ Instrument: ____________________

Recorded by: ____ Calibration Date: ________________

Weather Conditions: ____

Time	Location	Wind Speed and Direction	Reading	Observations

Recording Procedures/Remarks: ____

____

____

____

TRC

AIR / VAPOR SAMPLE LOG

PROJECT NAME:	PREPARED		CHECKED	
PROJECT NUMBER:	BY:	DATE:	BY:	DATE:

SAMPLE INFORMATION

SAMPLE TYPE:	COMPOSITE	GRAB	**SAMPLE ID:**	
SAMPLE MEDIA	INDOOR AIR	SOIL VAPOR	LOCATION:	LOCATION COORDINATES:
	SYSTEM PERFORMANCE			N:
	OTHER			E:
SAMPLE DURATION:			SAMPLE HEIGHT / (DEPTH):	
SAMPLE CONTAINER TYPE:	SUMMA CANISTER	TEDLAR BAG	OTHER:	
FLOW VALVE ID / SERIAL NUMBER:			CANISTER SERIAL NUMBER:	

READING	TIME	VACUUM (INCHES - Hg / PSIG)	DATE	INITIALS	COMMENTS
INITIAL VACUUM CHECK					
INITIAL FIELD VACUUM					
FINAL FIELD VACUUM					

SAMPLE START TIME:	**SAMPLE STOP TIME:**

NOTES AND OBSERVATIONS

MOTORIZED VEHICLE STORAGE :

MOTORIZED VEHICLE TRAFFIC:

OPERATIONS (e.g., painting, oil recovery):

CLEANERS / SOLVENTS IN USE:

MATERIAL STORAGE (e.g., paint, gasoline):

NOTICEABLE ODORS:

AUDIBLE OR NEARBY HVAC OPERATION:

OTHER:

ADDITIONAL COMMENTS:

SHIPPING METHOD: ____________	DATE SHIPPED: ____________	AIRBILL NUMBER: ____________
COC NUMBER: ____________	SIGNATURE: ____________	DATE SIGNED: ____________

TRC		**DATE:**
		REPORT NO.:
		PAGE NO.: 1 of 2
		PROJECT NO.:
		LOGBOOK NO.: -- **PAGES:** -- to --

DAILY FIELD ACTIVITY REPORT

PROJECT

LOCATION

ATTACHMENTS

WEATHER	TIME	TEMP.	PRECIP.	WIND (MPH)	WIND (DIR)
		°F			
		°F			

SITE CONDITIONS:

WORK GOAL FOR DAY:

PERSONNEL ON SITE:

NAME	AFFILIATION	ARRIVAL TIME	DEPART TIME

EQUIPMENT ON SITE:

TYPE	MODEL	TYPE	MODEL

HEALTH & SAFETY:

PPE REQUIRED: ☒ LEVEL D ☐ LEVEL C ☐ LEVEL B ☐ LEVEL A **HASP?** YES

SITE SAFETY OFFICER:

H & S NOTES:

		DATE:
		REPORT NO.:
		PAGE NO.: 2 of 2
		PROJECT NO.:
		LOGBOOK NO.: -- **PAGES:** -- to --

DAILY FIELD ACTIVITY REPORT

DESCRIPTION OF WORK PERFORMED AND OBSERVED

PREPARED BY (OBSERVER):	**REVIEWED BY:**
PRINT NAME:	**PRINT NAME:**

TRC

FIELD CHANGE FORM

Project Name:____

Project Number:____________________________Field Change Number:___________________

Location: ____Date:____________________

Field Activity Description:____
____
____
____

Reason for Change:____
____
____
____

Recommended Disposition:____
____
____
____

____ ________________

Field Operations Officer (TRC) (Signature) Date

Disposition:____
____
____
____

____ ________________

On-site Supervisor (NYSDEC) (Signature) Date

Distribution: Project Manager (TRC)
Project Manager (NYSDEC)
Field Operations Officer (TRC)
On-site Supervisor (NYSDEC)

Others as Required:__________________
____
____
____

TRC

GROUNDWATER SAMPLE LOG

PROJECT NAME:	PREPARED		CHECKED	
PROJECT NUMBER:	BY:	DATE:	BY:	DATE:

SAMPLE ID:	WELL DIAMETER:	2"	4"	6"	OTHER	____________
WELL MATERIAL:	PVC	SS	IRON	GALVANIZED STEEL	OTHER	____________
SAMPLE TYPE:	GW	WW	SW	DI	LEACHATE	OTHER ____________

PURGING	TIME:	DATE:
PURGE METHOD:	PUMP ____________	
	BAILER ____________	
DEPTH TO WATER: ________ T/ PVC	FLOW-THRU CELL VOLUME	
DEPTH TO BOTTOM: ________ T/ PVC		
PUMP INTAKE DEPTH: ______ T/ PVC	________ LITERS	
WELL VOLUME: ________	LITERS	GALLONS
VOLUME REMOVED: ________	LITERS	GALLONS
COLOR: ____________	ODOR: ________	
TURBIDITY		
NONE SLIGHT	MODERATE	VERY
DISPOSAL METHOD: GROUND	DRUM	OTHER

SAMPLE	TIME:	DATE:
PH: ________ SU	CONDUCTIVITY: ________ umhos/cm	
ORP: ________ mV	DO: ________ mg/L	
TURBIDITY: ________ NTU		
NONE SLIGHT	MODERATE	VERY
TEMPERATURE: ________ °C	OTHER: ____________	
COLOR: ________	ODOR: ____________	
FILTRATE (0.45 um) YES	NO	
FILTRATE COLOR: ________	FILTRATE ODOR: ________	
QC SAMPLE: MS/MSD	DUP- ________	
COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **10 %** COND.: +/- **10 %** ORP: +/- **10 %** D.O.: +/- **10 %** TURB: +/- **10 %** or </= **5** TEMP.: +/- **0.5°C**

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _______

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED		NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	
				Y	N					Y	N
				Y	N					Y	N
				Y	N					Y	N
				Y	N					Y	N

SHIPPING METHOD: ____________	DATE SHIPPED: ____________	AIRBILL NUMBER: ____________
COC NUMBER: ____________	SIGNATURE: ____________	DATE SIGNED: ____________

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	PREPARED		CHECKED	
PROJECT NUMBER:	BY:	DATE:	BY:	DATE:

SAMPLE ID:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)

