North Carolina Department of Environmental Quality

Division of Waste Management

Hazardous Waste Section

GENERATOR CLOSURE GUIDELINES

For Cleanup of Environmental Media and Debris at Generator Sites

Issue Date: March 31, 2023

NOTE: This document replaces the cleanup guidance *"Generator Closure Guidelines"* revised April 2, 2019

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1.0 Purpose and Application

The purpose of this document is to ensure the consistent assessment and cleanup of sites contaminated with hazardous waste, hazardous waste constituents, and/or used oil. Sites with discharges, spills or releases of hazardous waste, hazardous waste constituents, or used oil are subject to North Carolina Hazardous Waste Management Rules administered by the Hazardous Waste Section (HWS). The "generator closure" process described in this document was developed by the HWS Compliance Branch (Branch) to assist owners and operators when decontaminating or closing hazardous waste management units and/or responding to discharges, spills or releases of hazardous waste, hazardous waste constituents and/or used oil at a hazardous waste generator site. To close a unit or cleanup discharges, spills or releases, the owner and/or operator must remove or decontaminate **ALL** waste residues, contaminated soils, and structures and equipment contaminated with waste, and manage them as hazardous waste. This document includes the processes owners and operators can use to close or decontaminate units and/or cleanup discharges, spills or releases, and demonstrate soil has been cleaned up to below remedial goals or naturally occurring background levels and that groundwater, surface water, and/or sediment have not been contaminated. A generator closure is limited to site assessment activities and removal of contaminated environmental media and debris. Successfully completed generator closures are not subject to RCRA hazardous waste permitting requirements. If soil contamination cannot be remediated below remedial goals or naturally occurring background levels and/or groundwater, surface water, and/or sediment is determined to be contaminated, the jurisdiction for the site is referred to another HWS Branch, North Carolina Department of Environmental Quality (NCDEQ) Section or Division, or another state of federal agency.

NOTE: Emerging contaminants, or contaminants of emerging concern, are relatively unknown compounds that are increasingly being detected in soil, groundwater, and surface water and, therefore, can be found in environmental media along with other chemicals and wastes during remediation of contaminated sites. Even though many emerging contaminants are currently not regulated, proper disposal of wastes that may contain these contaminants is a growing concern and an evolving issue. Proper sampling and disposal of contaminated environmental media and wastes should be addressed with the regulatory program having jurisdiction of the remedial action as well as with disposal facilities receiving the generated wastes.

2.0 Regulatory Jurisdiction

Different NCDEQ programs have jurisdiction over environmental cleanup of discharges, spills or releases depending on the type of material involved. Therefore, the owner and/or operator needs to first determine the proper jurisdiction for the cleanup activity. **Figure 1** is a flow diagram to assist with determining if a release is under the jurisdiction of the HWS.

Below is information on the HWS regulatory jurisdiction and a brief summary of some other NCDEQ programs with regulatory jurisdictions similar to or that intersect with the HWS.

2.1 Hazardous Waste Section

The Division of Waste Management's (DWM) HWS has jurisdiction for the remediation of contamination resulting from a discharge, spill or release of known or suspected hazardous waste or used oil. The scope of the HWS jurisdiction includes (but is not limited to) discharges, spills or releases of hazardous waste originating from hazardous waste management units (or that should have been placed in a hazardous waste management unit).

NOTE: Some product discharges, spills or releases will not initially fall into the HWS regulatory jurisdiction, but once contaminated media and/or debris is generated and/or managed (i.e., excavated or removed from an area of contamination), it must comply with the HWS jurisdictional requirements.

North Carolina is authorized by the United States Environmental Protection Agency (EPA) to operate the State Hazardous Waste Program in lieu of the federal program under the Resource Conservation and Recovery Act (RCRA). North Carolina General Statute (NCGS) 130A-294(c) provides the statutory authority for the Division of Waste Management, Hazardous Waste Section to implement the Hazardous Waste Rules in North Carolina. State law relevant to the HWS is found at NCGS 130A-290 through 130A-310.12. The Hazardous Waste Management Rules are codified in the North Carolina Administrative Code (NCAC) at 15A NCAC 13A. Federal regulations (40 Code of Federal Regulations [CFR] 260 through 279) are incorporated by reference in the NCAC and add clarification or additional state requirements (more stringent than the federal regulations) are described in the NCAC. Most of the state law mandated in the NCGS is codified in the NCAC; however, there are requirements in NCGS 130A-290 through 130A-310.12 relevant to the North Carolina Hazardous Waste Management Program that have not been codified in 15A NCAC 13A. For this reason, the NCGS and the NCAC should both be reviewed to ensure compliance with the hazardous waste management requirements. The following Hazardous Waste Section website provides links to state hazardous waste rules and law:

https://deq.nc.gov/about/divisions/waste-management/hw/rules

Site owners and operators using this guidance need to contact the HWS Compliance Branch and submit reports to the Compliance Branch Chemist, unless directed otherwise, for review and approval. **HWS staff contact information are listed in Appendix 7.** The contact information for the HWS central office is as follows:

Division of Waste Management / Hazardous Waste Section
Physical Address:
217 West Jones Street
Raleigh, NC 27603

Mailing Address:
1646 Mail Service Center
Raleigh, NC 27699-1646

Contact Number: 919-707-8200

Regulatory jurisdiction can vary depending on type of waste, waste source, environmental media that has been impacted, method of release, and date of waste release. The list below consists of other NCDEQ and state organizations that may have jurisdiction over how waste is handled or corrective action requirements depending on these factors. The list is not exhaustive and is meant to assist with finding the program that provides oversight when the material does not fall into HWS jurisdiction. For assistance with determining the applicable remediation program, please contact the HWS.

2.2 Other NC Regulatory Programs

NC Department of Environmental Quality

- Division of Waste Management
  - Underground Storage Tank Section – underground and above ground storage tanks and other petroleum releases
  - Solid Waste Section –non-hazardous solid waste in landfills, coal ash, septage, scrap tires, yard waste
  - Brownfields Redevelopment Section – redevelopment of abandoned, idled or underused properties where environmental contamination is present by prospective developers who did not cause or contribute to the contamination.
  - Superfund Section
    - Inactive Hazardous Sites Branch – historical and recent releases of hazardous substances and other contaminants e.g. PCBs, not overseen by other programs
    - Dry Cleaning Solvent Act Program – dry-cleaning solvent contamination at dry cleaning and wholesale distribution facilities
    - Pre-Regulatory Landfill Program – pre-1983 non-industrial landfills and dumps
    - Federal Remediation Branch – EPA and DoD sites that fall under CERCLA
- Division of Air Quality – air quality permitting and compliance
- Division of Energy, Mineral, and Land Resources
  - Stormwater Permitting Program – stormwater management and monitoring
  - Mining Program – mine operations and reclamation
- Division of Water Resources
  - Water Quality – NPDES permitting, animal feeding and manure hauler operations, non-discharge facilities
  - Groundwater Resources – underground injections, well construction/permitting

NC Department of Agriculture

- Pesticides Section – pesticide application and management

NC Department of Health and Human Services

- Radiation of Protection Section – use and management of radioactive materials
- Environmental Health Section – asbestos, lead based, paint, and septic systems

3.0 Initial Site Actions /Site Characterization and Reporting

After the owner and/or operator determines that a discharge, spill, or release is under the jurisdiction of the HWS, the generator closure provisions are used for guidance to clean up the release of hazardous waste, hazardous waste constituents, or used oil. Cleanup activities under a generator closure are limited to assessment and remediation of contaminated surface and subsurface soil and/or debris that has not contaminated groundwater. The discussion below provides more detail about the generator closure process. It is important to note that site assessment and waste determination are two separate and independent concepts. A site assessment is conducted as an overall evaluation of the nature and extent of the release, whereas the waste determination is required as part of a site assessment to determine if the material meets the definition of a hazardous waste and to characterize it for disposal purposes. More information on the waste determination process can be found in Section 6.

3.1 Evaluation and Reporting

When a discharge, spill, or release of hazardous waste, hazardous waste constituents and/or used oil is discovered, it must be cleaned up. If it is not cleaned up, it may be considered hazardous waste that is abandoned, and as a result, may need to be managed as a hazardous waste land disposal unit. Hazardous waste generators are required to take immediate action to stop and control the discharges and to prevent and mitigate any fire, explosion or vapor hazards. Any detectable amount of a contaminant released to the environment is considered a discharge. Hazardous waste generators must also comply with any other federal, state, and local spill release reporting requirements.

After the initial response actions to contain and control the release, the owner and/or operator must determine the presence of soil and/or groundwater contamination. The owner and/or operator needs to submit an Initial Site Sampling Plan (ISSP) that details the intended site assessment activities to the Branch for approval. The format for the ISSP is outlined in **Appendix 3A**. When approved, the ISSP and any conditions specified by the HWS must be carried out following the agreed upon schedule. After the ISSP activities are performed, submit a report of the initial site assessment to the Branch for review. The report should include (1) a description of the activities performed (in a format consistent with the ISSP) and (2) the analytical results (in a format consistent with the Laboratory Reporting Format in **Appendix 3C**).

When contamination is discovered, the extent of the contamination must be determined. The site owner or operator needs to submit an Assessment and Cleanup Plan (ACP) for review that describes the actions necessary to define the extent of contamination and to remediate the contamination. When releases are small, and the extent of contamination is readily defined and removed, the ISSP and ACP may be combined. All plans and reports should be submitted to the HWS Compliance Branch Chemist, unless directed otherwise, for review (See **Appendix 7**). When approved, the site owner or operator must implement the ACP following the Branch's approved schedule. When contamination has been remediated to below the specified cleanup levels (see Section 4.0), the site owner or operator should submit a Closure Report. Where sites have been remediated to unrestricted-use cleanup levels, the Branch will issue a letter stating that no further action is required. When contamination cannot be cleaned up to unrestricted-use levels, the site will be referred to the appropriate branch, section, division, or agency for subsequent oversight.

NOTE: Please note that completing the requirements of another regulatory agency prior to meeting unrestricted-use-cleanup levels may not fulfill the obligations required under the HWS Compliance Branch.

When clean closure cannot be achieved, in accordance with the closure and post-closure requirements under 40 CFR Part 265.116, adopted by reference at 15A NCAC 13A .0110(g), the Branch may require an owner or operator to submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the HWS, a survey plat indicating the location and dimensions of landfill cells or other hazardous waste disposal units with respect to permanently surveyed benchmarks. This plat must be prepared and certified by a professional land surveyor. The plat must contain a note, prominently displayed, which states the owner's or operator's obligation to restrict disturbance of the hazardous waste disposal unit.

NOTE: The letter of "no further action" is for the specific contamination event documented in the Closure Report. It is not applicable to other areas of contamination at the site or contamination that may be discovered at the site in the future. If the facility is operating under the terms of an enforcement document, actions must be undertaken by the compliance dates set within the enforcement document. The enforcement document may set requirements that the facility must comply with in *addition* to the methods and procedures discussed in this guidance. A "no further action" letter does not denote compliance with any enforcement action.

3.2 Document Submittal

Documents need to be submitted electronically unless otherwise requested by Branch staff. All electronic documents should be submitted as one PDF file that includes any cover letters and appendices. Documents should be emailed, but a file-sharing system may be used if the document is large in size.

4.0 Cleanup Requirements

The Branch requires hazardous waste generators to remediate ALL impacted media to unrestricted-use levels. Contaminated soil must be remediated to the lower of the Branch's Soil Cleanup Goals (SCGs) that protect both human health and the underlying groundwater or to site-specific background levels for naturally occurring metals. Contaminated groundwater concentrations must be less than the lower of the permanent and interim standards established under the State's Classifications and Water Quality Standards applicable to the Groundwaters of North Carolina (NC 2L Standards), Environmental Protection Agency (EPA) maximum contaminant levels (MCLs), or site-specific background levels. Surface water and sediment also have certain cleanup criteria that must be met if impacted due to surface run-off and/or groundwater discharge. Hazardous waste generators that cannot meet clean closure remedial goals and standards for all media are subject to hazardous waste permitting requirements under the North Carolina Hazardous Waste Management Rules.

4.1 Soil Cleanup Levels

For sites being remediated to the SCGs, the owner and/or operator must determine, for each contaminant detected at the site, (1) the level most protective of human health through direct contact (residential level) and (2) the soil screening level protective of groundwater. The lower of these two values will be the unrestricted-use cleanup level for each contaminant of concern. The SCGs, both health-based residential soil remediation goals and soil remediation goals protective of groundwater, are available in the **SCG Table** at https://deq.nc.gov/waste-management/dwm/hw/guidance-document-table-documents/compliance-branch-soil-cleanup-goal-table/download?attachment. Before soil that contains hazardous waste is excavated for purposes of treatment, management, and/or subsequent disposal, Branch staff should be contacted for assistance to address LDRs. The LDRs can be found at 40 CFR Part 268.

4.2 Site-Specific Background Levels

Background soil samples may be collected only to establish site-specific natural metal concentrations in soils. Samples should be collected according to Section 5.4.B. Once approved by the Branch, these background levels may be used as alternative cleanup levels for metals only.

4.3 Groundwater Cleanup Levels

If groundwater contamination is confirmed during a generator closure, remediation oversight will be transferred to the appropriate branch, section, division, or agency. Groundwater cleanup levels are the lower of the NC 2L Standards or EPA MCLs, or site-specific background levels. The NC 2L standards can be found at 15A NCAC 02L and are available at http://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/groundwater-standards. For contaminants without NC 2L standards or to determine a MCL, Branch staff should be contacted for assistance.

