UST SECTION ASSESSMENT GUIDELINES

PETROLEUM AND HAZARDOUS SUBSTANCE UST RELEASES

PETROLEUM NON-UST RELEASES

UST Section

North Carolina Department of Environmental Quality

Division of Waste Management

January 19, 2021 Version

Index of Changes

Document Title and Revised Pages	Version Date	Change Date	Change Number
Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases *(current version)*	March 1, 2007	January 9, 2018	Change 8
Guidelines for Sampling *(current version*)	July 15, 2008	May 1, 2012	Change 2
Guidelines for Ex Situ Petroleum Contaminated Soil Remediation *(current version)*	August 23, 2012		
Guidelines for Initial Response and Abatement, Assessment, and Corrective Action for Non-UST Releases of Petroleum *(current version)*	July 1, 2012		
Guidelines for Assessment and Corrective Action for Petroleum Releases	May 1, 2018		See ***Assessment Guidelines***
Assessment Guidelines *(current version)*	January 19, 2021		

Contents

Tables

(See COMPREHENSIVE TABLES FOR CORRECTIVE ACTION GUIDELINES)

Appendices

Appendix A – Report Formats

1. Site Check Report
2. UST-3 - Notice of Intent: UST Permanent Closure or Change-in-Service
3. 24-Hour Release and UST Leak Reporting Form (UST 61 Form)
4. 24-Hour Notification of Discharge Form (UST 62 Form)
5. 20-Day Report
6. UST Closure Report (following UST-12 format) and Site Investigation Report for Permanent Closure or Change-in-Service of UST (UST-2 Form)
7. Site Investigation Report for Permanent Closure or Change-in-Service of UST
8. Initial Abatement Action (Site Check, UST Closure with UST-2 Form, Excavation, Post-Excavation Soil Contamination Assessment) Report
9. 45-Day Report (For non-petroleum UST releases only)
10. Free Product Recovery Report
11. Free Product Recovery System Specification Report
12. Initial Site Assessment Report
13. Limited Site Assessment Report
14. Request for Water Supply Well Information
15. Comprehensive Site Assessment Report
16. Soil Assessment Report
17. Corrective Action Plan
18. Soil Cleanup Plan
19. Monitoring Reports
20. System Enhancement Recommendation Report
21. New Technology Cleanup Plan
22. Soil Cleanup Report with Site Closure Request
23. Site Closure Report
24. Format of Individual Public Notice
25. Format of Public Notice by Posting (15A NCAC 2L .0409(a))
26. Format of Individual Public Notice for Non-Petroleum UST Releases
27. VPH (Aliphatics/Aromatics) Laboratory Reporting Form
28. EPH (Aliphatics/Aromatics) Laboratory Reporting Form

Definitions

Action Level: the concentration of a contaminant that if exceeded may require further regulatory action such as cleanup or monitoring.

Aquifer: a permeable body of rock or sediment that stores and transmits groundwater in sufficient quantity to supply wells or springs.

Bedrock: any consolidated rock which is encountered in the place in which it was formed or deposited and which cannot be readily excavated without the use of explosives or heavy rock cutting equipment. (15A NCAC 02L .0102) Bedrock generally underlies soil or other unconsolidated, superficial material.

Cleanup Level: the concentration of a contaminant at which *no* further cleanup actions are required based on the risk of harm posed by the contaminant.

Closure: activities conducted during the permanent removal (or abandonment) of underground storage tank systems and not inclusive of abatement or corrective actions, or remediation.

Commercial Underground Storage Tank: any tank or tank system, including any connected piping, containing petroleum products, where at least ten percent (10%) of the total system volume (including both tanks and piping) is buried beneath the surface of the ground, excluding any systems exempted in North Carolina General Statute (NCGS) 143-215.94A(2).

Confining Layer: a layer having very low hydraulic conductivity, in relationship to adjacent stratigraphic units, that restricts the movement of water into and out of an aquifer (e.g., dense, unfractured clay).

Confirmed Release: a release for which an analytical result for sampled media shows any contaminant level above the Method Detection Limit.

Contaminant: any substance occurring in concentrations which exceed the groundwater quality standards specified in 15A NCAC 02L.0202.

De Minimis Concentration: amount of a regulated substance which does not exceed one percent (1%) of the capacity of the tank, excluding piping and vent lines (15A NCAC 02N.0203).

Department: the North Carolina Department of Environmental Quality.

Discharge: a release (See also Release).

Division: the Division of Waste Management.

Ex Situ Soil: soil that has been excavated.

Free Product: free-phase petroleum, also known as liquid-phase hydrocarbon or phase-separated hydrocarbon (See also NAPL).