SIGNATURE: ______________________________ DATE SIGNED: ______________________________

LOW FLOW GROUNDWATER SAMPLING LOG

PROJECT NAME		LOCATION ID	DATE
PROJECT NUMBER		START TIME	END TIME
SAMPLE ID	SAMPLE TIME	SITE NAME/NUMBER	PAGE OF

WELL DIAMETER (INCHES) ☐ 1 ☐ 2 ☐ 4 ☐ 6 ☐ 8 ☐ OTHER ________

TUBING ID (INCHES) ☐ 1/8 ☐ 1/4 ☐ 3/8 ☐ 1/2 ☐ 5/8 ☐ OTHER ________

MEASUREMENT POINT (MP) ☐ TOP OF RISER (TOR) ☐ TOP OF CASING (TOC) ☐ OTHER ________

WELL INTEGRITY

	YES	NO	N/A
CAP	___	___	___
CASING	___	___	___
LOCKED	___	___	___
COLLAR	___	___	___

INITIAL DTW (BMP)	FT	FINAL DTW (BMP)	FT	PROT. CASING STICKUP (AGS)	FT	TOC/TOR DIFFERENCE	- FT
WELL DEPTH (BMP)	FT	SCREEN LENGTH	FT	PID AMBIENT AIR	PPM	REFILL TIMER SETTING	- SEC
WATER COLUMN	FT	DRAWDOWN VOLUME (final DTW - initial DTW X well diam. squared X 0.041)	GAL	PID WELL MOUTH	PPM	DISCHARGE TIMER SETTING	- SEC
CALCULATED GAL/VOL (column X well diameter squared X 0.041)	GAL	TOTAL VOL. PURGED (mL per minute X total minutes X 0.00026 gal/mL)	GAL	DRAWDOWN/ TOTAL PURGED		PRESSURE TO PUMP	- PSI

FIELD PARAMETERS WITH PROGRAM STABILIZATION CRITERIA (AS LISTED IN THE QAPP)

TIME 3-5 Minutes	DTW (FT) 0.0-0.33 ft Drawdown	PURGE RATE (mL/min)	TEMP. (°C) (+/- 3 degrees)	SP. CONDUCTANCE (mS/cm) (+/- 3%)	pH (units) (+/- 0.1 units)	DISS. O_2 (mg/L) (+/- 10%)	TURBIDITY (ntu) (+/- 10% <10 ntu)	REDOX (mv) (+/- 10 mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
	BEGIN PURGING									
FINAL STABILIZED FIELD PARAMETERS (to appropriate significant figures[SF])										

TEMP.: nearest degree (ex. 10.1 = 10)
COND.: 3 SF max (ex. 3333 = 3330, 0.696 = 0.696)
pH: nearest tenth (ex. 5.53 = 5.5)
DO: nearest tenth (ex. 3.51 = 3.5)
TURB: 3 SF max, nearest tenth (6.19 = 6.2, 101 = 101)
ORP: 2 SF (44.1 = 44, 191 = 190)

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- ☐ PERISTALTIC
- ☐ SUBMERSIBLE
- ☐ BLADDER
- ________
- ☐ WATTERA
- ☐ OTHER ________
- ☐ OTHER ________

DECON FLUIDS USED
- ☐ LIQUINOX
- X DEIONIZED WATER
- ☐ POTABLE WATER
- ☐ NITRIC ACID
- ☐ HEXANE
- ☐ METHANOL
- X OTHER ALCONOX

TUBING/PUMP/BLADDER MATERIALS
- ☐ SILICON TUBING
- ☐ TEFLON TUBING
- ☐ TEFLON LINED TUBING
- ☐ HDPE TUBING
- ☐ LDPE TUBING
- ☐ OTHER ________
- ☐ OTHER ________
- ☐ S. STEEL PUMP MATERIAL
- ☐ PVC PUMP MATERIAL
- ☐ GEOPROBE SCREEN
- ☐ TEFLON BLADDER
- ☐ OTHER ________
- ☐ OTHER ________
- ☐ OTHER ________

EQUIPMENT USED
- ☐ WL METER ________
- ☐ PID ________
- ☐ WQ METER ________
- ☐ TURB. METER ________
- ☐ PUMP ________
- ☐ OTHER ________
- ☐ FILTERS NO. ____ TYPE ________

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	FIELD FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	QC COLLECTED	SAMPLE BOTTLE ID NUMBERS
☐								
☐								
☐								
☐								
☐								
☐								
☐								

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED YES ☐ NO ☐

NUMBER OF GALLONS GENERATED ________

NO-PURGE METHOD UTILIZED YES ☐ NO ☐

If yes, purged approximately 1 standing volume prior to sampling or _________mL for this sample location.

SKETCH/NOTES

Sampler Signature: Print Name:

Checked By: Date:

Residential Well Sampling Log

Project:	**Project Number:**
Address of Residence:	**Sample ID:**
Homeowner's Name:	**Date:**
Contact Number:	**Sample Time:**
	Sampler's Name:

Description of Sample Location ***(circle one)*** **:**

System Bypass   Exterior Faucet   Kitchen/Bath Faucet

Sketch of Sample Location

Expansion Tank and Upstream Pipe Capacity

Tank Capacity (gallons) = ________

Tank Capacity (gallons) - if not stamped on tank = (radius of tank [ft]^2*height of tank [ft])* 23.5

Pipe Capacity (gallons) = ________

Pipe Capacity (gallons) = (radius of pipe [ft]^2* length of pipe upstream of tank [ft])* 23.5

Required Purge Volume: __________ (gallons)

Actual Purge Volume Prior to Sampling: _______(gallons)

Purge Time Duration: ________ (min)

Flow Rate During Sampling: ______________ (gpm)

Well Used in Past 24 Hours? ***(circle one)***

Yes   No   Unknown

Faucet Aerator present?   Yes   No

Faucet Aerator removed prior to sampling?   Yes   No

Field Parameters (If Applicable)

Time										
Temp (°C)										
Conduct. (umhos/cm)										
DO (mg/L)										
pH (std units)										
ORP (millivolts)										
Turbidity (NTU)										
Volume purged (gal)										
Flow Rate (ml/min)										

Laboratory Analysis

Analytical Parameter	Filtered? Y N	Preservation	pH Chk	Volume	# of Bottles

Notes: (age, type [drilled/dug], well depth, well yield, water treatment system type, where applicable)

QC Sample (Field Duplicate or MS/MSD) Collected?