4.4 Sediment and Surface Water Levels

Branch staff may require an evaluation of any environmental media including sediment and surface water if contamination is suspected due to a hazardous waste release. Site-specific instructions will be given for the evaluation depending on the nature of the release and the stream or surface water body. Remedial goals will depend on the nature and/or classification of the stream or surface water body.

5.0 Sampling Procedures

This section provides general guidance or standard industry practice on sampling to determine (1) if contamination exists and (2) the horizontal and vertical extent of the contamination. At some sites, additional sampling and analysis based on site-specific conditions will be needed. It is a procedural preference of the HWS, that the chemists be on-site, when scheduling allows, to document soil sampling activities associated with enforcement actions or voluntary cleanup.

To determine the presence of contamination for each known or suspected release area or an area where contamination was detected during the initial site sampling, the ISSP needs to propose the collection of samples described below. If contamination is present, the next phase of the investigation must define the extent of each contaminant in each release area, for each environmental medium contaminated. The site owner or operator must provide the activities proposed to define and remediate the contamination. If the release is known to be small and the extent of contamination is readily defined and removed, the ISSP and ACP activities may be combined. Analytical methods for the samples collected are discussed in **Appendix 1**. All samples need to be collected and handled using the **Appendix 2** guidelines.

Incremental Sampling Methodology (ISM) is another method designed specifically for evaluating contamination from metals (not compounds with volatile physical properties) waste instead of discrete sampling techniques for the ISSP and ACP. ISM is a structured composite sampling and processing protocol with specific elements designed to increase sample representativeness for a specified volume of soil under investigation, and to reduce data variability. Contact staff for additional information.

NOTE: All sample collection should follow procedures provided in this guidance document and protocol established by the USEPA Region 4 Laboratory Services and Applied Science Division

(LSASD) which can be found at https://www.epa.gov/quality/quality-system-and-technical-procedures-lsasd-field-branches#fsp.

5.1 Soil Sample Collection

Initial Site Sampling

The purpose of the soil investigation is to identify and characterize the chemical nature of all releases to the site soil. Suspected areas of contamination should be determined by using knowledge of releases or discharges, historical research (such as investigating waste management records), maps, aerial photographs, and employee interviews, as applicable.

Samples must be collected from **each known** or **suspected** release area, e.g., near any vessels used to store chemical product or waste streams; any units used to manage hazardous substances; disposal areas; spill areas; areas of stressed vegetation; potentially contaminated ponding areas, ditches, culverts or other drainage features that may have received runoff from a contaminated area; and underground pathways such as sewer or utility lines.

The sampling strategy depends on whether there is visible evidence of contamination. See **Appendix 2C** for additional information regarding sample collection.

VISIBLE EVIDENCE OF CONTAMINATION

Grab samples must be collected centrally from the most visibly contaminated location in each area of a known or suspected release. The HWS may consider composite samples for non-volatile contaminants such as metals based on site-specific situations. Please consult with Branch staff prior to sampling efforts.

NO VISIBLE EVIDENCE OF CONTAMINATION

1. Surface Release:

   a. Sample areas where contamination would be likely to occur such as run-off, pooling or ponding areas, valve, and piping locations, or possible disposal areas. If no visible evidence exists, conduct sampling by first establishing a grid with line intersections (nodes) spaced no farther than 20 feet apart. Samples must be collected from each grid node. Samples for volatile organic contaminants need to be collected six to 12 inches below ground surface and consist of unmixed (i.e., non-composited) grab samples. The HWS may consider composite samples for non-volatile contaminants such as metals based on site-specific situations. Please consult with Branch staff prior to sampling efforts. See **Appendix 2C** for additional information regarding sample collection.

   b. Where the actual contaminants released are either unknown or mobile contaminants, a soil boring must be advanced to the depth of contaminant non-detection. Field screening devices may be used following the **Appendix 4** guidelines. Borings must be centrally located in each known or suspected release area or an area where contamination was detected during the initial site sampling and sampled at intervals from the ground surface to the depth of contaminant non-detection. Intervals for sample collection should be based on the type of contaminant, the depth of the boring and site-specific conditions. If contaminant detections or evidence of contamination are continuous in a soil boring, soil samples should be collected at intervals that extend to the depth of the seasonal high-water table.

      Suggested intervals for sampling are:

(1) 6 - 18 inches below ground surface;

(2) at least every 5 feet along the boring to the depth of contaminant non-detection. Choose additional sampling depths, if necessary, based on visual and field- screening evidence.

NOTE: For extremely large release areas (releases that are several acres in size), contact Branch staff to discuss site-specific conditions.

c. Samples for volatile organic analysis must be collected as unmixed grab samples. Accurate delineation of volatile organic compounds in soil requires sample preparation procedures consistent with SW-846 Method 5035. It is strongly recommended that the sample be collected for semi-volatiles and volatiles organic compounds, when the methanol-preserved vial method is used and ship within 48-hours to the laboratory. See **Appendix 2** for additional information regarding sample collection.

d. All borings should be backfilled with a grout or grout-bentonite mixture as soon as is feasible following the North Carolina Well Construction Standards.

NOTE: If the owner or operator decides not to advance a boring within an area due to grossly contaminated conditions or concern for rupturing underground vessels, utilities, process lines, etc., the soil and groundwater must be sampled by installing soil borings converted to groundwater monitoring wells immediately surrounding the suspect area. Once groundwater flow patterns are clearly defined, wells will be needed on the hydraulically down gradient perimeter of the release area. (See Section 5.2 for groundwater sample collection).

2. Subsurface Release:

a. Subsurface releases may occur from septic tanks, underground storage tanks, buried drums, waste lines, etc. Areas where subsurface releases have been identified or are suspected must be sampled according to the preceding section for "No visible evidence of contamination." If the suspected release is along a linear feature, such as underground piping, collect samples at least every 20 feet apart and at locations of cracks, joints, drains, and low areas.

b. Site assessment sampling activities, historical research, and geophysical surveys may be used to identify suspected underground disposal areas, e.g., buried drum and underground tanks. The purpose of the site assessment investigation is to delineate the horizontal and vertical extent of contamination in each known or suspected release area or an area where contamination was detected during the initial site sampling. The extent is defined by concentrations less than or equal to the method detection limit (MDL), the applicable cleanup level, or naturally occurring background levels (metals). Samples should be collected at the expected vertical and lateral boundaries for each release area. Field screening methods may be used according to the guidelines in **Appendix 4** to help in the determination of these boundaries. If field screening methods are used, collect soil samples at the expected vertical and lateral boundaries of each contaminated area and submit them to the laboratory for analysis. Information about the history of the release and the nature of the contaminant(s) (e.g., mobility, solubility, and density) may help in the determination of the depth at which samples should be collected and the analysis selected. Soil samples from historical releases must be analyzed for the parent contaminants and any degradation compounds. If the alternative ISM is proposed for the ISSP and ACP, consult with your **HWS Compliance Branch Contact listed in Appendix 7.**

5.2 Groundwater Sample Collection

If evidence exists that groundwater may be impacted, the Branch may determine an investigation is necessary to evaluate groundwater conditions for the site. During the site soil investigation and initial response actions, the site owner and/or operator should evaluate the following site conditions:

- estimated depth to the water table
- estimated depth of the soil contamination
- mobility of the contaminants
- site-specific conditions that may encourage contaminant mobility, e.g., sandy soil and contaminant density, presence of nearby utilities, etc.
- the volume of contaminants released
- the history of the release
- the extent and effectiveness of initial response actions

After considering the above information, if the Branch determines that groundwater must be evaluated, the owner and/or operator must provide a plan to further characterize the subsurface conditions including the groundwater flow direction. The plan should include the following:

1. intended methods, locations, depths of, and justification for all sample collection points for all media that will be sampled;

2. planned monitoring well locations and anticipated screened intervals to evaluate the extent of contamination at the source area(s) and to estimate the shallow groundwater flow direction beneath the site;

3. proposed field and laboratory procedures for quality assurance and quality control;

4. proposed analytical parameters and analytical methods for all samples;

5. equipment and personnel decontamination procedures; and

6. plans for managing investigative derived waste (IDW).

NOTE: If temporary wells are installed and used to determine the groundwater flow direction, the casing must be removed, and the borings backfilled with grout or grout bentonite mixture as soon as technically feasible and in accordance with the North Carolina Well Construction Standards, which can be found at http://deq.nc.gov/about/divisions/water-resources/water-resources-rules/nc-administrative-code-statutes.

Once the groundwater flow direction has been determined, the owner and/or operator must confirm that the monitoring wells are installed so that they will immediately detect a release to the groundwater from the area being investigated. When the wells are properly located, the site owner or operator must obtain water samples to determine if there has been any impact to groundwater. All samples need to be collected and handled according to the guidelines in **Appendix 1** and **2**. The specific list of contaminants of concern for the site need to be approved by the Branch.

When the groundwater investigation is complete, the site owner or operator should submit a report that describes the investigation results in a format consistent with the ACP format in **Appendix 3B.** If groundwater is contaminated, it will be necessary to conduct a survey that identifies exposure pathways and receptors within 1,500 feet of the facility boundary and verification that identified receptors are not impacted by contamination from the Facility. The primary receptors of concern include potable water supplies, vapors within structures located within 100 feet of volatile contamination, surface waters, and sensitive ecological environments. If imminent hazards are identified, notification to the DWM should be made within 24 hours of discovery. Immediate remedial measures and actions necessary to mitigate the hazards to protect public health and the environment will be necessary. Upon discovery, oversight of the imminent hazard as well as further remedial measures for contaminated media may be referred to another HWS Branch, NCDEQ Section or Division, or another state of federal agency for oversight.

5.3 Surface Water and Sediment Sample Collection

The purpose of a surface water/sediment investigation is to identify and characterize the chemical nature of all releases of hazardous substances to surface water or sediments. A surface water assessment is necessary when there is evidence of contaminants migrating to surface waters. Site-specific instructions will be given for the evaluation depending on the nature of the release and the classification of the stream or surface water body. Branch staff may also include additional instructions following consultation with the Division of Water Resources. If a stream assessment is required, at least one water and one sediment sample need to be collected at the following areas: (1) immediately upstream of the site, (2) at the area(s) where contaminants are likely to enter the stream, and (3) immediately downstream of the site. These samples need to be analyzed for the contaminants of concern identified at the site.

5.4 Other Sample Collection

A. Buried Containers or Tanks

Any buried containers or tanks no longer in use must be properly closed out (see Section 10, Procedures for Generators to Close Out Active Hazardous Waste Units). Prior to closure, vessels containing unknown materials or hazardous substances must be sampled for a waste determination (see Section 6).

NOTE: Excavation of containers holding unknown materials need to be conducted using extreme caution. Only personnel trained to conduct this type of excavation under the Occupational Safety and Health Administration (OSHA) and other applicable regulations may excavate and sample unknown materials.

Container disposal/storage areas need to be sampled as described in Section 5.4. Soil samples will also be necessary at the time of container or tank excavation. Sample in the immediate vicinity of all joints and junctures of subsurface pipe associated with any underground tanks known or suspected to contain hazardous substances. Post-excavation sampling needs to be conducted according to Section 8. Manage soil excavated in association with buried containers or tanks according to Section 7.

B. Background Samples

Site-specific background soil samples may be collected to establish natural occurring metal concentrations. However, the site owner or operator needs to prove that constituents of concern are at background levels, and background concentrations need to be statistically established according to an approved plan. Accepted guidance, such as the EPA publication "Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites" (https://www.epa.gov/risk/guidance-comparing-background-and-chemical-concentrations-soil-cercla-sites) and/or Interstate Technology Regulatory Council publication "Soil Background and Risk Assessment" (https://sbr-1.itrcweb.org/), may be useful in the evaluation.

Samples need to be located away from roadways, railways, parking areas, areas affected by facility processes and other sources of contamination. The samples need to be collected from depths and soil type representative of the contaminated soil should not be collected from topsoil, which is typically from 0 to 6 inches below the land surface. The HWS typically recommends collecting at least five (5) representative samples and using a statistical evaluation on the laboratory analytical results from the samples. The background concentration for each metal is established as the mean concentration found in the samples plus two standard deviations from this mean. However, the data should be reviewed to determine if there are any "outliers" that should be discarded prior to performing statistical analysis.

C. Floors, Concrete, Asphalt, etc.

Collecting samples through various structures may be necessary to determine if contamination is present in the soil below. For example, floors, sumps, storage pads, etc. often consist of concrete or asphalt. This will require that a core be drilled through the surface allowing the sample to be taken. If the structure is to be removed, or if the contaminant is likely to be absorbed into the core material, analyze the core as well.

After sampling, repair the boring to prevent contaminants migrating to underlying soil. Determine sample location(s) similar to a surface release with no evidence of contamination (see Section 5.1.1). For storage pads, a grid node spacing no farther than 20 feet apart is typically used. If the suspected release is along a linear feature, such as underground piping, collect samples at least every 20 feet apart and at locations of cracks, joints, drains, and low areas.

6.0 Waste Determination

All generators are responsible for determining whether or not the waste generated at their site is hazardous. Hazardous waste determinations must be accurate and made at the point of generation before dilution, mixing or other alteration occurs; and at any time in the course of management that the waste has, or may have, changed its properties as a result of exposure to the environment or other factors that may change the properties of the waste such that the RCRA classification of the waste may change. Additional information on waste determination can be found in the Hazardous Waste Generator Compliance Manual which is available at https://deq.nc.gov/about/divisions/waste-management/hazardous-waste-section/technical-assistance-and-guidance-documents#HazardousWasteGenerator-2355.