Gross Contamination Levels (GCLs): levels of groundwater contamination for any contaminant (except ethylene dibromide, benzene and the aliphatic and aromatic carbon fraction classes) that exceed 50 percent of the solubility of the contaminant at 25 degrees Celsius or 1,000 times the groundwater quality standard or interim groundwater quality standard established in 15A NCAC 02L .0202, whichever is lower: and levels of groundwater contamination for ethylene dibromide and benzene that exceed 1,000 times the federal drinking water standard set out in 40 CFR 141.

Groundwater: those waters occurring in the subsurface under saturated conditions.

Hazardous Substance: a hazardous substance defined in Section 101 (14) of the Comprehensive Environmental Response Compensation and Liability (CERCLA) Act of 1980 (but not including any substances regulated as a hazardous waste under RCRA Subtitle C or any mixture of such substances and petroleum).

Hazardous Waste: discarded material which, 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 define a waste as a hazardous waste if it exhibits a characteristic of a hazardous waste (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 non-hazardous solid waste (unless the mixture is specifically excluded or no longer exhibits any of the characteristics of a hazardous waste).

In Situ Soil: soil or fill material that is in the ground and has not been disturbed.

Land Application: the process of remediating contaminated soil by spreading soil over land. Land application may include remediating soil by natural biological methods, enhanced biological methods, or volatilization.

Maximum Soil Contaminant Concentration (MSCC): the concentration of a soil contaminant at which no further cleanup actions are required based upon the risk of harm posed by the contaminant.

Method Detection Limit (MDL): the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte (40 CFR 136 Appendix B).

Maximum Extent Practicable (MEP): the limits of available technology and the practical and technical limits on an owner or operator of an underground storage tank to conduct assessment and cleanup activities that are protective of human health and the environment in response to a discharge of petroleum to the environment.

Minimum Reporting Limit (MRL): the minimum reporting limit that must be achieved by laboratories for target analyte results submitted to the UST Section; it is a reporting limit established by the UST Section for the target analytes required for each approved analytical method as an alternative to the detection limit indicated in the method description and is listed for each analyte in the *Guidelines for Sampling.*

NAPL: also known as "free product". A non-aqueous phase liquid (i.e., not dissolved in water) which may be present within the subsurface at a measurable thickness greater than or equal to 0.01 of a foot (approximately 1/8 inch), as a sheen on surface water, or accumulating as a liquid on an exposed surface. Depending on the density of the liquid in relation to water, the NAPL may be further described as 'Light' (LNAPL) or 'Dense" (DNAPL).

Non-Commercial Underground Storage Tank: any tank or tank system, including any connected piping, containing petroleum products, where at least ten percent (10%) of the total system volume (including both tanks and piping) is buried beneath the surface of the ground, that is *not* included within the Commercial UST classification, and excluding any systems exempted in North Carolina General Statute (NCGS) 143-215.94A(7) .

Operator: Per § 143-215.94OO "Primary operator" means a person having primary responsibility for the daily on-site operation and maintenance of an underground storage tank system.

Petroleum or Petroleum Product: crude oil or any fraction thereof which is liquid at standard conditions of temperature (60 degrees Fahrenheit) and pressure (14.7 pounds per square inch absolute), but excluding substances defined as a hazardous substance in Section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980.

Petroleum Contaminated Soil or Soil Containing Petroleum Products: any soil that has been exposed to petroleum products because of any emission, spillage, leakage, pumping, pouring, emptying, or dumping of petroleum products onto or beneath the land surface and that exhibits characteristics or concentrations of typical petroleum product constituents in quantities that exceed the soil-to-groundwater MSCC or the residential MSCC, whichever is lower, as established by 15A NCAC 02L .0411.

Practical Quantitation Limit (PQL): the lowest concentration of a given material that can be reliably achieved among laboratories within specified limits of precision and accuracy by a given analytical method during routine laboratory analysis.

Receptor: any human, plant or animal, structure or surface water body that is or has the potential to be adversely effected by the release or migration of contaminants.

Release: any spilling, leaking, emitting, discharging, escaping, leaching or disposing into groundwater, surface water or subsurface soils. (Refer to statutes and regulations relevant to UST releases or to AST and surface releases.)

Responsible Party (RP): a UST owner, UST operator, and/or landowner seeking reimbursement from the State Trust Fund, or any person who is responsible for a discharge or release of petroleum or a hazardous substance. (Refer to statutes and regulations relevant to UST releases or to AST releases and spills.)

Smear Zone: the zone around a source area where LNAPL has been 'smeared' across different soil horizons due to water table fluctuations, with some LNAPL remaining trapped in pore spaces beneath the historic high water table.