SOIL BORING LOG

TRC	Project Name:		Boring ID:
	Project Location:		Page No.
	Project No.:	Client:	of:
Boring Location:	Refusal Depth:	Total Depth:	Bore Hole ID/OD:
Weather:	Soil Drilled:	Method:	Casing Size:
Subcontractor:		Protection Level:	Sampler:
Driller:	Date Started:	Date Completed:	Sampler ID/OD:
Rig Type/Model:	Logged By:	Checked By:	Latitude:
Reference Elevation:	Water Level:	Time:	Longitude:

Sample Information				Monitoring	Sample Description and Classification	USCS Group Symbol	Remarks
Depth (feet bgs) 0.0	Sample Number	Penetration/ Recovery (feet)	PID Reading (ppm)				

NOTES:

10 Maxwell Drive, Suite 200
Clifton Park, NY 12065

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Site Name: ______ Site Code: ______ Operable Unit: ______

Building Code: ______ Building Name: ______

Address: ______ Apt/Suite No: ______

City: ______ State: ______ Zip: ______ County: ______

Contact Information

Preparer's Name: ______ Phone No: ______

Preparer's Affiliation: ______ Company Code: ______

Purpose of Investigation: ______ Date of Inspection: ______

Contact Name: ______ Affiliation: ______

Phone No: ______ Alt. Phone No: ______ Email: ______

Number of Occupants (total): ______ Number of Children: ______

☐ Occupant Interviewed? ☐ Owner Occupied? ☐ Owner Interviewed?

Owner Name (if different): ______ Owner Phone: ______

Owner Mailing Address: ______

Building Details

Bldg Type (Res/Com/Ind/Mixed): ______ Bldg Size (S/M/L): ______

If Commercial or Industrial Facility, Select Operations: ______

If Residential Select Structure Type: ______

Number of Floors: ______ Approx. Year Construction: ______ ☐ Building Insulated? ☐ Attached Garage?

Describe Overall Building 'Tightness' and Airflows(e.g., results of smoke tests): ______

Foundation Description

Foundation Type: ______ Foundation Depth (bgs): ______ Unit: FEET

Foundation Floor Material: ______ Foundation Floor Thickness: ______

Foundation Wall Material: ______ Foundation Wall Thickness: ______ Unit: INCHES

☐ Floor penetrations? Describe Floor Penetrations: ______

☐ Wall penetrations? Describe Wall Penetrations: ______

Basement is: ______ Basement is: ______ ☐ Sumps/Drains? Water In Sump?: ______

Describe Foundation Condition (cracks, seepage, etc.) : ______

☐ Radon Mitigation System Installed? ☐ VOC Mitigation System Installed? ☐ Mitigation System On?

Heating/Cooling/Ventilation Systems

Heating System: ______ Heat Fuel Type: ______ ☐ Central A/C Present?

Vented Appliances

Water Heater Fuel Type: ______ Clothes Dryer Fuel Type: ______

Water Htr Vent Location: ______ Dryer Vent Location: ______

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

PRODUCT INVENTORY

Building Name: ______________________ Bldg Code: ____________ Date: ____________

Bldg Address: ______________________________________ Apt/Suite No: ____________

Bldg City/State/Zip: ____

Make and Model of PID: ______________________________ Date of Calibration: ____________

Location	Product Name/Description	Size (oz)	Condition *	Chemical Ingredients	PID Reading	COC Y/N?
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐

* Describe the condition of the product containers as **Unopened (UO)**, **Used (U)**, or **Deteriorated (D)**

** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Product Inventory Complete? ☐ Were there any elevated PID readings taken on site? ☐ ☐ Products with COC?

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Site Name: ______ Site Code: ______ Operable Unit: ______

Building Code: ______ Building Name: ______

Address: ______ Apt/Suite No: ______

City: ______ State: ______ Zip: ______ County: ______

Factors Affecting Indoor Air Quailty

Frequency Basement/Lowest Level is Occupied?: [ ] Floor Material: [ ]

☐ Inhabited? ☐ HVAC System On? ☐ Bathroom Exhaust Fan? ☐ Kitchen Exhaust Fan?

Alternate Heat Source: [ ] ☐ Is there smoking in the building?

☐ Air Fresheners? Description/Location of Air Freshener: ______

☐ Cleaning Products Used Recently?: Description of Cleaning Products: ______

☐ Cosmetic Products Used Recently?: Description of Cosmetic Products: ______

☐ New Carpet or Furniture? Location of New Carpet/Furniture: ______

☐ Recent Dry Cleaning? Location of Recently Dry Cleaned Fabrics: ______

☐ Recent Painting/Staining? Location of New Painting: ______

☐ Solvent or Chemical Odors? Describe Odors (if any): ______

☐ Do Any Occupants Use Solvents At Work? If So, List Solvents Used: ______

☐ Recent Pesticide/Rodenticide? Description of Last Use: ______

Describe Any Household Activities (chemical use,/storage, unvented appliances, hobbies, etc.) That May Affect Indoor Air Quality:

☐ Any Prior Testing For Radon? If So, When?: ______

☐ Any Prior Testing For VOCs? If So, When?: ______

Sampling Conditions

Weather Conditions: [ ] Outdoor Temperature: [ ] °F

Current Building Use: [ ] Barometric Pressure: [ ] in(hg)

Product Inventory Complete? [ ] ☐ Building Questionnaire Completed?

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Building Code: ____________________ Address: ____

Sampling Information

Sampler Name(s): ______________________ Sampler Company Code: ______________

Sample Collection Date: [ ] Date Samples Sent To Lab: ______________

Sample Chain of Custody Number: ______________ Outdoor Air Sample Location ID: ______________

SUMMA Canister Information

Sample ID:					
Location Code:					
Location Type:					
Canister ID:					
Regulator ID:					
Matrix:					
Sampling Method:					

Sampling Area Info

Slab Thickness (inches):					
Sub-Slab Material:					
Sub-Slab Moisture:					
Seal Type:					
Seal Adequate?:	☐	☐	☐	☐	☐

Sample Times and Vacuum Readings

Sample Start Date/Time:					
Vacuum Gauge Start:					
Sample End Date/Time:					
Vacuum Gauge End:					
Sample Duration (hrs):					
Vacuum Gauge Unit:					

Sample QA/QC Readings

Vapor Port Purge:	☐	☐	☐	☐	☐
Purge PID Reading:					
Purge PID Unit:					
Tracer Test Pass:	☐	☐	☐	☐	☐