NOTE: The procedures below are for evaluating wastes with unknown constituents. If a site/property assessment and cleanup is under the jurisdiction of a regulatory program other than the HWS and wastes from contaminated environmental media are generated during the cleanup, the wastes must be managed as hazardous (Section 7) until the wastes are sampled and a determination is made to demonstrate otherwise (Section 9). Therefore, for project management purposes and planning, it may be appropriate to conduct a preliminary evaluation of the contaminated media prior to initiating cleanup activities.

6.1 Procedures for Sampling and Disposal of Containers with Unknown Constituents

A hazardous waste determination per 40 CFR 262.11 must be performed using representative samples of each container of unknown materials. Sampling of containers with hazardous or unknown materials should be performed with extreme caution. Sampling should only be conducted by personnel trained under OSHA and other applicable regulations. Sample collection and testing should be conducted using the following standard industrial practices and procedures:

A. Sample Collection

Sample each container of unknown material separately and do not composite with other containers. If the material is layered or sediment/sludge is present, sample and analyze each layer separately. All sample collection should follow guidance from the USEPA Region 4 LSASD which can be found at https://www.epa.gov/quality/quality-system-and-technical-procedures-lsasd-field-branches#fsp. Specific procedures for waste sampling are provided at https://www.epa.gov/sites/production/files/2017-07/documents/waste_sampling302_af.r3.pdf. Specific soil sampling procedures are provided at https://www.epa.gov/sites/production/files/2015-06/documents/Soil-Sampling.pdf.

B. Analytical Methods for Characteristic Waste Determination

For unknown materials, the analytical tests (along with regulatory citations) are provided in Table 1 of **Appendix 1**. Treatment, storage, and disposal facilities may also require additional testing for treatment or disposal purposes (e.g., Btu and ash content). Contact the waste disposal facility before collecting samples as additional analyses may be necessary.

NOTE: Emerging contaminants, or contaminants of emerging concern, are relatively unknown compounds that are increasingly being detected in soil, groundwater, and surface water and, therefore, can be found in environmental media along with other chemicals and wastes during remediation of contaminated sites. Even though many emerging contaminants are currently not regulated, proper disposal of wastes that may contain these contaminants is a growing concern and an evolving issue. Proper sampling and disposal of contaminated environmental media and wastes should be addressed with the regulatory program having jurisdiction of the remedial action as well as with disposal facilities receiving the generated wastes.

C. Disposal of Wastes Following the Waste Determination

Once the waste determination is complete, the wastes can be disposed using an approved method. If the waste is a listed or characteristic hazardous waste, it must be manifested to a permitted Treatment, Storage and Disposal (TSD) facility. If the waste is a non-hazardous waste, it may be disposed by some other approved method at a facility permitted to accept the waste.

7.0 Procedures for Managing Investigative Derived Wastes and Remediation Wastes

Whenever contamination is suspected in environmental media, whether discovered at a facility's hazardous waste unit or at a contaminated site/property under the jurisdiction of another regulatory program, RCRA compliance should be an integral part of the remedial efforts. In most cases, assessment and remedial plans will need to be approved by the agency staff that have oversight of the remediation activities. Therefore, it is important to consider including personnel experienced with RCRA requirements during site-wide assessment and cleanup activities since wastes are often generated that could be defined as hazardous waste. All wastes generated during an investigation and/or remedial action must be managed as hazardous wastes in accordance with 40 CRF 261 and 262 until a waste determination (Section 6) is complete.

NOTE: As indicated in Section 6, even if a site/property cleanup is under the jurisdiction of a regulatory program other than the HWS, a proper waste determination is necessary to evaluate if any wastes generated during the cleanup are defined as hazardous. Therefore, the wastes will need to be managed as hazardous wastes until the waste determination is complete (see Sections 6 and 9).

7.1 Investigative Derived Wastes

Site assessment activities for contaminant releases result in generation and subsequent accumulation of contaminated soil and water (e.g., soil boring cuttings, monitoring well purge water, etc.) that are termed investigative derived wastes (IDW). IDW must be properly managed immediately upon generation. Generated IDW during assessment activities is typically containerized in 55-gallon drums that are labeled and stored in a secured area in accordance with 40 CFR 262 until a waste determination (Section 6) is completed to evaluate the proper disposal method (Section 9).

7.2 Remediation Wastes

Wastes are generated during remediation of contaminated media (e.g., soil, sediment, groundwater, etc.), and plans must be developed to safely manage and dispose of them prior to site cleanup. For remediation that includes removal of soil and/or sediment, the site owner or operator should only excavate the media that is necessary to remove the contamination. Excavated contaminated media must be containerized if it contains hazardous wastes; it cannot be stockpiled. A container may consist of a roll-off, drums, or other types of containers appropriate for, and compatible with, the type of contaminated media. The containers must be kept closed to prevent rain from entering or wind from blowing the media. If the media contaminant concentrations are unknown, or the media is a hazardous waste, the containers must comply with all applicable requirements specified in 40 CFR 262, adopted by reference at 15A NCAC 13A .0107. The containerized contaminated media must be labeled and stored in a secured area in accordance with 40 CFR 262 until a waste determination (Section 6) is completed to evaluate the proper disposal method (Section 9).

NOTE: Excavations cannot be backfilled with contaminated soil. For listed IDW and remediation wastes, if the contaminated soil was evaluated according to the procedures specified in the *Hazardous Waste Section's "Contained-In" Policy for Excavated Contaminated Soil that Contains a Listed Hazardous Waste ("Contained-In" Policy)*, and the contaminant levels are below the levels specified in the policy, the soil may not have to be managed as a listed hazardous waste. Be aware, the "Contained-In Policy" is not applicable to characteristic hazardous wastes. Also, any treatment of wastes to remove a characteristic prior to disposal must be approved by the HWS or by the program with remedial action jurisdiction.

8.0 Post-Excavation Confirmatory Sampling for Generator Closure

In accordance with 40 CFR 265.114, when contaminated media are excavated at a facility's hazardous waste unit, post-excavation confirmatory sampling needs to take place to document ALL wastes are removed and to demonstrate compliance with unrestricted use cleanup levels for soil. Post-excavation confirmatory sampling and testing should be conducted using the following standard industrial practices and procedures:

8.1 Sampling Grid Design

Design a sampling grid over the base and sidewalls of the excavation. Collecting samples through various structures may be necessary to determine if contamination is present in the soil below. For example, floors, sumps, storage pads, etc. often consist of concrete or asphalt. This will require that a core be drilled through the surface allowing the sample to be taken. If the structure is to be removed, or if the contaminant is likely to be absorbed into the core material, analyze the core as well.

8.2 Sample Collection

Collect unmixed grab samples immediately after excavation. Collect biased samples from residual contamination areas based on visible observations or field screening data. Depending on the extent of the excavation, multiple soil samples along the sidewalls may be required. Please consult with Branch staff prior to sampling.

8.3 Analytical Methods for Post-Excavation Sampling

Analyze all post-excavation (i.e., confirmation) samples for the entire list of constituents developed during the site assessment. Analyze confirmation samples using EPA methods with detection limits less than or equal to unrestricted use cleanup levels, or EPA methods with the lowest available detection limits for each contaminant of concern (See **Appendix 1, Table 2**).

NOTE: TCLP analysis is only used to characterize wastes; it is inappropriate for determining if cleanup levels have been reached. See Section 9.0 for information on sampling and characterizing wastes for disposal.

8.4 Contamination Levels

Contamination levels above cleanup levels require further remediation and sampling. At many facilities, the owner and/or operator may need to complete additional sampling and analysis based on site-specific conditions. If confirmation samples indicate unrestricted use cleanup levels have not been achieved, additional remediation will be necessary for generator closure. The owner and/or operator will need to provide the assessment results and submit a plan for additional remediation to the Branch for approval.

NOTE: Unless there are concerns regarding safety or possibly spreading contamination, excavations should not be backfilled until sampling confirms remedial goals have been achieved and/or Branch approval is received.

9.0 Procedures for Sampling and Disposal of Investigative Derived Wastes and Remediation Wastes

When IDW and remediation wastes are generated, a waste determination (Section 6) must be performed before disposal of the wastes, and the wastes must be appropriately managed (Section 7) until the waste determination is complete. If, after a thorough review has been completed, it is determined that the IDW or remediation wastes contain listed hazardous wastes, continue to manage the materials as a listed hazardous waste with a waste code corresponding to that of the original waste released. Regardless of the listing, the site owner or operator must also determine if the waste materials have any hazardous waste characteristics and properly manage the wastes accordingly until the sample collection and analytical testing procedures described below are complete.

Sampling of IDW and/or contaminated media should be performed with extreme caution. Sampling should only be conducted by personnel trained under OSHA and other applicable regulations. All sampling should follow applicable protocol provided by USEPA Region 4 LSASD. Sample collection

and testing should be conducted using the following standard industrial practices and procedures:

9.1 Collection Procedure for Non-volatiles

Collect one composite sample from each IDW container, such as a 55-gallon drum, or each roll-off container or 25 cubic yards of excavated media in other large-volume containers. For roll-off containers or other large-volume containers with up to 25 cubic yards of media, collect the composited sample from at least two sampling locations at random. Using an auger or other approved sampling device, collect a portion of media from the upper, middle and bottom portion of the sampling device at each sample boring location. Mix samples per the USEPA Region 4 LSASD Quality System and Technical Procedures for waste sampling and soil sampling. Composite them into one sample for laboratory analysis (see **Appendix 2, Table 3** for container types and sample holding times).

9.2 Collection Procedure for Volatiles

Collect at least one grab sample from each IDW container, such as a 55-gallon drum and collect at least two grab samples from each roll-off or 25 cubic yards of excavated media in other large-volume containers. For roll-off containers or other large-volume containers with up to 25 cubic yards of excavated media, select sample locations at random and, using an auger or other approved sampling device, collect samples by filling two sample containers at each sample boring location. Sample aliquots need to be collected from the middle or lower portion of the boring at each sample location. Samples should not be mixed (see **Appendix 2, Table 3** for types of containers to use and sample holding times).

9.3 Analytical Methods for Characteristic Waste Determination

Before a disposal alternative can be finalized for IDW and remediation wastes, the site owner or operator must determine if the material has any hazardous waste characteristics. The analytical tests (along with regulatory citations) are provided in Table 1 of **Appendix 1**. Treatment, storage, and disposal facilities may also require additional testing for treatment or disposal purposes (e.g., Btu and ash content); therefore, contact the waste disposal facility before collecting samples. Appropriate laboratory detection limits must be used while conducting a waste determination. If any of the toxicity characteristic constituents or other characteristics (ignitability, reactivity, and corrosivity) are exceeded, the material must continue to be managed as a hazardous waste (Section 7) until the material is properly disposed.

NOTE: For listed IDW and remediation waste, if the contaminated soil was evaluated in accordance with the procedures specified in the "Contained-In" Policy" and the contaminant levels are below the levels specified in the policy, the soil may not need to be managed as a listed hazardous waste. Be aware, a "Contained-Out" determination can only be made for soil with listed hazardous wastes that are also not characteristic. Also, any treatment of wastes to remove a characteristic prior to disposal must be approved by the HWS or by the program with remedial action jurisdiction.

9.4 Disposal of Wastes

Once the waste determination is complete, the IDW and/or remediation wastes can be disposed using an approved method. If the contaminated media contains a listed and/or characteristic hazardous waste, it must be manifested to a permitted TSD facility. If the waste is a non-hazardous waste, it may be disposed by some other approved method at a facility permitted to accept the waste. However, if underlying hazardous constituents are present in the contaminated soil, LDRs may apply. Please contact Branch staff for assistance.

NOTE: Emerging contaminants, or contaminants of emerging concern, are relatively unknown compounds that are increasingly being detected in soil, groundwater, and surface water and, therefore, can be found in environmental media along with other chemicals and wastes during remediation of contaminated sites. Even though many emerging contaminants are currently not regulated, proper disposal of wastes that may contain these contaminants is a growing concern and an evolving issue. Proper sampling and disposal of contaminated environmental media and wastes should be addressed with the regulatory program having jurisdiction of the remedial action as well as with disposal facilities receiving the generated wastes.

10.0 Procedures for Generators to Close Out Active Hazardous Waste Units

Prior to closing a hazardous waste unit at a facility, or prior to closing a facility, a generator must meet the conditions of 40 CFR 262.17(A)(8)(i) adopted by reference at 15A NCAC 13A .0107. These units include containers, tanks, drip pads, and containment buildings. For specific guidance regarding closure of wood treating units (drip pads) and tank systems, contact Branch Staff.

11.0 Notification Requirements under RCRA

All hazardous wastes generated during a cleanup will count toward the site generator category, including excavated soil that is hazardous. If 220 pounds or more of non-acute hazardous waste, 2.2 pounds or more of acute hazardous waste, or 220 pounds or more of residues from cleanup of acute hazardous waste is generated, the site must have or obtain an EPA Identification (ID) number. An EPA ID number is assigned to and stays with the site (regardless of changes to operator and/or ownership). If the site has been assigned an EPA ID number and the quantity of hazardous waste generated increases the hazardous waste generator category, the site must submit a notification to update the site information (including, but not limited to, notification of the proper hazardous waste generator category). The site must also have an EPA ID number if the quantity of waste generated will cause the site to change generator category (to a small or large quantity generator of hazardous waste). A site must have or obtain an EPA ID number if the site is operating as a hazardous waste treatment, storage or disposal site. All requests for new EPA ID numbers or any updates to site information for existing EPA ID numbers is done electronically using EPA's RCRAInfo database (https://rcrainfo.epa.gov/rcrainfoprod/action/secured/login).