Soil (or Regolith): a general term for the fragmental and unconsolidated geological material of highly varied character that nearly everywhere forms the surface of the land and overlies or covers bedrock. It includes rock debris of all kinds, volcanic ash, glacial till, alluvium, loess and eolian deposits, and vegetal accumulations.

Soil Scientist: an individual who is a Certified Professional in Soils through the NCRCPS (N.C. Registry of Certified Professionals in Soils) or a Certified Professional Soil Scientist or Soil Specialist by ARCPACS (American Registry of Certified Professionals in Agronomy, Crops and Soils) or a Registered Professional Soil Scientist by NSCSS (the National Society of Consulting Soil Scientist) or can provide documentation that he/she meets the minimum education and experience requirements for certification or registration by one or more of the organizations named in this Subparagraph or upon approval by the Director, an individual with a demonstrated knowledge of soil science.

Source Area: point of release or discharge. The term 'secondary source area' refers to any zone of NAPL-impacted soil that continues to release contaminants in the subsurface.

Surface Water: all waters of the state as defined in North Carolina General Statute (NCGS) 143-215.77 Article 21A, except for underground waters, such that "waters" shall mean any stream, river, creek, brook, run, canal, swamp, lake, sound, tidal estuary, bay, reservoir, waterway, wetlands or any other body or accumulation of water, surface or underground, public or private, natural or artificial, which is contained within, flows through, or borders upon this State, or any portion thereof, including those portions of the Atlantic Ocean over which this State has jurisdiction.

Total Petroleum Hydrocarbons (TPH): the concentration of petroleum fuel contamination present.

Transmissivity: the ability of geologic material to transmit water.

Underground Storage Tank (UST): any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which (including the volume of underground pipes connected thereto) is 10 percent or more beneath the surface of the ground (For a full definition, see 15A NCAC 02N .0203.).

Unrestricted Use Standards: land use restrictions for a property contaminated by a petroleum release are not required when soil contaminant concentrations are below residential maximum contaminant concentrations and groundwater contaminant concentrations are below the 2L groundwater standards.

Used Oil: means any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities.

UST System: an underground storage tank, connected underground piping, underground ancillary equipment, and containment system, if any.

Waste Oil: a generic term for oil that has been contaminated with substances that may or may not be hazardous. Any used oil or waste oil spill from a non-UST stored generator, transporter, recycler, etc. would fall under the jurisdiction of the Hazardous Waste Section if determined to be hazardous.

Water Table: the surface of the saturated zone (phreatic zone) below which all interconnected voids are filled with water and at which the pressure is atmospheric.

Acronyms

AFVR	Aggressive Fluid - Vapor Recovery
ASC	Accelerated Site Characterization
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
CAP	Corrective Action Plan
CAS	Chemical Abstracts Service Number
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CPT	Cone Penetrometer/Penetration Test
CSA	Comprehensive Site Assessment
DEQ	Department of Environmental Quality
DPP	Direct-Push Platform
DWR	Division of Water Resources
DWM	Division of Waste Management
EDB	Ethylene Dibromide (1,2 Dibromoethane)
EPA	The Environmental Protection Agency
FID	Flame Ionization Detector
GCL	Gross Contamination Level
HCl	Hydrochloric Acid
HNO_3	Nitric Acid
HPT	Hydraulic Profiling Tool
IAA	Initial Abatement Action
ISAR	Initial Site Assessment Report
IATA	International Air Transport Association
ITRC	Interstate Technology & Regulatory Council
L.G.	Licensed Geologist
LUR	Land Use Restrictions
LIF	Laser-Induced Fluorescence (Direct Push)
LSA	Limited Site Assessment

LUST	Leaking Underground Storage Tank
MADEP	Massachusetts Department of Environmental Protection
MDL	Method Detection Limit
MIP	Membrane Interface Probe
MMPE	Mobile Multi-Phase Extraction
MRL	Minimum Reporting Limit
MSCC	Maximum Soil Contaminant Concentration
MNA	Monitored Natural Attenuation
NAPL	Non-Aqueous Phase Liquid
NC	North Carolina
NCAC	North Carolina Administrative Code
NCDA&CS	North Carolina Department of Agriculture & Consumer Services
NCGS	North Carolina General Statutes
NCS	Notice of Contaminated Site
NFA	No Further Action
NORR	Notice of Regulatory Requirements
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NRP	Notice of Residual Petroleum
OPHSCA	Oil Pollution and Hazardous Substances Control Act of 1978
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
P.E.	Professional Engineer
PID	Photoionization Detector
POTW	Publicly Owned Treatment Works
PQL	Practical Quantitation Limit
PVI	Petroleum Vapor Intrusion
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SAR	Soil Assessment Report