Sample start and end times should be entered using the following format: MM/DD/YYYY HH:MM

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

LOWEST BUILDING LEVEL LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the lowest building level .
The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image

Design Sketch

Design Sketch Guidelines and Recommended Symbology

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sket(
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or F	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	**xxxxxxx**	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	**######**	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

FIRST FLOOR BUILDING LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the first floor of the building.
The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image

Design Sketch

Design Sketch Guidelines and Recommended Symbology

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sketc
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or **F**	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	xxxxxxx	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	######	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

OUTDOOR PLOT LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the outdoor plot of the building as well as the surrounding area. The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image

Design Sketch

Design Sketch Guidelines and Recommended Symbology

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sketc
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or F	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	**xxxxxxx**	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	**######**	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

TRC Surface Water/Sediment Sample Log	Project:	Project No.:	Date/Time:	Sheet 1 of 1
	Contractor Personnel:		TRC Personnel:	

Sample No.:	Sample Location:
Depth/Interval Sampled:	Sample Type: (circle) Grab Composite Both
Field Screening Information:	Media: (circle) Other ___________ Sediment Surface Water Water Depth:
Other Field Observations:	Sample Description/Observations:

SAMPLE COLLECTION EQUIPMENT

Hand Auger	☐	Dip Sampler	☐
Core Sampler	☐	Trowel	☐
Spatula/Spoon	☐	Dredge Sampler	☐
Bowl (stainless)	☐	Kemmerer	☐
En-Core®	☐	Extension Rods	☐
Tube Auger	☐	Van Dorn Bottle	☐
Direct	☐	Spade	☐
Ponar Grab	☐	Shovel	☐
Bucket Auger	☐	Terra Core™	☐
Peristaltic Pump	☐	Scoop	☐
Macro-Core®	☐	Vibracore	☐
Other	☐	Split-spoon	☐

Analytical Parameters	Preservation Method	Volume/Container	Time of Collection	Sample ID

Signed: ________________________________

Test Pit Log

TRC

Test Pit Log	**Project Name/Number:**	**Test Pit Number:** Sheet___ of ___
	Location:	**Date/Time**
Equipment Used (e.g., reach/capacity):	**Contractor Personnel:**	**TRC Personnel:**
Total Depth:	**Contractor Used:**	**Top of Pit Elevation:**
Depth to Ground Water:	**Weather:**	

Depth	Sample Number	Stratigraphic Description	REMARKS
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: ______________________________

____

____

____

____

WATER AND PRODUCT LEVEL MONITORING FORM

Technician: ______________ **Job #/Task #:** __________________ **Date:** ______________

Site # ______________ **Project Manager** __________________ **Page** _____ **of** ______

Well #	TOC	Time Gauged	Total Depth (feet)	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Time Sampled	Misc. Well Notes

FIELD DATA COMPLETE QA/QC COC WELL BOX CONDITION SHEETS

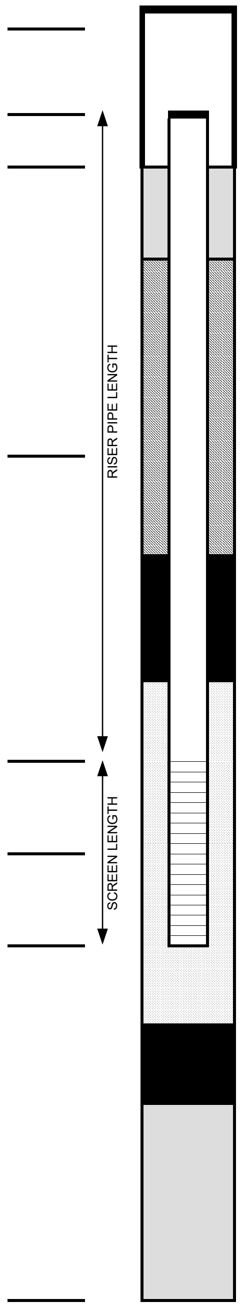
MANIFEST DRUM INVENTORY TRAFFIC CONTROL

TRC

WELL CONSTRUCTION DIAGRAM (FLUSH-MOUNT)

PROJ. NAME:			WELL ID:	
PROJ. NO:	DATE INSTALLED:	INSTALLED BY:	CHECKED BY:	

ELEVATION (BENCHMARK: USGS)	DEPTH /HEIGHT RELATIVE TO GROUND SURFACE (FEET)



0.0 GROUND SURFACE

TOP OF CASING

SURFACE SEAL MATERIAL

SURFACE SEAL

GROUT/BACKFILL MATERIAL

GROUT/BACKFILL METHOD

GROUT

BENTONITE SEAL MATERIAL

BENTONITE SEAL

TOP OF SCREEN

FILTER PACK MATERIAL

BOTTOM OF SCREEN

BOTTOM OF FILTER PACK

BENTONITE PLUG

BACKFILL MATERIAL

HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: ____________________

PIPE SCHEDULE: ____________________

PIPE JOINTS: ____________________

SCREEN TYPE: ____________________

SCR. SLOT SIZE: ________

BOREHOLE DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ____________________

TIME DEVELOPING: ______ HOURS

WATER REMOVED: ______ GALLONS

WATER ADDED: ______ GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: ____________________

COLOR BEFORE: ____________________

CLARITY AFTER: ____________________

COLOR AFTER: ____________________

ODOR (IF PRESENT): ____________________

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:		T/PVC		
DTB AFTER DEVELOPING:		T/PVC		
SWL BEFORE DEVELOPING:		T/PVC		
SWL AFTER DEVELOPING:		T/PVC		
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☐ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☐ YES ☐ NO

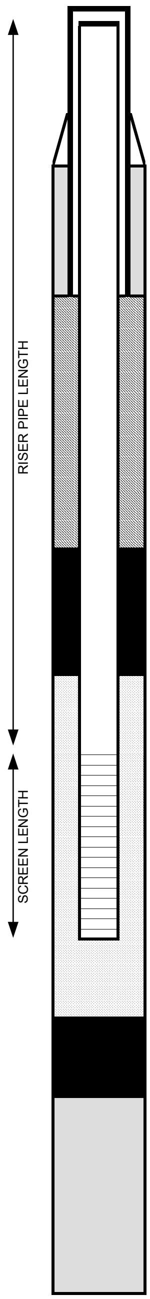
LOCK KEY NUMBER: ____________

REVISED 11/2013

WELL CONSTRUCTION DIAGRAM (ABOVE-GRADE)