Anyone using the RCRAInfo database must register and create an account in RCRAInfo. The following link is a tutorial that may be helpful for registering and using RCRAInfo:

https://files.nc.gov/ncdeq/Waste%20Management/DWM/HW/8700-guidelines/Electronic-Filing-of-EPA-Notifications.pdf

Facilities may contact the HWS Compliance Branch or Financial and Information Management Unit for instruction on how register in RCRAInfo, or how to electronically request a new EPA ID number or make electronic updates to site information for sites with existing EPA ID number using RCRAInfo.

12.0 Site Closure

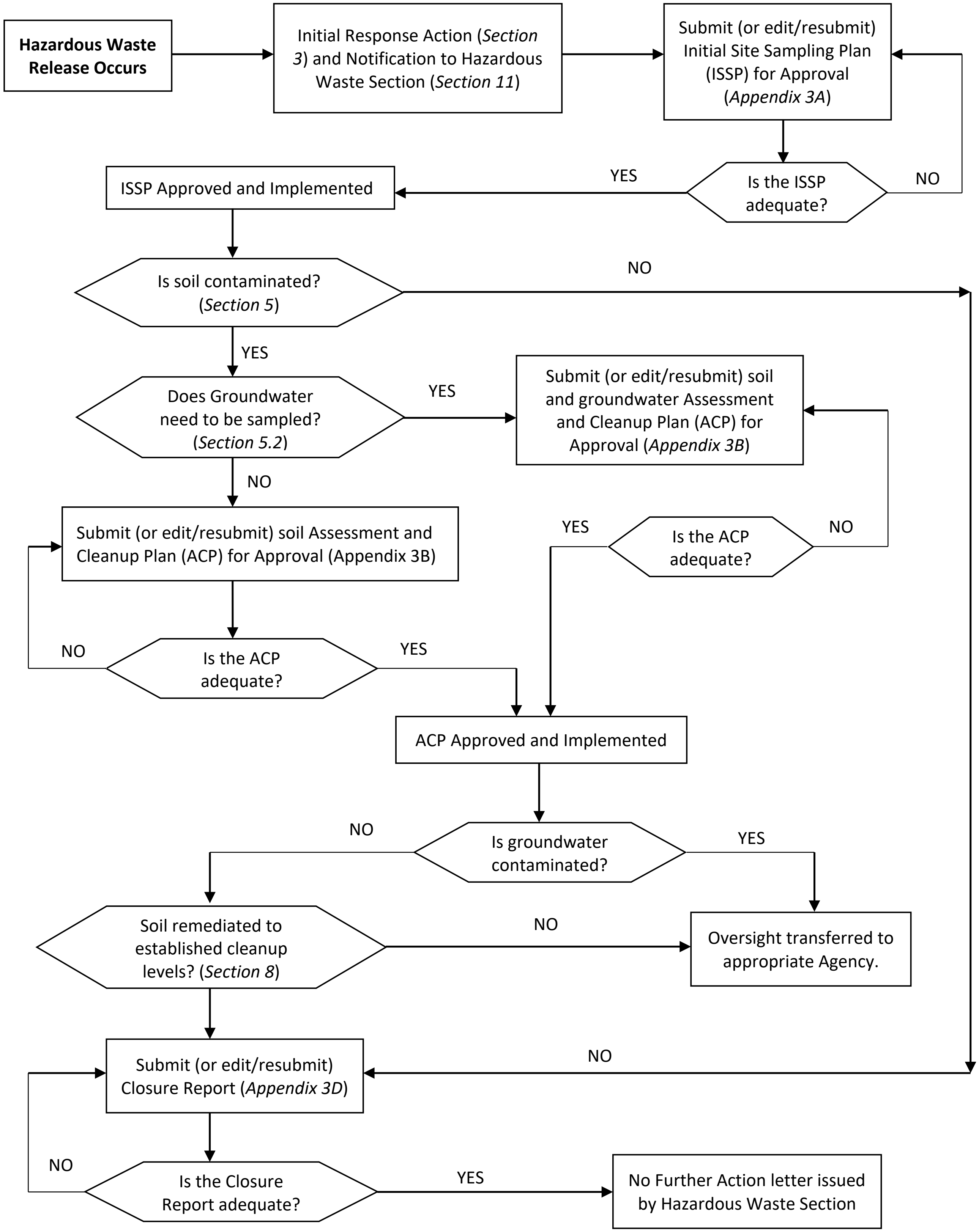
When remediation is complete, a Closure Report should be submitted to the HWS Compliance Branch. The

HWS will review the documentation to ensure the site has been adequately cleaned up and all pertinent information is provided. If the Closure Report is approved, a letter of "no further action" will be sent to the site owner or operator. The letter only applies to the specific contamination event documented in the Closure Report. It is not applicable to other areas of contamination at the site, or contamination that may be discovered at the site in the future.

NOTE: If the facility is operating under the terms of an enforcement document, actions must be undertaken within the compliance dates set within the enforcement document. In addition to the guidance procedures, the enforcement document may set requirements that the owner and/or operator must comply with. A "no further action" letter does not denote compliance with any enforcement action.

FIGURE 1 FLOW CHART FOR HAZARDOUS WASTE GENERATOR CLOSURES

Notations in italics refer to sections of the North Carolina Hazardous Waste Section Generator Closure Guidance document.



APPENDIX 1

ANALYTICAL METHODS

Analytical methods that are appropriately sensitive for the detection of the contaminants of concern at the site must be used to analyze for all samples. All analyses must be performed using either an SW-846 method or an equivalent analytical method. SW-846 serves as a compendium of methods that are approved, but not mandatory, to comply with the RCRA regulatory requirements. Some specific analytical methods are mandated for waste characterization. Use general quality assurance/quality control (QA/QC) procedures for analyses using SW-846 methods, as specified in Chapter One of SW-846, as well as any method- specific quality control criteria. Additionally, the HWS strongly recommends that a NC certified laboratory be used to run the appropriate methods. To obtain a current list of NC Certified Laboratories, call the Division of Water Resources, Laboratory Section at (919) 733-3908 or visit their website at https://deq.nc.gov/about/divisions/water-resources/water-resources-science-and-data/water-sciences-home-page/chemistry-laboratory/laboratory-certification-branch/certified-laboratory-listings. If a non-certified laboratory is chosen, additional data reporting requirements apply.

Table 1 lists the test methods described in the regulations when making a characteristic hazardous waste determination. Additional testing information is also listed in this table for instances when the regulation does not specify a test method.

Table 2 specifies the analysis needed for detection of contaminated soil and groundwater for confirmatory sampling purposes. For other media (sediments) or constituents that may not be detected by these methods, see the following web site links for further guidance and information on EPA analytical test methods: https://www.epa.gov/hw-sw846/sw-846-compendium and the searchable table of all methods at: https://www.epa.gov/hw-sw846/basic-information-about-how-use-sw-846#UseWhich.

NOTE: Compounds must be analyzed using a method capable of detecting and achieving method detection limits (MDLs) at or below the applicable cleanup level.

Table 1. EPA Analytical Methods for Waste Determination

This table provides a summary of the analytical methods specified in the hazardous waste regulations when making a characteristic hazardous waste determination. The last column in the table provides additional information and recommended test methods when an analytical method is not described in the regulations.

If you have questions about making a waste determination and/or test methods, please contact your local Hazardous Waste Section Inspector or Chemist. The following is a link to a map showing the contact information and regions for the Hazardous Waste Section Inspectors and Chemists:

https://files.nc.gov/ncdeq/Waste%20Management/DWM/HW/Compliance/Compliance_Map_by_Inspector.pdf

Hazardous Waste Characteristic		**Definition Citation**	**Definition**	**Test Method Described in Regulation**	**Recommended Test Methods when not Described in Regulation/Additional Information**
Ignitability 40 CFR 261.21 (D001)	Ignitable Liquid	40 CFR 261.21(a)(1)	It is a liquid, other than a solution containing less than 24 percent alcohol by volume and at least 50 percent water by weight, that has a flash point less than 60 °C (140°F).	SW-846 Test Methods for Flash Point: 1010B (Pensky-Martens Closed Cup Tester) - ASTM D93-79, - ASTM D93-80, or - ASTM D8175-18 or 1020C (Setaflash (Small Scale) Closed-Cup Apparatus): - ASTM D3278-78, or - ASTM D8174-18	To determine whether a waste is "Liquid" - Free Liquids is determined by SW-846 Test Method 9095B: Paint Filter Liquids Test
	Ignitable Solid	40 CFR 261.21(a)(2)	It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.	No test method specified in hazardous waste regulation.	If there are no free liquids (as determined by SW-846 Test Method 9095B: Paint Filter Liquids Test), then test for one part of the ignitable solid definition: - SW 846 Method 1030 is used to assess the tendency to burn vigorously and persistently but doesn't address the "capable of causing fire through friction, absorption of moisture or spontaneous chemical changes". - SW 846 Method 1050 "Test Methods to Determine Substances Likely to Spontaneously Combust." Test Method A and C are used to determine whether the solid material will spontaneously combust. - If you do one of the ignitable solids test and it fails it, then you may stop (and not do both parts of the test) – it is not an ignitable solid. If it passes the test (e.g., does burn vigorously and persistently) then you need to continue on to the second test.

Table 1. Analytical Methods for Characteristic Hazardous Waste Determination (continued)

Hazardous Waste Characteristic		Definition Citation	Definition	Test Method Described in Regulation	Recommended Test Methods when not Described in Regulation/Additional Information

Ignitability
40 CFR 261.21 (continued)
(D001)
	Ignitable Compressed Gas	40 CFR 261.21(a)(3)	It is an ignitable compressed gas.
			- The term “compressed gas” shall designate any material or mixture having in the container an absolute pressure exceeding 40 p.s.i. at 70 °F or, regardless of the pressure at 70 °F, having an absolute pressure exceeding 104 p.s.i. at 130 °F; or any liquid flammable material having a vapor pressure exceeding 40 p.s.i. absolute at 100 °F.
			- A compressed gas shall be characterized as ignitable if any one of the following occurs:
			  - Either a mixture of 13 percent or less (by volume) with air forms a flammable mixture or the flammable range with air is wider than 12 percent regardless of the lower limit. These limits shall be determined at atmospheric temperature and pressure.
			  - It is determined to be flammable or extremely flammable using 49 CFR 173.115(l).
				"Compressed Gas" determined by:
				- ASTM Test D-323
				Compressed Gas is characterized as ignitable by the following method of sampling and test procedure:
				- ASTM E 681-85 or
				- Other equivalent methods approved by the Associate Administrator, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation.
					DOT Test Method: ASTM E681-85 (Standard Test Method for Concentration Limits of Flammability of Chemicals)

	Oxidizer	40 CFR 261.21(a)(4)	It is an oxidizer.
			- An oxidizer for the purpose of 40 CFR 261 is a substance such as a chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily to stimulate the combustion of organic matter.
			- An organic compound containing the bivalent -O-O- structure and which may be considered a derivative of hydrogen peroxide where one or more of the hydrogen atoms have been replaced by organic radicals must be classed as an organic peroxide unless:
			  - The material meets the definition of a Division 1.1, 1.2, or 1.3 explosive, as defined in 40 CFR 261.23(a)(8), in which case it must be classed as an explosive,
			  - The material is forbidden to be offered for transportation according to 49 CFR 172.101 and 49 CFR 173.21,
			  - It is determined that the predominant hazard of the material containing an organic peroxide is other than that of an organic peroxide, or
			  - According to data on file with the Pipeline and Hazardous Materials Safety Administration in the U.S. Department of Transportation, it has been determined that the material does not present a hazard in transportation.
				No test method specified in hazardous waste regulation.	DOT’s hazardous materials table at 49 CFR 172.101, Column (3) identifies the Hazard Class of each material and Hazard Class of 5.1 or 5.2 indicates that the material is a DOT oxidizer. Column (3) identifies the primary hazard associated with a given hazardous material. For a complete classification, the generator must also reference Column (6), which identifies the primary and subsidiary hazards associated with a given hazardous material.
					dizing Solids: SW-846 Test Method 1040 for Oxidizing Solids
					dizing Liquids: UN Manual of Tests and Criteria (previously known as the Recommendations on the Transport of Dangerous Goods) provides information and recommended test methods for oxidizing liquids on page 386.