SCR/SCR	Soil Cleanup Report/Site Closure Request
SM	Standard Method
STIRA	Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases
STF	State Trust Fund
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compounds
SW	Solid Waste
TCLP	Toxicity Characteristic Leaching Procedure (EPA Method SW-846 1311)
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TPH-DRO	Total Petroleum Hydrocarbons - Diesel Range Organics
TPH-GRO	Total Petroleum Hydrocarbons - Gasoline Range Organics
UST	Underground Storage Tank
UVF	Ultraviolet Fluorescence
USGS	United States Geological Survey
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds

ASSESSMENT GUIDELINES

1.0 Introduction

1.1 Purpose of the Guidelines

The Underground Storage Tank (UST) Section ***Assessment Guidelines*** assists tank owners, tank operators, landowners, and other 'responsible parties' in understanding the process of evaluating releases to meet the applicable statutes and administrative rules. Releases covered by this document include petroleum USTs, hazardous substance USTs and petroleum non-USTs. Petroleum non-UST releases can include surface spills, releases from aboveground storage tanks (ASTs), and releases from associated conduits and piping.

These Guidelines describe methods and procedures for assessing the nature and extent of petroleum or other contamination and characterizing the risk posed to human health and the environment. This document replaces all previous guidance documents issued by the UST Section covering assessment of petroleum and non-hazardous substance releases from USTs and other non-UST sources.

The guidelines do not imply or guarantee Trust Fund eligibility and/or reimbursement or supersede a requirement for pre-approval.

Emergency actions should be taken as soon as a petroleum or a hazardous substance release is discovered, the following documents may be helpful:

- The ***Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases*** (***STIRA Guidelines***) provide guidance for investigating suspected UST and non-UST releases, removing or permanently closing UST systems; and performing initial response and abatement efforts at releases from UST and non-UST systems.

Electronic versions of current guidelines developed by the UST Section are available to download from the Division of Waste Management – Underground Storage Tank Section web site at https://deq.nc.gov/about/divisions/waste-management/ust. Questions concerning the information presented in this document should be directed to the UST Section Central Office. Questions concerning a specific site should be directed to the UST Section regional office that is responsible for the county in which the site is located. The address, telephone number, of the central office and each regional office are provided on the Corrective Action Branch Map and can be found at the following website: https://deq.nc.gov/about/divisions/waste-management/ust/corrective-action

Note: Throughout this document, comments related to the North Carolina Commercial Leaking Petroleum Underground Storage Tank Cleanup Fund (State Trust Fund) will be enclosed in boxed text, such as this. If State Trust Fund reimbursement is anticipated for any work related to a leaking Commercial UST, the parties concerned should be aware of all policies and procedures that pertain to the State Trust Fund to insure reimbursement eligibility.

Information related to the scope-of-work of tasks that may be required to be performed in accordance with the regulations and up to the maximum rates allowed for these tasks is provided in the current version of the Reasonable Rate Document, which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents.

The State Trust Fund is authorized under Chapter 143, Article 21A, Part 2a of the North Carolina General Statutes, and is regulated under Title 15A of the North Carolina Administrative Code, Subchapter 02P. State Trust Funds may be used only for the cleanup of commercial leaking petroleum USTs. Furthermore, some costs incurred for cleanup of leaking petroleum USTs may not be reimbursable, as described in the most current version of the Task Scope-of-Work Document.

Owners or operators applying for participation in the State Trust Fund are cautioned that all required annual operating fees must be paid in full before any release is discovered, or reimbursement will not be available for any cleanup or third-party liability expense incurred in response to a release from that UST system (even if all outstanding fees are subsequently paid). Questions related to eligibility and reimbursement should be directed to the State Trust Fund Branch at 919-707-8200.

1.2 Statutory and Regulatory Background

The Department of Environmental Quality (DEQ or Department) has the authority to regulate the response to a petroleum release, and does so through the Underground Storage Tank (UST) Section of the Department's Division of Waste Management (DWM). This regulatory authority and the responsible party's obligations to address a petroleum release are defined in Title 15A of the North Carolina Administrative Code (NCAC), under Subchapters 02L and 02N. In addition to petroleum releases, the UST Section is tasked with overseeing assessment of releases from hazardous substance UST systems.

Oil Pollution and Hazardous Substances Control Act of 1978 (**OPHSCA, G.S. §143-215.94A(10)**) defines the term '*petroleum*' or *'petroleum product'* as being crude oil or any fraction of crude oil that is a liquid at standard temperatures and pressures, including blended motor fuels that include alcohol, and excluding anything that would be defined as a 'hazardous substance' covered under the ***Comprehensive Environmental Response, Compensation, and Liability Act of 1980***, *(*or

CERCLA,) or a 'hazardous waste' covered under the ***Resource Conservation and Recovery Act of 1976***, (or ***RCRA***).