PROJ. NAME:		WELL ID:
PROJ. NO:	DATE INSTALLED: INSTALLED BY:	CHECKED BY:

ELEVATION (BENCHMARK: USGS)	DEPTH /HEIGHT RELATIVE TO GROUND SURFACE (FEET)



______ TOP OF CASING

0.0 GROUND SURFACE

SURFACE SEAL MATERIAL ______

______ SURFACE SEAL

GROUT/BACKFILL MATERIAL ______

GROUT/BACKFILL METHOD ______

______ GROUT

BENTONITE SEAL MATERIAL ______

______ BENTONITE SEAL

______ TOP OF SCREEN

FILTER PACK MATERIAL ______

______ BOTTOM OF SCREEN

______ BOTTOM OF FILTER PACK

______ BENTONITE PLUG

BACKFILL MATERIAL ______

______ HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: ______

PIPE SCHEDULE: ______

PIPE JOINTS: ______

SCREEN TYPE: ______

SCR. SLOT SIZE: ______

BOREHOLE DIAMETER: ______ IN. FROM ______ TO ______ FT.
______ IN. FROM ______ TO ______ FT.

SURF. CASING DIAMETER: ______ IN. FROM ______ TO ______ FT.
______ IN. FROM ______ TO ______ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ______

TIME DEVELOPING: ______ HOURS

WATER REMOVED: ______ GALLONS

WATER ADDED: ______ GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: ______

COLOR BEFORE: ______

CLARITY AFTER: ______

COLOR AFTER: ______

ODOR (IF PRESENT): ______

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:		T/PVC		
DTB AFTER DEVELOPING:		T/PVC		
SWL BEFORE DEVELOPING:		T/PVC		
SWL AFTER DEVELOPING:		T/PVC		
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☐ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☐ YES ☐ NO

LOCK KEY NUMBER: ______

FIGURE 3

WELL DECOMMISSIONING RECORD

Site Name:	Well I.D.:
Site Location:	Driller:
Drilling Co.:	Inspector:
	Date:

DECOMMISSIONING DATA
(Fill in all that apply)

OVERDRILLING

Interval Drilled	
Drilling Method(s)	
Borehole Dia. (in.)	
Temporary Casing Installed? (y/n)	
Depth temporary casing installed	
Casing type/dia. (in.)	
Method of installing	

CASING PULLING

Method employed	
Casing retrieved (feet)	
Casing type/dia. (in)	

CASING PERFORATING

Equipment used	
Number of perforations/foot	
Size of perforations	
Interval perforated	

GROUTING

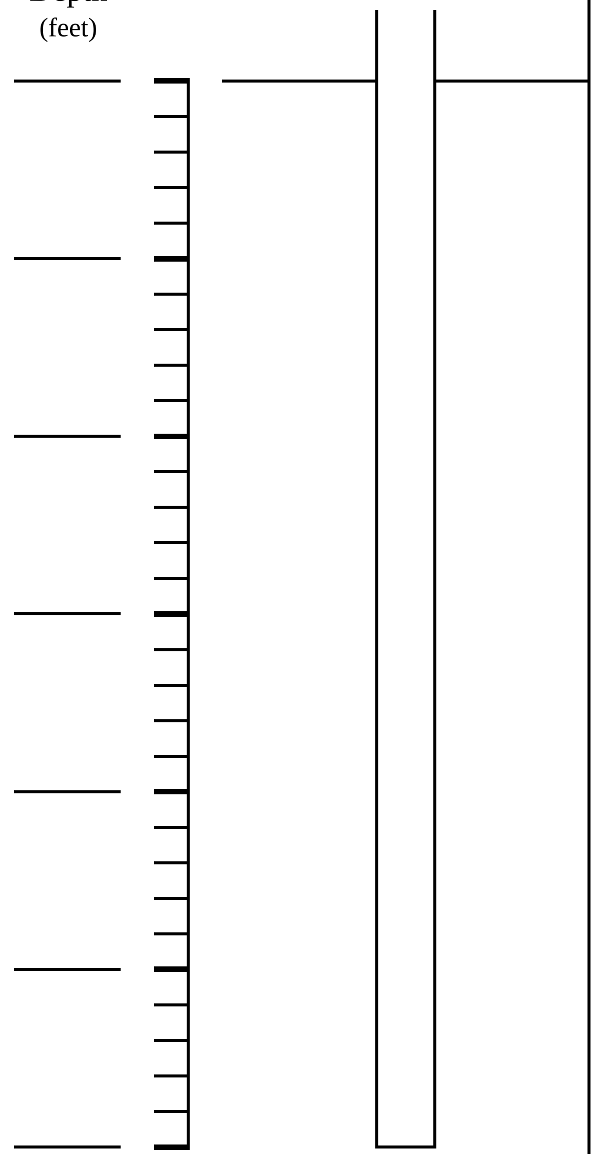
Interval grouted (FBLS)	
# of batches prepared	

For each batch record:

Quantity of water used (gal.)	
Quantity of cement used (lbs.)	
Cement type	
Quantity of bentonite used (lbs.)	
Quantity of calcium chloride used (lbs.)	
Volume of grout prepared (gal.)	
Volume of grout used (gal.)	

WELL SCHEMATIC*

Depth
(feet)



COMMENTS:

* Sketch in all relevant decommissioning data, including:
interval overdrilled, interval grouted, casing left in hole,
well stickup, etc.

Drilling Contractor

Department Representative

TRC Results you can rely on **Well Development Form**	**Project:**	**Project No.:**	**Date/Time:**	**Sheet ___ of ___**
	TRC Personnel:			

Well Identification:

WELL INTEGRITY

	YES	NO
Protect. Casing Secure	☐	☐
Concrete Collar Intact	☐	☐
PVC Stick-up Intact	☐	☐
Well Cap Present	☐	☐
Security Lock Present	☐	☐

PID SCREENING MEAS.

Background	
Well Mouth	

Protective Casing Stick-up (from ground) _______ ft.

Riser Stick-up (from ground) _______ ft.

WELL DIAMETER ☐ 2 inch ☐ 4 inch ☐ 6 inch ☐ _____

WELL MATERIAL ☐ PVC ☐ SS ☐ ___

Well Depth ____ ft. ☐ top of riser ☐ top of casing ☐ __________ ☐ measured ☐ historical

Water Depth ____ ft.