Table 1. Analytical Methods for Characteristic Hazardous Waste Determination (continued)

Hazardous Waste Characteristic		Definition Citation	Definition	Test Method Described in Regulation	Recommended Test Methods when not Described in Regulation/Additional Information
Corrosivity 40 CFR 261.22 (D002)	Aqueous	40 CFR 261.22(a)(1)	It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5 or	Determined by a pH meter using SW-846 Test Method 9040C for pH Electrometric Measurement	Aqueous wastes must contain at least 20% free water by volume
	Liquid	40 CFR 261.22(a)(2)	It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55 °C (130 °F).	SW-846 Test Method 1110A for Corrosivity Towards Steel	To determine whether a waste is "Liquid" - Free Liquids is determined by SW-846 Test Method 9095B: Paint Filter Liquids Test
Reactivity 40 CFR 261.23 (D003)			A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties: - It is normally unstable and readily undergoes violent change without detonating. - It reacts violently with water. - It forms potentially explosive mixtures with water. - When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment. - It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment. - It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement. - It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure. - It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.	No test method specified in hazardous waste regulation.	Representative sample is defined in 40 CFR 260.10. SW-846 Test Method 8330B for Nitroaromatics, Nitramines, and Nitrate Esters by High Performance Liquid Chromatography (HPLC) may be used to determine the concentration of nitroaromatics, nitramines, and nitrate ester explosives in water and soil. On a case by case basis the following could be used. Cyanide and sulfide bearing wastes when solid waste releases more than 250 mg of hydrogen cyanide gas/kg of waste or more than 500 mg of hydrogen sulfide gas/kg of waste these should be regulated as reactive hazardous waste. Examples of Known Reactives (this list is not exhaustive): - Aluminum Alkyls - Ammonium Fulminate - Gold Cyanide - Lead Azide (dry) - Lithium - Nitroglycerine - Picric Acid (crystals) - Potassium Sulfide - Pentaerythrite tetranitrate - Sodium - Sodium-potassium alloy - Sodium sulfide - Silver cyanide - Silver picrate (dry) - Trinitrotoluene - White Phosphorous (dry) - Zinc Powder

Table 1 Analytical Methods for Characteristic Hazardous Waste Determination (continued)

Hazardous Waste Characteristic	Definition Citation	Definition	Test Method Described in Regulation	Recommended Test Methods when not Described in Regulation/Additional Information
Toxicity 40 CFR 261.24 (D004 through D043)		A solid waste (except manufactured gas plant waste) exhibits the characteristic of toxicity if the extract from a representative sample of the waste contains any of the 40 contaminants listed in 40 CFR 261.24 Table 1 (Maximum Concentration of Contaminants for the Toxicity Characteristic) at the concentration equal to or greater than the respective value given in that table.**	SW-846 Test Method 1311 for Toxicity Characteristic Leaching Procedure (TCLP) - Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract for the purpose of this section.	Representative sample is defined in 40 CFR 260.10. When testing for toxicity, once the TCLP is run, the extract obtained may be analyzed for the 40 constituents listed in 40 CFR 261.24 by any method as long as that method has documented quality control and is sensitive enough to meet the regulatory limits. - Methods 3010 and 6010 for arsenic, barium, cadmium, chromium, lead, silver, and selenium; - Method 7470 for mercury - Method 3510 and 8081 for pesticides - Method 8151 for herbicides - Method 8260 for volatile organics; and - Methods 3510 and 8270 for semi-volatile organics. Total waste analyses in lieu of TCLP results*

*** A generator may alternatively use total waste analyses to determine that a waste does not exhibit the toxicity characteristic. Check with the Hazardous Waste Section Environmental Chemist prior to using totals for waste determination purposes when the waste is a solid or dual-phase waste. The methodology for using total waste analyses to make a toxicity determination varies depending on the type of waste as described below:**

- **Liquids**: Liquids (i.e., wastes that contain less than 0.5% filterable solids) do not require extraction. Instead, per the last sentence of 40 CFR 261.21(a), a generator may characterize such a liquid waste by filtering it, analyzing the total constituent concentrations in the resulting filtrate, and comparing those concentrations directly to regulatory levels.

- **Solids**: For wastes that are 100% physically solid (i.e., contain no filterable liquid), the total concentration of the toxicity characteristic constituent (in Table 1 of 40 CFR 261.24) is determined, and then the total levels is converted to the maximum theoretical leachate concentrations that could possibly result from performing the TCLP. This is accomplished by dividing the total constituent concentration by 20 (reflecting the 20 to 1 weight ratio of extraction fluid to solid in the TCLP) and then comparing the resulting maximum theoretical leachate concentration to the applicable regulatory level (see formula below and Table 1 in 40 CFR 261.24). Using the maximum theoretical leachate concentration for wastes that are 100% solid is known as the "Rule of 20" because of the 20 to 1 weight ratio described in the previous sentence. If the maximum theoretical leachate concentration does not equal or exceed the appropriate regulatory limit for the specific constituent, the solid does not exhibit the toxicity characteristic. If the total concentration is greater than or equal to the toxicity characteristic regulatory level, the TCLP would be required for waste determination. The Rule of 20 can be used to prove a material is not a toxicity characteristic hazardous or it can be used as screen to determine when the TCLP needs to be run.

  $$\mathbf{M = C/20}$$

  Where:
  M = maximum theoretical leachate level (mg/L);
  C = concentration of analyte in the soil (mg/kg), total concentration; and mg/L= ppm= mg/kg

- **Dual-phase wastes**: The generator of a dual-phase waste (a waste that has both a solid and a filterable liquid component) can perform a total waste analysis on both the solid and liquid portions and calculate maximum theoretical leachate concentrations for the waste as a whole. This is accomplished by combining results mathematically through use of the following formula:

  $$\mathbf{M = \frac{(A \times B) + (C \times D)}{B + (20\ L / kg \times D)}}$$

  Where:
  M = Maximum theoretical leachate concentration (mg/L)
  A = Total concentration of the analyte in the liquid portion of the sample (mg/L)
  B = Volume of the liquid portion of the sample (L)
  C = Total concentration of the analyte in the solid portion of the sample (mg/kg)
  D = Weight of the solid portion of the sample (kg)

** 40 CFR 261.24 Table 1 - Maximum Concentration of Contaminants for the Toxicity Characteristic

Maximum Concentration of Contaminants for Toxicity Characteristics			
Waste Code	**Contaminant**	**Concentration (mg/l)**	**Category of Contaminant**
D004	Arsenic	5.0	Metal
D005	Barium	100.0	Metal
D006	Cadmium	1.0	Metal
D007	Chromium	5.0	Metal
D008	Lead	5.0	Metal
D009	Mercury	0.2	Metal
D010	Selenium	1.0	Metal
D011	Silver	5.0	Metal
D018	Benzene	0.5	Volatile Organic Compound
D019	Carbon tetrachloride	0.5	Volatile Organic Compound
D021	Chlorobenzene	100.0	Volatile Organic Compound
D022	Chloroform	6.0	Volatile Organic Compound
D028	1,2-Dichloroethane	0.5	Volatile Organic Compound
D029	1,1-Dichloroethylene	0.7	Volatile Organic Compound
D035	Methyl ethyl ketone	200.0	Volatile Organic Compound
D039	Tetrachloroethylene	0.7	Volatile Organic Compound
D040	Trichloroetheylene	0.5	Volatile Organic Compound
D043	Vinyl chloride	0.2	Volatile Organic Compound
D023	o-Cresol	200.0	Semi-Volatile Organic Compound
D024	m-Cresol	200.0	Semi-Volatile Organic Compound
D025	p-Cresol	200.0	Semi-Volatile Organic Compound
D026	Total Cresols	200.0	Semi-Volatile Organic Compound
D027	1,4-Dichlorobenzene	7.5	Semi-Volatile Organic Compound
D030	2,4-Dinitrotoluene	0.13	Semi-Volatile Organic Compound
D032	Hexachlorobenzene	0.13	Semi-Volatile Organic Compound
D033	Hexachlorobutadiene	0.5	Semi-Volatile Organic Compound
D034	Hexachlorothane	3.0	Semi-Volatile Organic Compound
D036	Nitrobenzene	2.0	Semi-Volatile Organic Compound
D037	Pentachlorophenol	100.0	Semi-Volatile Organic Compound
D038	Pyridine	5.0	Semi-Volatile Organic Compound
D041	2,4,5-Trichlorophenol	400.0	Semi-Volatile Organic Compound
D042	2,4,6-Trichlorophenol	2.0	Semi-Volatile Organic Compound
D020	Chlordane	0.03	Pesticide
D012	Endrin	0.02	Pesticide
D031	Heptachlor (and its epoxide)	0.008	Pesticide
D013	Lindane	0.4	Pesticide
D014	Methoxychlor	10.0	Pesticide
D015	Toxaphene	0.5	Pesticide
D016	2,4-D	10.0	Herbicide
D017	2,4,5-TP (Silvex)	1.0	Herbicide

Table 2. EPA Analytical Methods for Soil and Groundwater Confirmation Sampling[1]

Suspected Contaminant[2]	Analytical Method for Soil[3]	Analytical Methods for Groundwater
Used/ Waste Oil	EPA Method 8021 or 8260 (volatiles) EPA Method 8270 (semi-volatiles) EPA 8082 (PCBs) 8 RCRA Total Metals (Speciate Chromium - Trivalent Chromium and Hexavalent Chromium)	EPA Method 8260 (volatiles)[4] EPA Method 8260 SIM (1,4-Dioxane)[9] EPA Method 8270 (semi-volatiles)[4] EPA Method 8082 (PCBs) 8 RCRA Total Metals[5,6,7,8]
Metals	8 RCRA Total Metals (Speciate Chromium – Trivalent Chromium and Hexavalent Chromium)	8 RCRA Total Metals[5,6,7,8] + other metals specific to site as needed
Solvents or other volatile or semi-volatile organic wastes	EPA Methods 8260 and 8270 with prep Method 5035 EPA Method 8260 SIM (1,4-Dioxane)	EPA Method 8260 (volatiles)[4] EPA Method 8260 SIM (1,4-Dioxane)[9] EPA Method 8270 (semi-volatiles)[4]
Unknown	EPA Method 8260 (volatiles) with 5035 prep EPA Method 8270 (semi-volatiles), plus 10 largest tentatively identified compounds (TICs) EPA Method 8081 (pesticides) EPA Method 8151A (herbicides) EPA Method 8082 (PCBs) Total RCRA Metals (Speciate Chromium – Trivalent Chromium and Hexavalent Chromium)	EPA Method 8260 (volatiles)[4] EPA Method 8260 SIM (1,4-Dioxane)[9] EPA Method 8270 (semi-volatiles)[4] EPA Method 8082 (PCBs) EPA Method 8081B (pesticides) EPA Method 8151A (herbicides) 8 RCRA Total Metals[5,6,7,8] + other metals specific to site as needed
Pesticides & Herbicides	EPA Method 8081B (pesticides) EPA Method 8151A (herbicides)	EPA Method 8081B (pesticides) EPA Method 8151A (herbicides) EPA Method 8260 (volatiles)[4] EPA Method 8260 SIM for 1,4-Dioxane (if VOCs detected)[9] EPA Method 8270 (semi-volatiles)[4] 8 RCRA Total Metals[5,6,7,8] + other metals specific to site as needed

TABLE 2 NOTES:

1. Compounds must be analyzed using a method capable of detecting and achieving method detection limits (MDLs) at or below the applicable cleanup level. Also, for guidance regarding site-specific contaminants/methods, please contact Branch staff for assistance.
2. For analyses of Per- and Polyfluoroalkyl Substances (PFAS), please consult with Branch Staff.
3. Additional analytical methods may be required if contaminated soil is to be disposed of or treated at a permitted facility. Contact the disposal facility for specific requirements.
4. All of the volatile and semi-volatile compounds with a library search to produce a list of the 10 largest tentatively identified compounds (TICs).
5. ICP-MS is preferred over ICP due to lower quantitation limits. However, ICP should be used for certain metals where interference issues exist.
6. Hexavalent chromium analysis is not needed for groundwater samples since the 15A NCAC 02L standard for total chromium is based on the more toxic hexavalent chromium species. This level must be met for all chromium in groundwater.
7. For metals, rapid analyses of samples are recommended to lessen the contact time with the acid preservative. Filtration of groundwater samples before digestion is not permitted. Highly turbid water samples for metals analysis should be collected in accordance with protocol established by the USEPA Region 4 Laboratory Services and Applied Science Division (LSASD) which can be found at https://www.epa.gov/quality/quality-system-and-technical-procedures-lsasd-field-branches#fsp.
8. Samples collected for hexavalent chromium analyses must be field filtered within 15 minutes of collection. Each sample must be collected in a separate pre-preserved container from those for other metals analyses. Sampling for hexavalent chromium must follow all procedures in Method 218.7 or Method 218.6. If 218.7 or 218.6 are not followed, hexavalent chromium samples must meet a maximum 24-hour hold time limit.
9. Due to possible interference issues between 1,4-dioxane and some chlorinated solvents, special sampling and other analyses may be needed. Contact Branch staff for assistance if necessary.

APPENDIX 2

SAMPLE COLLECTION GUIDELINES AND HOLDING TIMES

A. Sample Preparation

The type of sample container used depends on the type of analysis needed. First, the site owner or operator needs to determine the type(s) of contaminants expected and the proper analytical methods to be used (See Appendix 1). Refer to Table 3 to determine the proper containers, preservation techniques and holding times for samples. You may also consult with the laboratory analyzing the samples or refer to the US EPA SW- 846-Compendium. Unless otherwise noted, field procedures need to comply with the most current version of the USEPA Region 4 LSASD Quality System and Technical Procedures. The HWS strongly recommends that a NC Certified laboratory be used to perform the needed analyses. The site owner or operator should ask the laboratory about any specific sample handling procedures required by the analytical methods used.