The term '*oil*' is defined by **OPHSCA** (**G.S. § 143-215.77(8)**) as any type of oil or 'liquid hydrocarbon' commonly used as fuel for motor vehicles or heating, oil used for lubrication, oil refuse and sludges, and petroleum-related products, by-products, or mixtures with other substances, etc.

If the substance released is not naturally occurring (or is naturally occurring but exceeds the naturally occurring standard), it must comply with the assessment and corrective action requirements of 15A NCAC 02L .0106.

Petroleum releases from USTs and other non-UST sources are governed by the North Carolina Environmental Management Commission (EMC) per the OPHSCA, as incorporated in Article 21A of Chapter 143 of the North Carolina General Statutes (**G.S. § 143-215.75** through **§ 143-215.104AA**). A flowchart of requirements for UST petroleum releases is included as Figure 1. A flowchart of requirements for Non-UST releases of petroleum is included as Figure 2.

Hazardous substance UST releases are subject to the initial response and abatement and the corrective action requirements of both **15A NCAC 02N .0700 and 15A NCAC 02L .0106**. The responsible party for a hazardous substance UST is required to perform assessment, submit a 45-Day Report, a Comprehensive Site Assessment (CSA) Report, and submit and implement a **Corrective Action Plan (CAP)** to address contamination.

The most stringent cleanup levels may apply to non-petroleum releases (even if commingled with a petroleum UST release). Therefore, groundwater contaminated by non-petroleum releases may need to be cleaned up to the groundwater quality standards in 15A NCAC 02L .0202, and soil may need to be cleaned up to levels protective of groundwater quality, the soil-to-groundwater maximum soil contaminant concentrations (MSCCs). However, in accordance with **Session Law 2015-286,** risk-based remediation is available for hazardous substance releases based upon the amendments to **G.S. § 130A-310**. Any responsible party seeking to conduct risk-based assessment and cleanup efforts at hazardous substance sites should follow the guidance offered by the Department at: https://deq.nc.gov/permits-regulations/risk-based-remediation. Other State agencies are also responsible for different types of non-petroleum, non-UST releases. Contact information for guidance on dealing with these types of releases is provided in **Appendix D**.

The assessment and corrective actions required for regulated hazardous substance UST releases and for non-regulated non-petroleum UST releases are similar. A single flowchart summarizing the regulatory requirement for both regulated and nonregulated non-petroleum UST releases is presented in **Figure 3**.

Non-regulated non-petroleum UST releases are subject to the initial response and abatement requirements of 15A NCAC 02L .0106. Non-regulated non-petroleum UST releases (e.g., alcohol, vegetable oil, or propylene glycol UST releases) are subject, if the substance released is not naturally occurring (or is naturally occurring but exceeds the naturally occurring concentration), to comply with the assessment and corrective action requirements of 15A NCAC 02L 0106. The

responsible parties must take immediate action to terminate and control the release, mitigate any hazards resulting from exposure to the pollutants or from fire, explosion, or vapors; determine and remove, treat, or control primary and secondary pollution sources. The responsible party is required to perform assessment and submit a CSA Report and to submit and implement a CAP to address contamination. More detailed guidance for action at non-regulated non-petroleum UST releases is not provided as such guidance is contaminant specific. The responsible party should contact the Corrective Action Branch of the UST Section for specific guidance. Most non-regulated non-petroleum UST releases (e.g., hazardous waste UST releases) do not fall under the regulatory authority of the UST Section: **Appendix D** provides a list of the appropriate agencies to contact.

1.2.1 Definitions of Commercial & Noncommercial USTs, and Other NonUST Sources

OPHSCA also includes definitions for USTs that include two different categories that are based upon what is being stored, why it is being stored, and how much product is being stored or passing through the system based on how it is used.

In both cases, the basic definition of an '***underground storage tank***' is a buried tank (or multiple tanks that are linked together), and any associated piping, that is used to store petroleum, where at least 10% of the volume of the tank(s) and piping is beneath the ground surface. The definitions do exclude things that are:

1. not intended to store petroleum, like septic tanks, storm water or waste water collection systems, or flow-through 'tanks' used as part of a manufacturing process;
2. types of surface depression storage that aren't actually 'tanks', like ponds, pits, or lagoons;
3. pipelines and oil or gas drilling equipment covered by other laws; and
4. storage tanks that may be located technically below the natural ground surface, but which are placed on the floor in something like a basement, tunnel, or mine, etc.