Height of Water Column ____ ft. x ☐ .16 gal/ft (2 in.) ☐ .65 gal/ft (4 in.) ☐ 1.5 gal/ft (6 in.) ☐ __ gal/ft (__ in.)

Volume of Water in Well = ______ gallon(s)

______ Total gallons purged

[Vol. = r^2 h(0.163)]

FIELD WATER QUALITY MEASUREMENTS

Time									
pH (Std. Units)									
Eh (millivolts)									
Conduct. (µmhos/cm)									
Temp. (C)									
Turb. (NTU)									
DO (mg/l)									
Purge Volume (gal.)									
Estimated purge rate (gpm)									
Static (pre-pumping) Depth to Water (ft)									
Pumping Depth to Water (ft)									
Time									
pH (Std. Units)									
Eh (millivolts)									
Conduct. (µmhos/cm)									
Temp. (C)									
Turb. (NTU)									
DO (mg/l)									
Purge Volume (gal.)									
Estimated purge rate (gpm)									
Static (pre-pumping) Depth to Water (ft)									
Pumping Depth to Water (ft)									

EOUIPMENT USED:

NOTES/COMMENTS:

Signed:______________________________

Appendix E
TRC SOP ECR023 – Packaging and Shipping of Non-Hazardous Environmental Samples

Title:	Procedure Number:
Packaging and Shipping of Non-Hazardous Environmental Samples	**SOP Fact Sheet ECR 023**
	Revision Number: **0**
	Effective Date: **January 2018**

Technical Reviewer	Date	ECR Practice Quality Coordinator	Date
Darby Litz	01/11/18	Elizabeth Denly	01/11/18

SOP FACT SHEET

PACKAGING AND SHIPPING OF NON-HAZARDOUS ENVIRONMENTAL SAMPLES

Purpose and Objective

This fact sheet has been developed to guide TRC personnel in the methods for proper packaging and shipping of non-hazardous environmental samples. In general, non-hazardous environmental samples include drinking water, groundwater, ambient surface water, soil, sediment, treated municipal and industrial wastewater effluent, biological specimens, or any samples not expected to be contaminated with regulated levels of hazardous materials (dangerous goods). Samples collected from process wastewater streams, drums, bulk storage tanks, soil, sediment, or water samples from areas suspected of being highly contaminated may require shipment as hazardous materials (see below). Please note that packaging of vapor and air samples is not included in this SOP Fact Sheet. Proper packaging and shipping of samples is important for maintaining sample integrity and ensuring prompt and reliable shipment of the samples to the analytical laboratory, as well as protecting the health and safety of the field, shipping, and laboratory personnel.

This Fact Sheet **does not address the shipment of hazardous materials**, as the shipping of hazardous materials requires specialized packaging, labeling, shipping, and training/certification. **Note**: According to the United States Department of Transportation, "the Secretary shall designate material (including an explosive, radioactive material, infectious substance, flammable or combustible liquid, solid, or gas, toxic, oxidizing, or corrosive material, and compressed gas) or a group or class of material as hazardous when the Secretary determines that transporting the material in commerce in a particular amount and form may pose an unreasonable risk to health and safety or property" 49 U.S.C 5103(a). If the composition and properties of a waste sample or highly contaminated soil, sediment, or water sample are unknown, or only partially known, the sample may not be offered for air transport. In addition, the shipment of pre-preserved sample containers or bottles of preservatives (e.g., nitric acid [HNO_3], sodium hydroxide [NaOH] pellets, hydrochloric acid [HCl], Methanol, etc.), which are designated as dangerous goods by the International Air Transport Association (IATA), is regulated. Shipment of nitric acid is strictly regulated. Consult the IATA Dangerous Goods Regulations for guidance. Dangerous goods must not be offered for air transport by any personnel except personnel trained and certified by IATA in dangerous goods shipment. Contact the laboratory if you are unsure if your material is regulated or need assistance in shipping or transporting samples**.**

What to Bring (some or all of these may apply)

- Appropriate level of personal protection in accordance with the Site Health and Safety Plan
- Coolers with return address of TRC office written on inside of lid or coolers provided by laboratory
- Heavy-duty plastic bags and/or trash bags
- Plastic Ziploc® bags, small and large
- Fiberglass-reinforced packing tape or strapping tape is preferred, or clear packing tape or duct tape
- Packing materials, such as foam peanuts and/or Bubble Wrap®

- Ice (Blue ice not recommended)
- Custody seals
- Chain-of-custody forms
- Landing pad (can be purchased from Federal Express; see Attachment)
- Tie-on tags (can be purchased from Federal Express; see Attachment)
- Shipping labels and documents (*e.g.*, air bill)
- Pens and markers, preferably waterproof
- Zip ties
- Clear tape
- Cooler labels (“Keep Refrigerated/Cool”, “THIS END UP”, “FRAGILE”, “Saturday delivery”, arrow labels, etc.)
- Laboratory-prepared temperature blank

<u>On-site Procedures</u>

- Use a sturdy cooler in good condition. Secure and tape drain plug (inside and outside), if present, with fiberglass-reinforced packing tape or duct tape.
- Line the cooler with a large heavy-duty plastic/trash bag.
- Verify that all caps on bottles are tight (will not leak).
- Verify sample labels and chain-of-custody records are completed properly.
- Pack samples with sufficient padding and ice to remain intact during shipment and at proper preservation temperature.
- If glass bottles are being shipped, place a layer of shock-absorbent material, such as Bubble Wrap®, on the base of the cooler to protect against breakage during shipping. Additionally, considered placing shock-absorbent material between the sample containers and the cooler sidewalls.
- Consider placing all bottles in separate and appropriately sized plastic Ziploc® bags or Bubble Wrap® bags provided by the laboratory. Up to three volatile organic analysis (VOA) vials may be packed in one Bubble Wrap® bag (from the same sample point). All glass bottles should be wrapped in Bubble Wrap®; all sample bottles should be placed in the cooler in a vertical position to minimize potential leaks and cross-contamination.
- Verify appropriate trip blanks (for volatile organic compound [VOC] analyses) and temperature blanks are included in the sample cooler in accordance with project-specific requirements. If multiple coolers prepared for one project, keep VOC samples in the same cooler to minimize the number of trip blanks submitted for analysis.
- Place ice in cooler. A plastic bag should be used as a moisture barrier between the ice and sample bottle labels to protect label integrity. This can be accomplished by placing loose ice around sealed Ziploc® bags containing sample bottles or by sealing ice in large plastic Ziploc® bags or trash bags and placing around the sample containers. Ice should be below, in between, and on top of samples within the large heavy-duty plastic/trash bag. **NOTE:** It is recommended that at least one-third of the cooler volume should be filled with ice.