Commercial laboratories sell kits for sample collection and transport. The kits should include all the items needed (containers, labels, shipping cartons, etc.) for sample collection and shipment. If an owner or operator uses these services, they need to carefully follow the instructions provided and not discard any preservative that may have been added to the containers. If the site owner or operator does not use a customized laboratory kit, use only new containers that are appropriate for the contaminants to be sampled. Check with the laboratory that will be running the analysis about appropriate sample containers and preservation for each method. **If proper sampling and QA/QC protocols are not followed, test results will not be valid.**

Sample containers should be labeled before sample collection. Each label should include the sample location and/or well number, sample identification, the date and time of collection, the analyses to be performed, the preservative added (if any), the sampler’s initials, and any other pertinent information for sample identification. The site owner or operator should also prepare the storage and transport containers (ice chests, etc.) before collecting samples so each sample can be placed in an environment chilled to approximately 4°C (40 °F) immediately after collection.

B. Sample Storage and Transport

Samples should be stored for transport in a manner that prevents breakage. To meet quality assurance standards, samples should be kept at a temperature of approximately 4° C (40 °F) following collection. Use ice if necessary. Transport samples to the laboratory as soon as possible. Avoid unnecessary handling of the sample containers. Heating (room temperature or above, including exposure to sunlight) or freezing of the sample containers should be avoided. The time between sampling and delivery to a laboratory should be kept to a minimum. Do not exceed the holding times of the samples (see Table 3).

A chain-of-custody form must accompany the samples to the laboratory. Complete all sections on the form. See Appendix 3, Figure 2 for a sample chain-of-custody form. A chain-of-custody form must include: the site name and location, sample collector, sample number, date and time of collection, type of sample, analysis required, the signature of the collector, time relinquished, the signature of the receiver, time received, grab or composite sample designation, and other pertinent information.

Table 3. Recommended Containers, Holding Times and Preservation[1,2]

ANALYTICAL GROUP	SOIL/ SEDIMENT CONTAINER	SOIL/ SEDIMENT PRESERVATION	SOIL/ SEDIMENT HOLDING TIME (DAYS)	WATER CONTAINER (VOLUME OF SAMPLE)	WATER PRESERVATION	WATER HOLDING TIME (DAYS)	WASTE CONTAINER (VOLUME OF SAMPLE)	WASTE PRESERVATION	WASTE HOLDING TIME (DAYS)
Inorganics									
pH	8 oz. Glass jar with Teflon lid	NA	--	500 mL polyethylene	--	--	8 oz. Glass jar with Teflon lid	NA	Indefinite
Flash Point	--	--	--	--	--	--	8 oz. Glass jar with Teflon lid	NA	Indefinite
BTU	--	--	--	--	--	--	8 oz. Glass jar with Teflon lid	NA	Indefinite
Ash Content	--	--	--	--	--	--	8 oz. Glass jar with Teflon lid	NA	Indefinite
Turbidity	--	--	--	500 mL polyethylene	Cool to 6°C	2	--	--	--
Conductivity	--	--	--	500 mL polyethylene	Cool to 6°C	28 - on-site if possible	--	--	--
Temperature	--	--	--	500 mL polyethylene	NA	within 15 minutes	--	--	--
Oil and Grease	4 oz. Glass jar with Teflon lid	Cool to 6°C	28	One-liter glass (Teflon lid)	H2SO4 to pH<2 Cool to 6°C	28	4 oz. Glass jar with Teflon lid	Cool to 6°C	28
Total Metals	8 oz. Glass jar with Teflon lid	Cool to 6°C	180	600 mL polyethylene	HNO3 to pH<2	180	8 oz. Glass jar with Teflon lid	Cool to 6°C	180
Mercury	8 oz. Glass jar with Teflon lid	Cool to 6°C	28	400 mL polyethylene	HNO3 to pH<2	28	8 oz. Glass jar with Teflon lid	Cool to 6°C	28
Metals TCLP	8 oz. Glass jar with Teflon lid	Cool to 6°C	180 to extract/180 to analyze	One-liter polyethylene	Cool to 6°C	180 to extract/ 180 to analyze	8 oz. Glass jar with Teflon lid	Cool to 6°C	180 to extract/180 to analyze
Chrome VI	4 oz. Glass jar with Teflon lid	Cool to 6°C	30 to extract/7 to analyze	400 mL polyethylene	Cool to 6°C	1	4 oz. Glass jar with Teflon lid	Cool to 6°C	30 to extract/7 to analyze

Table 3. (cont'd.) Recommended Containers, Holding Times, and Preservation[1,2]

ANALYTICAL GROUP	SOIL/ SEDIMENT CONTAINER	SOIL/ SEDIMENT PRESERVATION	SOIL/ SEDIMENT HOLDING TIME (DAYS)	WATER CONTAINER (VOLUME OF SAMPLE)	WATER PRESERVATION	WATER HOLDING TIME (DAYS)	WASTE CONTAINER (VOLUME OF SAMPLE)	WASTE PRESERVATION	WASTE HOLDING TIME (DAYS)
Cyanide	4 oz. Glass jar with Teflon lid	Cool to 6°C	14	500 mL polyethylene	50% NaOH to pH>12 Cool to 6°C	14	4 oz. Glass jar with Teflon lid	Cool to 6°C	14
ORGANICS									
VOCs	2 oz glass Teflon septum lid	Cool to 6°C	14	40 ml glass (Teflon septum lid)	HCL to pH<2 / Cool to 6°C	14 with preservative/ 7 without	8 oz. Glass jar with Teflon lid	Cool to 6°C	14
VOCs- TCLP	2 oz glass Teflon septum lid	Cool to 6°C	14 to extract/ 14 to analyze	40 ml glass (Teflon septum lid)	Cool to 6°C	14 to extract/ 14 to analyze	8 oz. Glass jar with Teflon lid	Cool to 6°C	14 to extract/14 to analyze
Extractable SVOCs including herbicides, pesticides and PCB	8 oz. Glass jar with Teflon lid	Cool to 6°C	14 to extract/ 40 to analyze	One-gallon amber glass (Teflon lid)	Cool to 6°C	7 to extract/ 40 to analyze	8 oz. Glass jar with Teflon lid	Cool to 6°C	14 to extract/ 40 to analyze
Extractable-TCLP	8 oz. Glass jar with Teflon lid	Cool to 6°C	14 to TCLP extraction/ 7 to solvent extraction/ 40 to analyze	One-gallon amber glass (Teflon lid)	Cool to 6°C	14 to TCLP extraction/ 7 to solvent extraction/ 40 to analyze	8 oz. Glass jar with Teflon lid	Cool to 6°C	14 to TCLP extraction/ 7 to solvent extraction/ 40 to analyze
Dioxins	consult lab	consult lab	30 to extract/45 to analyze	consult lab	consult lab	30 to extract/45 to analyze	consult lab	consult lab	30 to extract/45 to analyze

Table 3 Notes:

(1) The recommended containers, holding times and preservations listed in the table above are provided to serve as a general guide but can vary depending on the data quality objectives and site-specific factors. To review the latest sample collection requirements, consult

- 40 CFR 136.3(e) Table II (https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-136/section-136.3#p-136.3(e))
- Chapters 2-4 of the SW-846 Compendium (https://www.epa.gov/hw-sw846/sw-846-compendium#chapters)
- Appendix D of the November 2020 Sampler's Guide for Contract Laboratory Program Guidance for Field Samplers (https://www.epa.gov/sites/default/files/2021-03/documents/samplers_guide_clp_guidance_for_field_samplers_november_2020.pdf).

(2) All sampling should be conducted using extreme caution and performed by personnel properly trained in EPA approved sampling procedures and methods. It is recommended that the laboratory be consulted prior to sample collection for proper containers, holding times, preservatives, chain of custody records, shipping supplies, paperwork, etc.

(3) For analyses of Per- and Polyfluoroalkyl Substances (PFAS), please consult with Branch Staff.

(4) NA Not applicable.

(5) -- No information or does not apply.

C. Soil Sample Collection

Collect soil samples under the charge of a professional engineer, licensed geologist or other knowledgeable environmental sampling professional. Collect soil samples using methods that cause the least disturbance to the soil's internal structure and minimize its exposure to heat, sunlight and open air. Do not allow samples to be contaminated by other site material or other samples.

While collecting samples from potentially contaminated soil, avoid contact with skin or other body parts. Wear disposable gloves and change them between samples to avoid cross-contamination. A clean, stainless steel sample apparatus should be used to collect each sample. Decontaminate sampling equipment between each collected sample. Do not use plastic, galvanized, chrome, rusted or painted equipment to collect samples.

Ideally, samples should be collected from soil cores. For practical reasons, however, it may be necessary to collect samples from a backhoe bucket, hand auger, etc. Collect the sample from material that has not contacted the equipment surface, especially if it is painted or rusted. Avoid the loss of contaminants from the sample. Samples for organic compounds that have volatile physical properties (aka, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, herbicides, etc.) must be collected with minimal handling and agitation; do not mix or composite. Power equipment may be used (power augers, etc.) to aid sample collection, but make every effort to avoid sample contamination with fuels, oils, greases, etc.

Once removed from the ground, immediately place each sample in a proper container necessary for the method of analysis. The sample should fill the entire volume of the container, leaving no headspace unless the method requires otherwise. Refer to Table 3 or the selected laboratory, for the necessary sample containers and volume of soil needed for each analytical method. If necessary, add preservative before filling sample jars. As soon as the sample is collected, immediately cap, seal and store the container at 4 °C (40 °F).

D. Standard Field Protocols

In addition to the standard protocols listed here and in the USEPA Region 4 LSASD Quality System and Technical Procedures, please observe the following:

- Field QC samples: (1) collect at least one duplicate sample per medium, per container type, per field day; (2) equipment rinsate blanks, field blanks and volatile organic analysis (VOA) trip blanks are strongly recommended.
- Collect soil, sediment and waste samples directly into sample containers without mixing.
- Stake and flag (or survey) all soil sampling and boring locations until the investigation is complete.
- All final monitoring well and water level measuring point locations must be surveyed by a Professional Land Surveyor registered in North Carolina.
- Do not filter groundwater samples for metals before analysis. Data from field-filtered groundwater samples will not be accepted. If excess turbidity is a problem, use low-flow purge and sample methods.
- IDW and remediation wastes (i.e., excavated soil, drill cuttings, well development and purge/decontamination water, etc.) must be placed in containers until laboratory data is available to

decide how treat or dispose of the material. Materials exceeding unrestricted use cleanup levels may not be placed on the site.

Manage listed or characteristic hazardous wastes according to RCRA requirements.

E. Decontamination

Decide arrangements ahead of time for on-site field decontamination of any sampling or measuring equipment that will be reused to collect more than one sample. It is necessary to decontaminate sampling equipment between each sample collected to reduce the possibility of cross-contamination. All decontamination procedures need to be included in reports as necessary. Follow the USEPA Region 4 LSASD Quality System and Technical Procedures for field decontamination techniques.

Soil Sampling

- Wear protective gloves for each sample. Change gloves between collecting each sample.
- Select all sampling equipment based on the material's chemical compatibility with the contaminants potentially present and the source being sampled. Decontaminate all sampling equipment between each sample collected.
- Transport equipment in a way that does not allow it to become contaminated.

Groundwater Sampling

In addition to the above:

- To reduce the possibility of cross-contamination, whenever possible disposable sampling supplies (e.g., bailers, line, etc.) dedicated to each sampling point are recommended and should be properly disposed after one use. Non-disposable sampling supplies should only be used after proper decontamination.
- Decontaminate or replace the inside and outside of pumps and reusable hoses/lines between each use. Ensure that hoses, lines and exposed gaskets are either constructed of non-reactive materials or replaced between each use.
- Depending on the contaminants, special equipment may be necessary for sample collection.

APPENDIX 3

REPORTING FORMATS AND CONTENT

A. Initial Site Sampling Plan (ISSP)

Documents need to be submitted electronically unless otherwise requested by Branch staff. All electronic documents should be submitted as one PDF file that includes any cover letters and appendices. Documents should be emailed, but a file-sharing system may be used if the document is large in size. The site owner or operator should submit the ISSP to the Branch for approval **before** commencing with any site activity other than initial emergency response actions. If the cleanup is being conducted under the terms of an enforcement document, include the site-specific actions specified to be completed to return to compliance. Upon Branch approval of the ISSP, the owner and/or operator should implement the plan according to the approved schedule. Refer to Section 3 of this guidance for the sequence to submit work plans and reports.

1. Introduction

The purpose of the ISSP is to identify all releases of hazardous substances to the environment, characterize the chemical nature of such releases, collect sufficient sampling data to compile a list of contaminants of concern, and determine if a cleanup is necessary.

2. Content of the Initial Site Sampling Plan

The ISSP should contain the information described below, **as applicable.** It needs to be presented in the following order and **Sections that are not applicable to the site should be documented as such**:

Title Page

- Site name and location, and EPA Identification Number (if the site has one).
- Site operator and any persons responsible for the site or the release, including address(es), email address(es), and phone number(s). List the current property owner(s), if different, including name(s), address(es) and phone number(s).
- Consultant/contractor information including name(s), address(es), email address and phone number(s).

Site Description:

- Site location information including location address including county, longitude, and latitude.
- Site history, **as it relates to the investigation**. Include a description of property ownership and uses, and a summary of actual and potential sources of the contamination. Include a summary of hazardous waste and hazardous substance management practices employed at the site. Use RCRA hazardous waste codes where applicable. Include a description of the facility's past and current RCRA hazardous waste activities and generator category; a summary of the nature of all on-site hazardous substance releases (including one-time releases or spills) and a summary of any previous and ongoing environmental investigations at the site.
- United States Geological Survey topographic maps (1/24,000 scale) sufficient to display the topography within a one-mile radius of the site.