The definition of a '***commercial underground storage tank***' **(G.S. § 143-215.94A(2))** includes all of the above, but further excludes:

1. small (1,100 gallons or less) motor fuel USTs located on farms or residential properties where the fuel is used only for farm equipment onsite or in personal vehicles and not for any other commercial purposes (such as resale or for delivery fleets, etc.);
2. small (1,100 gallons or less) heating oil USTs used to heat buildings onsite; and
3. large (greater than 1,100 gallons) heating oil USTs that are used for on-site heating by one to four households;

Additionally, a '***noncommercial underground storage tank***' **(G.S. § 143-215.94A(7))** is defined as a small farm or residential motor fuel tanks, small heating oil tanks used for on-site heat, and larger heating oil tanks used on site by one to four households.

OPHSCA also covers petroleum releases from '***aboveground storage tanks and other sources***', also known as '***non-UST petroleum releases***'. This group includes petroleum releases that are not from a commercial or noncommercial UST as defined above (per G.S. § 143-215.104AA(g)).

Please note that releases at facilities with formal permits or certifications, such as those required for used oil generators and transporters, etc., may be covered by the specifics of the statutes and rules covering the permit, and should be discussed with the permitting agency.

1.2.2 Responsible Parties and Regulatory Applicability

Title 15A NCAC 02L .0403 and **.0503**, describe who is required to conduct assessment and cleanup of petroleum releases from UST and non-UST sources, respectively. In each, the '*responsible party*' includes the tank owner, tank operator, any landowner who is seeking reimbursement under the Leaking UST Trust Fund, and any person in control of an activity that causes petroleum to be released into, or near, groundwater.

Within the first 24 hours after a petroleum or non-hazardous substance release is found, the responsible party must take steps to stop the release, recover any lost product, take care of any fire, vapor, and/or explosion hazards (working with the local fire marshal), and notify the Department of the release. Next, the responsible party must take some initial abatement actions, as described in the ***STIRA Guidelines***.

If the responsible party is not able to completely restore the site during the initial abatement phase, the next steps involve assessment and corrective action, as required by **15A NCAC 02L .0400** for petroleum UST releases and **15A NCAC 02L .0500** for non-UST petroleum releases. The ***Assessment Guidelines*** cover the procedures that a responsible party should follow to complete the next phase, as needed. These procedures include initial site risk characterization and soil and groundwater assessment. The ***Corrective Action Guidelines*** cover the process of soil and groundwater cleanup efforts and site closure procedures.

1.2.3 Certification and Licensing Requirements for UST Assessment and Corrective Actions

As required under **15A NCAC 02L .0103(e),** any work that involves site assessment, interpretation of subsurface geologic conditions, preparation of corrective action plans, or which requires detailed technical knowledge of site conditions, must be performed by persons, firms, and corporations licensed by the North Carolina State Board of Professional Engineers or the North Carolina State Board of Licensed Geologists, as appropriate.

To document this, professional reports based on templates described in these ***Assessment Guidelines*** should display the seal and signature of the certified Professional Engineer or Licensed Geologist and the name and corporate certification number of the firm or corporation that is professionally responsible for the evaluations and interpretations that are being made in the report.

1.3 Review of Release Confirmation and Abatement Measures

The following section represents a brief overview of information provided in the ***STIRA Guidelines***. For a better explanation of what is required immediately after the discovery of a new petroleum release, please visit https://deq.nc.gov/about/divisions/waste-management/ust/guidance-documents.

1.3.1 Initial Responses for Any Petroleum Release

The responsible party for a petroleum release must comply with the release response and abatement requirements defined in **15A NCAC 02L .0404** or **.0504**, respectively. For each type of release, many of the initial steps overlap.

Within 24 hours of the discovery of a petroleum release, the responsible party must take steps to stop the release, recover any lost product (including non-aqueous phase liquids, or NAPLs, found to have reached nearby surface water bodies, such as streams or lakes), and take care of any fire, vapor, and/or explosion hazards (working with the local fire marshal).

The responsible party also must notify the appropriate UST Section regional office of a confirmed petroleum release **within 24 hours** of discovery by telephone, fax, email, or other means, and provide information as requested on ***Form UST-61 - 24-Hour Release and Reporting Form*** for a UST release or ***Form UST-62 – 24-Hour Notification of Discharge Form*** for a non-UST release (https://deq.nc.gov/about/divisions/waste-management/ust/forms) as soon as possible. This information describes the nature, location, and time of the release and a description of any initial response actions.

Once a petroleum release is confirmed, if the landowners plan to sell or otherwise convey the site property prior to remediation to below "unrestricted use standards", a Notice of Residual Petroleum that documents the presence of residual petroleum contamination on site must be filed with the county Register of Deeds before conveyance of the property, as required by **G.S. § 143B-279.11**. (Refer to Section 4.5 for more details.)