- Fill the remaining space in cooler with shock-absorbent material, such as sheets of Bubble Wrap®. Keep in mind that the sample containers are less likely to break if their movement is minimized during shipment.
- Place the completed chain-of-custody record for the laboratory in a plastic Ziploc® bag. Tape the bag to the inner side of the cooler's lid. **NOTE:** If laboratory courier service is used, the chain-of-custody record may be handed to the courier and not be put inside the cooler; the courier must sign the record upon receiving the samples. Alternately, you can treat the laboratory courier just as you would a common carrier like Federal Express. In this situation, the chain-of-custody gets signed at the laboratory upon receipt.
- The sampler should keep a copy of the completed and signed chain-of-custody record.
- Wrap cooler at least two times with fiberglass-reinforced packing tape (preferred) or duct tape at each end of the cooler.
- Custody seals should be placed on the opening of the cooler. **NOTE:** Custody seals are not required when laboratory courier service is used, as long as the courier signs the chain-of-custody document as noted above. Consider applying custody seals even on hand-delivered or couriered coolers to avoid potential confusion. Cover the custody seal with clear packing tape that extends around the entire cooler and overlaps itself so that it cannot be easily removed without breaking the seal. In some situations, it may be appropriate to install two (or more) custody seals, one at each end, placed diagonally opposite from one another. The custody seals should be placed such that the cooler cannot be opened without destroying at least one of the labels.
- Use a "THIS END UP" label or arrow labels to indicate proper upward position of the container.
- Add a label containing name and address of both the shipper and the recipient on the outside of the container. Use Federal Express tie-on tags, if applicable, attached with zip ties to affix the label to the cooler handle if possible.

<u>Shipping</u>

- Consider using prepaid shipping labels supplied by the laboratory, if possible.
- Determine ahead of time the location and deadline for when samples must be available for courier pickup or at the shipper to ensure the samples go out on time.
- Ship the sample using an appropriate method, typically overnight or same day, to arrive by the required time. Samples shipped on Friday for Saturday delivery must be coordinated ahead of time to verify laboratory staff are available to receive the samples on weekends. Liberally apply "Saturday Delivery" stickers to the outside of the cooler. Verify that the common carrier marks the cooler and shipping documents appropriately for Saturday or Sunday delivery.
- Check the laboratory sample tracking for acknowledgment of receipt of container and arrival of shipment.

Additional Guidelines when Using Federal Express

A. Shipping Coolers with Environmental Samples by Federal Express (FedEx)

TRC has experienced some issues with coolers not getting to their destination because of lost labels and this has resulted in the recollection of samples. Shipping of coolers presents a unique problem. It is important that the contents of coolers arrive at the laboratory in a timely manner, but sometimes, despite best efforts, the shipping labels come off of the coolers because they do not adhere well. This may cause delays and/or non-delivery of the coolers, resulting in samples that are no longer available or not appropriate for analysis because of temperature and/or holding time requirements.

At the advice of FedEx, it is strongly recommended that every time a cooler is shipped, that **two** different types of labels be used on the cooler:

1. A "landing pad" (FedEx #156841): A "landing pad" is a super sticky label that is adhered directly to the top of the cooler. The barcode label then gets put on top of the landing pad. These landing pads are designed specifically for use with odd-shaped or non-smooth surfaces.
2. A "tie-on tag" (FedEx #150454 large tag, or #149849 for small tag): Along with the landing pad and label, it was recommended to also use a tie-on tag if there is a handle on the cooler. The tie-on tag wraps around the handle of the cooler and then sticks to itself. The barcode label then gets adhered to the longer side of the tie-on tag. For added strength, a zip-tie should also be used to secure the tie-on tag to the handle.

Both the landing pads and the tie-on tags can be ordered by calling 800.GoFedEx and referring to the FedEx #s above. In addition:

1. TRC staff should place these labels on the coolers, rather than having FedEx place them.
2. TRC staff should place a "Keep Refrigerated/Cool" label on the cooler, which may be helpful to keep the shipment moving.
3. The use of laboratory courier service, when available, rather than FedEx, is suggested.

B. Insuring Sample Shipments

FedEx does NOT insure sample shipments; meaning if the shipment is lost or delayed, FedEx will not pay for the cost to recollect the samples.

What FedEx does offer is a Declared Value; however, again this does not cover the cost to recollect the samples. Therefore, do **NOT** pay the extra fee for a Declared Value when shipping a cooler of samples; it is a waste of money.

What may be available is that TRC's insurance program may cover losses in excess of $10,000. If you have an incident that meets these criteria, you should notify your manager, Greg Hobbs and Andrew Johnson/TRC legal for any loss you believe exceeds $10,000. TRC legal can address the merits of an insurance claim at that point in time.

C. Insuring Equipment Shipments

When shipping equipment (e.g., a GPS unit), the following is suggested:

1. Using FedEx's Declared Value option **DOES** make sense when shipping valuable equipment. Currently FedEx's cost for this option is $3 for shipments valued between $100 to $300, and $1 per $100 of declared value for shipments in excess of $300. The cost of insuring equipment should be factored into the cost of the project.
2. If the equipment does not have its own specialized shipping container (e.g., pelican case), then request that FedEx package the equipment for shipment. If FedEx provides the packaging, and the equipment is damaged, then FedEx is responsible. If TRC packages the equipment, then experience has shown that FedEx will deny the claim, even if a Declared Value was used, because FedEx will claim that it was improperly packaged.

Appendix F
TRC SOP CP0028 – Preventative Maintenance Program

1. PURPOSE

The purpose of this program is to establish the responsibilities and process for maintaining equipment used at field project sites in good working condition to reduce the risk of injuries to personnel.

2. SCOPE

This program applies to field project where equipment is used that could increase the risk of injury to personnel if the equipment is not proactively maintained. The program does not supersede any existing preventive maintenance requirements set forth by equipment manufacturers or nationally recognized consensus standards. Where items are subject to preventive maintenance requirements under multiple programs, the more stringent program/requirement shall apply.