- A site map including scale, benchmarks and north arrow. Include, **as they relate to the investigation:** locations of property boundaries, buildings, structures, all perennial and intermittent surface water features, drainage ditches, dense vegetation, known and suspected spill or disposal areas, underground utilities, storage vessels, existing on-site wells, and an identification of adjacent property land usage.
- A description of local geologic and hydrogeologic conditions, and the depth to water table, if known.

Source Characterization

- A description of the source(s) of the release. Include the compound(s) released, compound mobility (density), the date discovered, the estimated quantity of the release, and the cause of the release(s). Use hazardous waste codes when appropriate.
- A summary of any assessment activities conducted, and corrective actions performed to date including emergency response and initial abatement activities.
- Site-specific conditions that may encourage contaminant mobility, e.g., sandy soils.

Receptor Information

- An inventory and map of all wells, springs and surface-water intakes and other sources of potable water within 1,500 feet of the facility boundary, structures within 100 feet of the groundwater contaminated with volatile compounds, and the location of nearby surface waters and sensitive ecological environments. If the site is greater than one hundred (100) acres in size, the inventory and map need to cover a one-mile radius from the center of each source area.
- An evaluation of the site and all adjacent property for the existence of any environmentally sensitive areas as defined in Appendix 5.

Proposed Methods of Investigation

- Proposed methods, locations, depths of, and justification for all sample collection points for all media (soil, water, sediment, containerized wastes, etc.). Include monitoring well locations and anticipated screened intervals, if applicable, for each known or suspected release area (refer to Section 5 and Appendix 1 and 2 of this guidance). Include plans for any special assessment such as a geophysical survey. Locate all proposed sample points on the map.
- Proposed analytical parameters and analytical methods for all samples. Describe equipment and personnel decontamination procedures. Proposed field and laboratory procedures for quality assurance/quality control (refer to Appendix 1 and 2 and Section 5 of this guidance).

Schedule

- A proposed schedule for site activities and reporting.

Other Information

- Any other information needed by the Branch or considered relevant by the owner and/or operator.

B. Assessment and Cleanup Plan (ACP)

Once it is determined that contamination exists above unrestricted use levels at the site, the site owner and/or operator needs to prepare an ACP that includes the information listed below. Documents need to be submitted electronically unless otherwise requested by Branch staff. All electronic documents should be submitted as one PDF file that includes any cover letters and appendices. Documents should be emailed, but a file-sharing system may be used if the document is large in size. If the site cleanup is being conducted under the terms of an enforcement document, include the additional requirements described in the enforcement document. Upon Branch approval of the ACP, the site owner and/or operator should implement the plan according to the approved schedule. Refer to Section 3 of this guidance for the sequence for submitting work plans and reports.

1. Introduction

The purpose of the ACP investigation is to delineate the horizontal and vertical extent of contamination in each known or suspected release area or an area where contamination was detected during the initial site sampling and the proposed areas of excavation or remediation. Cleanup activities are usually conducted in an initial assessment phase proposed in the ISSP. The next step is the delineation of contamination and removal phase proposed by the ACP. In some cases (e.g., if releases are small and the extent of contamination is easily defined and removed) activities may be combined in these documents. If the ACP and ISSP are combined, all items needed for both documents should be included in the ACP. The Branch must approve the ACP before it is implemented. See Section 4 and 5 regarding assessment activities, remedial goals, background levels, etc.

2. Content of the Assessment and Cleanup Plan

ACPs should be organized in sections that correspond to the following and:

Introduction:

- A synopsis of purpose and objectives of the ISSP.

Site Description:

- A summary description and map(s) of the site location and setting.
- A summary of the site geologic and hydrologic conditions, including a description of soil and unsaturated zone characteristics. If known, include a description of the groundwater flow gradient, direction, and estimated rate of migration.

Receptor Information:

- Discuss any human or sensitive environmental populations, or areas that may be impacted by site conditions.

Initial Investigation Results:

- A narrative description of the initial investigation activities, including a discussion of any variances from the approved ISSP.
- A map, drawn to scale, showing all existing soil, surface water and sediment sample locations. If applicable, include monitoring well locations in relation to the areas of contamination.
- A description of all laboratory quality control and quality assurance procedures used during the investigation.
- Tabulation of analytical results for all sampling (soil, water, containerized wastes, etc.). Include sampling dates, soil-sampling depths, and copies of all laboratory-reports. Use the data-reporting format shown in Appendix 3C.
- Soil, groundwater, surface water and sediment contaminant delineation maps and cross-sections. Include scale and sampling points with contaminant concentrations.
- A description of the procedures used, including equipment and personnel decontamination procedures, and the results of any special assessments conducted.
- If groundwater monitoring was conducted, include the following data. More information may be requested.
    1. The boring logs and water levels from the borings/wells.
    2. The location of borings/wells on the site map.
    3. A water table elevation contour map with groundwater flow patterns depicted, if applicable.
    4. The construction design for each well including depth and screened interval.
    5. The sample collection and analysis procedures used to sample groundwater quality monitoring wells.
    6. Results of the groundwater quality samples.

Proposed Investigation Activities

- A narrative description of the planned activities to define the extent of contamination.
- A map, drawn to scale, showing all proposed soil, surface water and sediment sample locations in relation to areas of contamination.
- If applicable, a description of proposed groundwater monitoring well locations. Include the purpose of the wells, design and installation procedures, drilling methods, and well construction techniques and materials, equipment and personnel decontamination procedures, and plans for managing IDW.
- A description of proposed field and laboratory procedures, including QA/QC.

Excavation/ Remediation Information:

- A description of the estimated depth and volume of areas to be excavated.
- A description of proposed disposal options for excavated soil/sediment. Include both hazardous and non-hazardous waste options as applicable. The destination facility information must include name,

address, phone number and, if applicable, EPA ID number. (Section 7)

- A description of proposed procedures to manage excavated soil, drill cuttings, purge water and decontamination water. (Sections 6 and 7)
- A description of any obstacles to excavation that may exist.
- A discussion of any other remediation that may be necessary (such as for sediment, or surface water contamination identified). (Section 5.3)

Other Information

- Include any other information needed by the Branch or considered relevant by the owner and/or operator. To clarify, attach copies of site photographs or document site activities, as applicable.

C. HWS Laboratory Data Report Procedures

Analytical results need to be compiled in an appropriate report and submitted to the Hazardous Waste Section. The laboratory data report needs to include the following information.

1. General information

   - Facility Name and, if applicable, an EPA ID Number
   - Laboratory contact and phone number
   - NC Laboratory certification number (if applicable)
   - Date of report preparation

2. Case Narrative

The case narrative must be written on the laboratory letterhead and the release of data authorized by the laboratory manager or his/her designee. The case narrative must consist of the following information:

   - Whether the holding times were met or exceeded
   - Whether the samples were received in good condition and at the required temperature /preservation
   - Discussion of possible reasons for any quality control criteria outside acceptance limits
   - Justification for any deviation from the methods, additional sample preparation, sample dilution and analytical problems not rectified
   - Observations regarding any events that may affect sample integrity or data quality

3. Chain-of-Custody Forms

   Submit legible copies of complete sampling COC forms for each sample. See Figure 2 for the information required on the form.

4. Summary of Analytical Results

Include the following information in the summary of results for each environmental sample:

- Client's sample identification and the corresponding laboratory identification
- Analytical methodology used; when applicable, cite EPA method numbers
- Sample matrix (soil, water, waste, etc.)
- Date of sample extraction/digestion, as applicable
- Date and time of analysis
- Identification of the instrument type used for analysis
- Weight or volume of sample used for analysis/extraction/digestion
- Dilution or concentration factor for the samples
- Percent moisture in the soil samples
- MDLs and sample quantitation limits (SQLs). The lab must report and quantify any estimated values where the constituent was detected at or above the MDL but below the SQL (i.e., estimated or "J" values)
- Definitions of any data qualifiers use
- Analytical results and units of detection. Report all results on a "dry weight" basis

5. Summary of QA/QC Results

List laboratory results for all laboratory quality control samples. Include results for accuracy and precision and the control limits used. The following are required:

- Instrument calibration. Report the concentration of the initial and continuing calibration standards and the date and time of analysis
- Method/Preparation Blank Analysis. List the environmental samples and QC analysis associated with each method blank (e.g., run logs). Report the concentration of any analyte found in the method blanks
- Surrogate Standard Recovery. Report the name and concentration of each surrogate compound added. List the percent recoveries of all surrogates in the samples, method blanks, matrix spike/matrix spike duplicates and other QC analyses. Include the acceptable recovery criteria and indicate when criteria are not met
- Matrix spike/matrix spike duplicate analysis. Report the name and concentration of each spiking compound. Spike samples with all specified compounds of interest. List the sample results, spiked sample results, percent recovery, and the relative percent difference. Include the acceptable recovery criteria and indicate when criteria are not met
- Laboratory duplicate analysis, as applicable. Report the relative percent difference between duplicate analyses

- Laboratory QC check sample or control sample analysis. Report the percent recovery for each analyte in the laboratory QC sample. List the acceptable control limits and indicate when criteria are not met

6. Results of other QC criteria as applicable

For example, ICP interference check sample, post digest spike, method of standard additions, trip blanks, field blanks, and equipment blanks, etc.

7. Additional Reporting Requirements for non-certified laboratories

Submit a:

- Copy of the laboratory's Quality Assurance Plan
- Results from the laboratory's Precision and Accuracy Study for each method run for the sampling results submitted
- Results from the laboratory's MDL studies
- Results from the laboratory's annual Performance Evaluation Study. If the laboratory does not participate in a Performance Evaluation Study, then the HWS may need the laboratory to analyze a performance evaluation sample to check its performance before accepting data.

8. Field Screening Data Procedures

Record the following each sampling day. If conditions change during field monitoring, note the changes.

For Flame Ionization Detectors, Photoionization Detectors (and similar instruments) report:

- The temperature
- The relative humidity
- Calibration gas
- Results in ppm associated with each confirmation sample collected

D. Closure Report

Within thirty (30) days after cleanup activities are complete, or as specified by an enforcement document, submit a Closure Report. The report should demonstrate the site has been cleaned up according to approved procedures and in compliance with any enforcement document.

1. Content of the Closure Report

The Closure Report needs to include at least the following:

2. Summary of Investigation Activities

- Description of site conditions and identified areas of contamination
- Maps showing site location, surrounding areas, sampling locations, and areas/extent of contamination
- Sample results (if not provided in previous submissions) using the laboratory data reporting format in Appendix 3C
- Groundwater sample results if applicable. Use the laboratory data-reporting format in Appendix 3C
- Identify any sample results in excess of cleanup levels (Section 4)

3. Remediation Activities

- A description of remediation activities and any causes for deviations from the approved plan(s)
- Cleanup levels used for each contaminant of concern (Section 4)
- Map(s) showing areas of contamination, excavated areas and any remaining contamination
- Volume and disposition of excavated soil and other wastes (contaminated water, waste in containers, etc.) removed from the site. The name and address for all treatment/storage/disposal/ (TSD) facilities used.
- Laboratory data used to determine disposal options for excavated soil and other wastes removed from the site (contaminated waters, wastes in containers, etc.). Use the laboratory data reporting format in Appendix 3C.
- Copies of disposal permits needed (e.g. land application permits), if applicable. Copies of manifests for hazardous wastes and bills-of-lading for non-hazardous wastes shipped off-site.

4. Results for Confirmation Sampling

- Post-excavation soil sampling results for all areas of contamination. Use the laboratory data reporting procedures in Section 8 and Appendix 3C. Identify any sample results in excess of cleanup levels.
- Map(s) depicting locations and results of post excavation samples