Additionally, if a water supply well is found to be contaminated by a petroleum release above the levels that are considered to be safe for human consumption, the responsible party must provide the users of that well with an alternate source of safe water.

> ***NOTE:*** *Any amount of a contaminant that is detected in an approved laboratory analysis is considered to be a release and must be reported. 'Human consumption' includes, but is not limited to: drinking, bathing, showering, cooking, dishwashing, laundering, swimming, and oral hygiene. Water supplies used only for bathrooms are also considered to be at risk for human consumption.*

1.3.2 Initial Abatement Requirements for Commercial USTs

For a release from a commercial UST, the responsible party must also comply with the investigation and abatement requirements described in **15A NCAC 02N .0601** through **.0604**, **.0701** through **.0703**, and **.0705**. Initial abatement may include repairs made to the UST system or the removal or in-place closure of the UST. **Title 15A NCAC 02N .0800** provides information on UST closures, and **15A NCAC 02N .0900** explains system component repairs and replacements.

Within 20 days (see Appendix A) of the discovery of a commercial UST release, per **15A NCAC 02N.0703**, the responsible party must provide the Department with information about the ongoing response in a progress report called a ***20-Day Report***. At a minimum, this information must include

a description of the incident response, site history, results of the abatement measures taken to that point, and steps taken to evaluate whether additional actions are required.

Within 90 days of discovery of a commercial UST release, an ***Initial Abatement Action Report*** must be provided to the Department that details information gained from the initial investigation and assessment efforts, and reports the results of the initial abatement actions. This report should include the information from all of the following reports, as appropriate: ***Site Check Report, UST Closure Report, Post-Excavation Soil Contamination Assessment Report,*** and ***Free Product Recovery Report***. These reports are described more fully in the ***STIRA Guidelines***.

1.3.3 Additional Initial Response Requirements for Noncommercial USTs

For a release from a noncommercial UST, in addition to the general requirements described in Section 1.3.A above, the responsible party must provide or otherwise make available any additional information required by the Department to determine the site risk as described in **15A NCAC 02L .0404**. Based upon this information, and other information available to the Department from other sources, the Department will determine if the risk posed by the release is low, and provide a 'No Further Action' (or NFA) designation, where applicable. This NFA designation may require the filing of a Notice of Residual Petroleum along with appropriate land use restrictions with the county Register of Deeds if petroleum contamination remains onsite. These land use restrictions help reduce the risk of exposure until the residual petroleum degrades over time.

Alternatively, if the Department determines that the release poses an unacceptable risk, the responsible party will be directed to take additional steps to further investigate or remediate the release, or otherwise take steps to address the risk posed by the release.

At any time, the responsible party may choose to voluntarily conduct initial abatement or corrective actions in line with those described for commercial UST releases in order to clean up the site to obtain a No Further Action designation without the need for a notice or land use restriction filed with the property deed.

1.3.4 Initial Abatement Requirements for Non-UST Petroleum Releases

For a petroleum release from a non-UST source, the scope of work defined in **15A NCAC 02L .0504** is similar to the requirements for commercial USTs.

Within 20 days of the discovery of a non-UST petroleum release, the responsible party must provide the Department with information about the ongoing response in a progress report called a ***20-Day Report***. At a minimum, this information must include a description of the incident response, site history, results of the abatement measures taken to that point, and steps taken to evaluate whether additional actions are required.

Within 90 days of discovery of a non-UST petroleum release, an ***Initial Site Assessment Report*** must be provided to the Department that details information gained from the initial investigation and assessment efforts, and reports the results of the initial abatement actions.

1.3.5 Initial Abatement Requirements for Hazardous Substance UST Releases

For a release from a hazardous substance UST, the responsible party must comply with the initial response and abatement requirements described in **15A NCAC 02N .0701** through **.0703**, and **.0705**.

Within 20 days of the discovery of a hazardous substance UST release, per **15A NCAC 02N .0703**, the responsible party must provide the Department with information about the ongoing response in a progress report called a ***20-Day Report***. At a minimum, this information must include a description of the incident response, site history, results of the abatement measures taken to that point, and steps taken to evaluate whether additional actions are required.

Within 45 days of discovery of a hazardous substance UST release, a ***45-Day Report*** must be provided to the Department that details information gained from the initial investigation and assessment efforts, and reports the results of the initial abatement actions. These reports are described more fully in the ***STIRA Guidelines***.

Note: Throughout this document, comments related to the North Carolina Commercial Leaking Petroleum Underground Storage Tank Cleanup Fund (State Trust Fund) will be enclosed in boxed text, such as this. If State Trust Fund reimbursement is anticipated for any work related to a leaking Commercial UST, the parties concerned should be aware of all policies and procedures that pertain to the State Trust Fund to insure reimbursement eligibility.