3. DEFINITIONS

ANSI: Means the American National Standards Institute

API: Means the American Petroleum Institute

ASME: Means the American Society of Mechanical Engineers

NFPA: Means the National Fire Protection Association

OSHA: Means the Occupational Safety and Health Administration

Preventative Maintenance: Means systematic inspection, detection, correction, and prevention of incipient failures a piece of equipment to lessen the likelihood of it failing. Preventative maintenance is performed while the equipment is still working, so that it does not break down unexpectedly.

4. RESPONSIBILITIES

4.1 The National Safety Director is responsible for communicating this program to affected employees.

4.2 TRC's Safety Network is responsible for providing guidance to Project Managers and Superiors on selecting appropriate safety precautions based on the project-specific risk factors.

4.3 Project Managers are responsible for the following

- Identifying equipment used at field project sites that needs to be included in the preventative maintenance program.

- Determining the preventative maintenance requirements and frequency for affected equipment.
- Assigning the responsibility of performing preventative maintenance tasks to TRC employees, or qualified contractor.
- Maintaining preventive maintenance schedules and the records of last maintenance inspections of equipment.
- Communicating the requirements of this program to affected subcontractors.

4.4 TRC Employees are responsible for the following:

- Conduct a visual inspection of equipment prior to use to ensure safety-related features are functioning properly.
- Immediately notify supervisors of facility/equipment failures and/or problems noted in visual inspections.
- Never use equipment that is not current with preventative maintenance, or is defective or damaged.

5. PROCEDURE

5.1 Equipment Assessment

- The Project Manager, in consultation with TRC's Safety Network, shall identify equipment that needs to undergo preventative maintenance. Preventative maintenance describes tasks that should be performed to maximize the life of equipment and also prevent unplanned equipment failures. Examples of tasks include, replacing critical components before they fail, lubricate equipment, inspect equipment and/or critical components. For reference, a list of safety related inspection requirements is listed in Appendix B – *"Equipment Inspection Requirements."*
- Preventative maintenance requirements should be identified by one or more of the following:
    - Manufacturer's recommendation
    - Regulatory requirement (i.e., OSHA)
    - National consensus standards (i.e., ANSI, ASME, NFPA, API, etc.)
    - Client requirements
    - TRC policy
- Equipment that typically has preventative maintenance requirements can include:
    - Portable fire extinguishers

- Overhead Lifting Equipment (i.e., hoists, cranes)
- Rigging Equipment (i.e., chains, slings, shackles, etc.)
- Emergency Equipment (sprinklers, fire alarms, emergency lighting, etc.)
- PPE (respirators, personal fall arrest devices, self-retracting lanyards, electrical gloves)
- Atmospheric Monitoring Equipment (i.e., 4-gas monitor)
- Powered and Portable Hand-tools
- Powered Industrial Vehicles (i.e., forklift, aerial lift, scissor lift, etc.)
- Electrical Protective Devices (i.e., insulated tools, GFCI's, etc.)

5.2 Scheduling and tracking.

- All equipment that is included in the preventative maintenance program shall be listed on Appendix A – "Preventive Maintenance Schedule." In addition, the maintenance task(s), frequency, the person responsible for completing the maintenance, completion date, and status must be listed on the schedule.
- Only competent and authorized employees or contractors shall perform preventative maintenance activities on equipment.

5.3 Damaged or defective equipment

- Equipment that is found to be damaged or defective, including early signs of wear or damage, shall be tagged as inoperable and removed from service.
- Damaged equipment can only be repaired by an authorized person.

6. REFERENCES/RELATED DOCUMENTATION

None

7. RECORDS

The completed preventative maintenance schedule shall remain with the project file for the duration of the project.

8. APPENDICES

Appendix A – Preventative Maintenance Schedule

Appendix B – Equipment Inspection Requirements

Appendix A
Preventative Maintenance Schedule

Project Name:		**Project Manager:**			**Project Start Date:**	
Equipment	**PM Tasks(s) (inspect, lubricate, replace part, etc.)**	**Responsible Person**	**Frequency (Daily, Monthly, Annual)**	**Reference**	**Completion Date**	**Equipment Status (Ok, Needs Repair)**
Portable Fire Extinguisher #2	*Visually inspect for accessibility, operable pressure, hose condition, fullness*	*Joe Foreman*	*30 days*	*NFPA 10 Chapter 7.2*	*December 15, 2015*	*OK*

Appendix B
Equipment Inspection Requirements

Equipment	Inspection Criteria	Frequency	Reference
Personal Fall Arrest Equipment	Personal fall arrest systems shall be inspected prior to each use	Prior to each use	29 CFR1926.502(d)(21)
Emergency lighting	Test the light to verify it remains functional	Monthly (30 second test); Annually (90 minute test)	National Fire Codes 101-31-1.3.8 as referenced by the OSHA standards
Cranes and hoists	All functional operating mechanisms for maladjustments (daily); – deteriorating or leaking lines, valves, etc., in air or hydraulic systems (daily); – deformation or cracks in hooks (daily visual inspection/monthly inspection with a certification record); – hoist chains, including end connections, for excessive wear, twist, distorted links, or stretch beyond manufacturer's recommendation (daily visual inspection/monthly inspection with a certification record); – all functional operating mechanisms for excessive wear; and – rope reeving for noncompliance with manufacturer's recommendations.	Daily	29 CFR 1910.179(j)(2)(i)
Slings and rigging equipment	Verify equipment is not damaged and required tags/labels are legible.	Daily	29 CFR 1910.184(d)
Forklift trucks	Visually inspect forklifts for damage or defects	Each Shift	1910.178(q)(7)
Lifting and support jacks	Visually inspect for damage or defects	Annually	29 CFR 1910.244(a)(2)(vi)
Lifting and support jacks	Lubricate as required	Regular intervals	29 CFR 1910.244(a)(2)(v)
Lifting and support jacks	For constant or intermittent use at one locality, visually inspect for damage or defects	Once every 6 months,	29 CFR 1910.244(a)(2)(vi)(a)
Portable power tools, extension cords, and power strips	Visually inspect for external defects (such as loose parts, deformed and missing pins, or damage to outer jacket or insulation) and for evidence of possible internal damage (such as pinched or crushed outer jacket).	Prior to use	29 CFR 1910.334(a)(2)(i)
Compressed gas cylinders	Visually inspect items such as markings, shell condition, oil, pressure relief device, valve, and label/color.	Upon receipt	49 CFR Parts 171-179 and 14 CFR Part 103; Compressed Gas Association pamphlet.