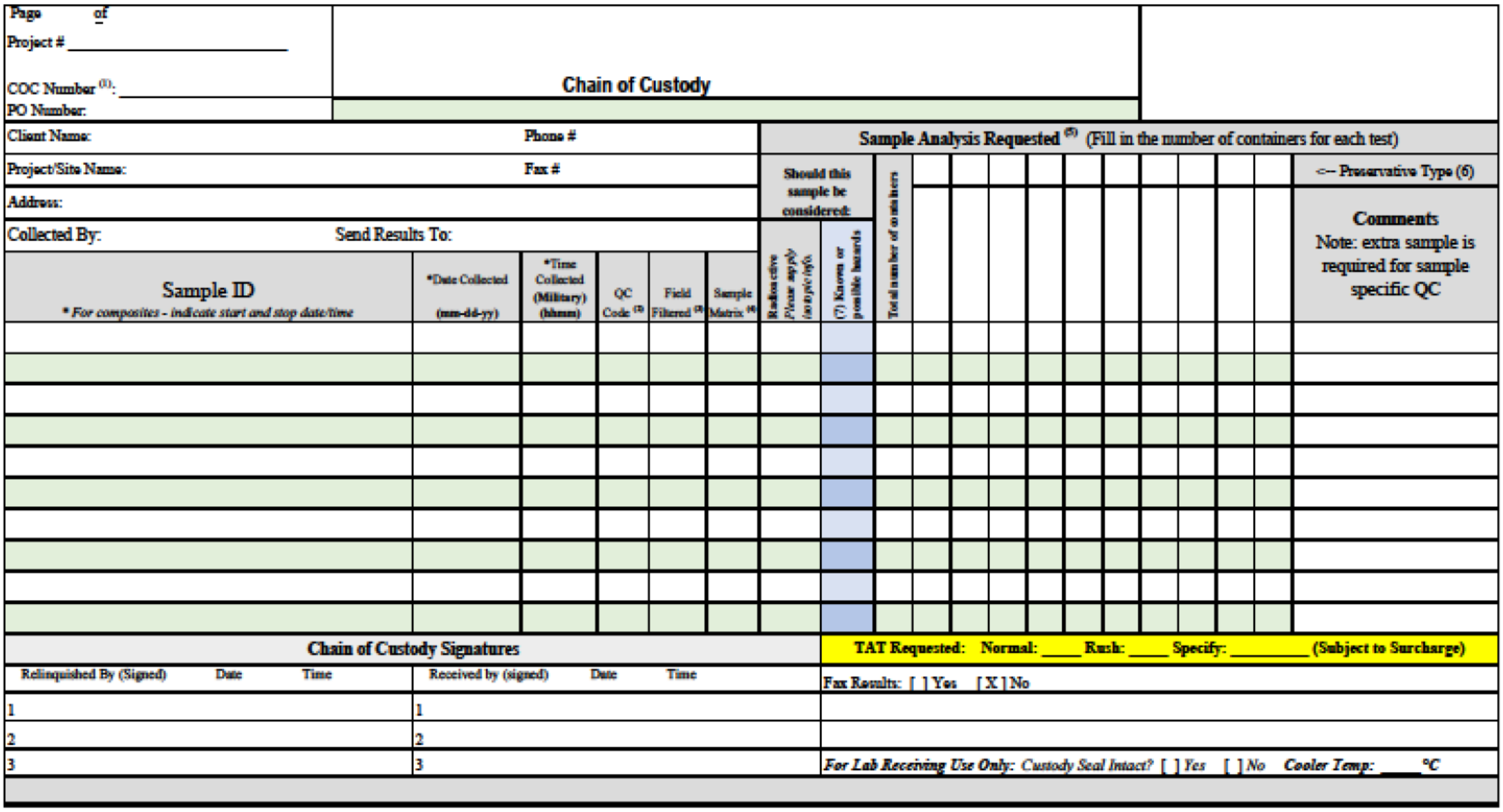
5. Conclusion

- A statement that the applicable/approved cleanup standards have been met

OR

- A statement that site contamination exists beyond the scope of a generator closure. Include a description of the existing site conditions that will require further investigation and/or remediation to meet the cleanup standards.

FIGURE 2 SAMPLE CHAIN OF CUSTODY RECORD



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PO Number:

Chain of Custody

Client Name: Phone #
Project/Site Name: Fax #
Address:
Collected By: Send Results To:

						Sample Analysis Requested (5) (Fill in the number of containers for each test)													
						Should this sample be considered:													**<-- Preservative Type (6)**
Sample ID * *For composites - indicate start and stop date/time*	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Radioactive *Please apply (isotopic info).*	(7) Known or possible hazards	Total number of containers											**Comments** Note: extra sample is required for sample specific QC

Chain of Custody Signatures		**TAT Requested: Normal: _____ Rush: _____ Specify: _________ (Subject to Surcharge)**
Relinquished By (Signed) Date Time	Received by (signed) Date Time	Fax Results: [ ] Yes [X] No
1	1	
2	2	
3	3	***For Lab Receiving Use Only:*** *Custody Seal Intact? [ ] Yes [ ] No* ***Cooler Temp:*** _____°C

APPENDIX 4

FIELD SCREENING METHODS

Portable environmental monitoring equipment such as flame ionization detectors, photoionization detectors, immunoassay kits, X-Ray Fluorescence spectrometry equipment, etc. are useful tools for on-site sample screening and selection. During site characterization, these tools can be used to speed up investigations. However, there are several factors that limit their applicability for determining the extent of hazardous waste contamination in soil. Refer to Appendix 3C for data reporting procedures when using portable field screening tools.

NOTE: Due to the lack of specificity, accuracy, precision, and QA/QC, field screening data will not be acceptable for confirming the presence, nature, or extent of contamination. Only laboratory results are acceptable. Also, all field screening should be conducted using extreme caution and performed by personnel properly trained in field screening procedures and methods. Equipment manufacturer instructions for operation and calibration of equipment must be closely followed when relying on field screening data for interpretation.

Comments regarding a few, but not all, field equipment devices are provided.

A. Photoionization Detectors (PIDs)

Description

Photoionization detectors use an ultraviolet (UV) light source to ionize a sample and detect its concentration in much the same way a FID uses a hydrogen gas flame to ionize VOCs. Ionization occurs when a molecule absorbs the high energy UV light produced by the PID's lamp and causes the temporary loss of an electron. This process causes the molecule to become positively charged and capable of being measured. Commercial PIDs are generally offered with UV lamps of 9.5 electron volts (eV), 10.6eV or 11.7eV with the 10.6eV lamp being the standard.

All elements and chemicals can be ionized, but they differ in the energy required. The energy required to displace an electron and ionize a compound is called its ionization potential (IP). It is measured in electron volts. To find the IP of a compound, consult a chemical dictionary. If the IP of the sample gas is less than the eV output of the lamp, the PID can measure the sample gas. For example, benzene has an IP of 9.24eV and can be read by the "standard" 10.6eV lamp. Acetic acid has an IP of 10.66eV and may be read only by an 11.7eV lamp. The standard calibration gas for PIDs is isobutylene with an IP of 10.6eV.

Uses

PIDs may be used to detect a variety of compounds including aromatic hydrocarbons (e.g., benzene, toluene, xylene), ketones and aldehydes, chlorinated hydrocarbons (trichloroethene, tetrachloroethane, etc.), sulfur compounds, amines and amides, alcohols, and saturated and unsaturated hydrocarbons (butane, hexane, butadiene, etc.). PIDs can also detect some inorganic compounds, including ammonia and chlorine. Generally, the lower the IP of a gas, the more sensitive the PID is to the gas.

Limitations

PIDs should not be used:
- To measure radiation, oxygen, nitrogen, carbon dioxide or carbon monoxide
- To measure hydrogen cyanide, sulfur dioxide or acid gases
- If the humidity is greater than 85%.

Documentation Needed

Date, Time, Weather, Temperature, Lamp eV, Calibration gas and results

B. X-Ray Fluorescence spectrometry (XRF)

Field portable X-Ray Fluorescence spectrometry (XRF) is a method for screening and should not be used to delineate the horizontal and vertical extent of contamination in each known or suspected release area. XRF can be used in conjunction with confirmatory analysis using other techniques (e.g., flame atomic absorption **spectrometry (FLAA), graphite furnace atomic absorption spectrometry (GFAA), inductively coupled plasma-**atomic emission spectrometry, (ICP-AES), or inductively coupled plasma-mass spectrometry, (ICP-MS).

If screening with a XRF, Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the determination of elemental concentration in soil and sediment must be used. The Method is available at: https://www.epa.gov/sites/production/files/2015-12/documents/6200.pdf.

APPENDIX 5

DEFINITIONS USED IN THIS DOCUMENT

Accuracy

Refers to the closeness of agreement between an observed value in a laboratory analytical method and an accepted reference value for that method.

Analyte

A chemical compound measured or detected in a sample.

Aquifer

A body of rock or other geologic material that is sufficiently permeable to conduct groundwater and to yield significant quantities of water to wells or springs.

Assessment and Cleanup Plan (ACP)

The second phase of a site investigation structured to define the extent of each contaminant, in each known or suspected release area or an area where contamination was detected during the initial site sampling, for each medium that is contaminated to concentrations less than or equal to the MDL, and the proposed remediation of each release area.

Background Level

Site-specific natural level of a compound. Usually only determined for metals.

Bedrock

A general term used to describe solid rock that underlies soil or other unconsolidated, superficial material. Bedrock cannot readily be excavated without the use of explosives or heavy rock cutting equipment.

Biased Sample

A sample collected based on information about the medium being sampled or based on the judgment and knowledge of the sample collector. Not a statistical approach.

Blanks

Used to identify and isolate the possible sources of contamination that may be introduced into a sample at some point during the collecting, transporting, handling and analytical process.

Branch

Refers to Compliance Branch of the Hazardous Waste Section.

Cleanup Level

The level of a compound that is both protective of human health and the underlying groundwater. The level at which no further remedial actions are required.

Closure Report

The final report submitted to the Branch documenting cleanup activities at a site.

Composite Sample

A sample consisting of a mixture of individual grab samples.

Contaminant of Concern

The compounds identified in each media at a site above the specified cleanup level.

Confining Layer

A layer having very low hydraulic conductivity in relationship to adjacent units. It restricts the movement of water into and out of an aquifer (e.g., dense unfractured clay).

Confirmed Release

A release for which a laboratory result of sampled media shows any contaminant above the method detection limit.

Department

Refers to the North Carolina Department of Environmental Quality (NC DEQ).

Discharge

A release.

Division

Refers to the Division of Waste Management of the NC DEQ.

Environmentally Sensitive Area

Areas protected by the NC Division of Parks and Recreation, The National Park Service, or the US Forest Service. They include: state parks, areas important to the maintenance of unique natural communities; sensitive areas identified under the National Estuary Program, designated state natural areas, national and state seashore, Lakeshore and River Recreational Areas, rare species (state and federal threatened and endangered), sensitive aquatic habitats, national parks or monuments, federal designated Wild and Scenic Rivers, designated and proposed Federal Wilderness and Natural Areas, national preserves and forests, federal land designated for the protection of natural ecosystems

Generator Closure

Sites with contamination resulting from releases of hazardous waste or hazardous waste constituents without groundwater contamination. Sites can be closed if remediated to background levels.

Grab sample

An individual sample collected from a single source usually collected instantaneously.

Groundwater

The waters occurring in the subsurface under saturated conditions.

Hazardous Waste

Discarded material that, due to its quantity, concentration or physical or chemical characteristics, may cause, or significantly contribute to, an increase in mortality, irreversible or incapacitating reversible illness, or pose a substantial threat or potential hazard to human health or the environment when improperly treated, stored, transported, disposed, or otherwise managed.

Federal regulations (adopted by reference in the North Carolina Administrative Code) define a waste as hazardous waste if it is not excluded (40 CFR 261.4) and it exhibits a characteristic of a hazardous wastes (40 CFR 261.20 through 261.24); has been listed as hazardous (40 CFR 261.31 through 261.33); or is a mixture containing a listed hazardous waste and a solid waste, unless the mixture is specifically excluded or no longer exhibits any of the characteristics of hazardous waste.

Hazardous Waste Constituent

A compound in the EPA list of hazardous wastes in 40 CFR 261 Subpart D, a compound listed in Table 1 of 40 CFR 261.24, or a compound listed in Appendix IX of 40 CFR 264.

Initial Site Sampling Plan (ISSP)

The plan of intended actions to be taken to (1) identify all releases of hazardous substances to the environment, (2) characterize the chemical nature of such releases, and (3) collect sufficient sampling data to compile a list of contaminants of concern.

In Situ Soil

The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. It is determined from analysis of a sample in a given matrix containing the analyte.

Precision

The closeness of agreement between randomly selected individual measurements or test results. It is a measure of the laboratory's ability to reproduce analytical results.

Receptor

Any human, plant or animal, well or surface water body that is, or has the potential to be, adversely affected by the release or migration of contaminants._

Release

Any spilling, leaking, emitting, discharging, escaping, leaching or disposing of a substance into groundwater, surface water or soil.

Representative Sample

A sample that reflects the characteristics of the "population" or medium being sampled.

Soil Screening Level

A conservatively calculated level of a constituent in a soil that is protective of human health and the groundwater being contaminated above NC 2L standards from the leaching or migration of contaminant through the soil.

Surface Water

All waters of the state as defined in G.S. 143-212, except underground waters.

Uppermost Aquifer

The saturated portion of the uppermost geologic formation, group of formations, or part of a formation that can yield a significant amount of groundwater to wells or springs.

APPENDIX 6 ACRONYMS

ACP	Assessment and Cleanup Plan (Phase II- extent of contamination)
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
DWM	Division of Waste Management
EPA	Environmental Protection Agency
EPA ID	Environmental Protection Agency Identification Number
eV	Electron Volt
FID	Flame Ionization Detector
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometry
HWS	Hazardous Waste Section
IFT	Immunoassay Field Test
IMAC	Interim Maximum Allowable Concentration
IP	Ionization Potential
ISM	Incremental Sampling Methodology
ISSP	Initial Site Sampling Plan (Phase I- initial site sampling plan)
MDL	Method Detection Limit
NC	North Carolina
NC DEQ	Department of Environmental Quality
NCAC	North Carolina Administrative Code
NCGS	North Carolina General Statutes
PCB	Polychlorinated Biphenyl

PID	Photo Ionization Detector
PQL	Practical Quantitation Limit
SCG	Soil Cleanup Goal
QA/QC	Quality Assurance/ Quality Control
RCRA	Resource Conservation and Recovery Act
TCLP	Toxic Characteristic Leaching Procedure
2L	North Carolina Groundwater Quality Standards located at 15A NCAC 02L
TSD	Treatment Storage Disposal (facility)
USEPA	United States Environmental Protection Agency
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

APPENDIX 7

HAZARDOUS WASTE COMPLIANCE BRANCH CONTACTS

Submit all Generator Closure reports to the Branch Environmental Chemist for your Region unless instructed otherwise.

If you do not know your Region, see the map at the following link for the Hazardous Waste Section Regional/County Contacts:

https://deq.nc.gov/media/29250/download?attachment?attachment