Information related to the scope-of-work of tasks that may be required to be performed in accordance with the regulations and to the maximum rates allowed for these tasks is provided in the current version of the Reasonable Rate Document, which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents.

The State Trust Fund is authorized under Chapter 143, Article 21A, Part 2a of the North Carolina General Statutes, and is regulated under Title 15A of the North Carolina Administrative Code, Subchapter 02P. State Trust Funds may be used only for the cleanup of commercial leaking petroleum USTs. Furthermore, some costs incurred for cleanup of leaking petroleum USTs may not be reimbursable, as described in the most current version of the Task Scope-of-Work Document.

Owners or operators applying for participation in the State Trust Fund are cautioned that all required annual operating fees must be paid in full before any release is discovered, or reimbursement will not be available for any cleanup or third-party liability expense incurred in response to a release from that UST system (even if all outstanding fees are subsequently paid). Questions related to eligibility and reimbursement should be directed to the Trust Fund Branch at 919-707-8200-.

2.0 Free Product / NAPL Recovery and Reporting

2.1 Recognizing Free Product / Non-Aqueous Phase Liquids

Non-aqueous phase liquids (NAPL), also known as "free product", are liquids that have not dissolved into a mixture when in contact with water. NAPL can be found in monitoring wells at or below the water table, where it is defined by being able to be measured as separate from the water at a thickness greater than or equal to 0.01 of a foot (approximately 1/8 inch). NAPL can be seen as a sheen floating on surface water, or as slugs or beads found floating below the surface of a water body. NAPL can also be found as a standing liquid pooling or flowing on the ground surface or seeping from vertical walls. Depending on the density of the liquid compared to water, the NAPL may be further described as 'Light' (LNAPL), which will typically float, as seen with most motor fuels, or 'Dense" (DNAPL), which typically sinks into the water, as seen with most chlorinated dry-cleaning solvents.

2.2 NAPL Requirements for Commercial, Hazardous Substance, and Non-UST Releases

A petroleum release from a commercial UST or a release from a hazardous substance UST, **Title 15A NCAC 02N .0703(1)** requires the responsible party to investigate for the presence of NAPL and begin recovery of any NAPL that is found **within 14 days**. Please note that for a hazardous substance UST, either a LNAPL or a DNAPL plume (or both) could be generated based on the density of the product being stored.

A petroleum release from a non-UST Source, **Title 15A NCAC 02L .0504(2)** requires the responsible party to investigate and begin recovery of any NAPL as soon as possible, with documentation of the efforts included in the required ***20 Day Report***.

2.2.1 NAPL Recovery Strategies

NAPL recovery efforts vary based on where the product is found. If pooled on the ground or affecting surface water, special absorbent pads and booms are often used. For sites with minor, limited amounts of NAPL, passive recovery techniques, such as down-well sorbent socks or passive/wicking skimmers may be a cost-effective strategy. Alternatively, a more aggressive mechanical recovery option, such as an 8-hour Aggressive Fluid Vapor Recovery (AFVR) event or a 96-hour Mobile Multi-Phase Extraction (MMPE) event may be more efficient at addressing greater NAPL thicknesses or larger NAPL bodies. Additionally, longer-term NAPL recovery or abatement systems may need to be constructed onsite to address a large or persistent NAPL problem.

NAPL recovery efforts should not delay any other required actions or the preparation and submittal of other reports or plans. Instead, NAPL recovery and any other required response, abatement, assessment, cleanup, or reporting activities should be performed at the same time. Following the completion of any NAPL recovery event, the responsible party must make sure that any recovered flammable liquids or other substances are handled safely and stored and disposed of properly by

knowledgeable professionals to reduce the risk of fire and explosion, or the accidental release of contamination elsewhere.

Although NAPL recovery is a form of 'corrective action', initial recovery efforts should be conducted immediately and without any need for a formal ***Corrective Action Plan***. However, if a long-term strategy is necessary for effective and efficient NAPL recovery (i.e., more than 4 MMPE or AFVR events), a proposed schedule and cleanup timeline must be submitted as part of the overall site-wide ***Corrective Action Plan***, as described in the *Corrective Action Guidelines*.

2.2.2 NAPL Recovery Reporting

Once any NAPL recovery efforts have been conducted in response to a release from a commercial UST, a hazardous substance UST, or a non-UST petroleum source, a report must be submitted to document the methods and the effectiveness of the recovery. Where NAPL recovery is being done during the same timeframe as other work covered by the ***20-Day Report,*** or ***Initial Abatement Action Report / Initial Site Assessment Report / 45-Day Report,*** described in the *STIRA Guidelines***,** or the ***Limited Site Assessment Report***, *or* ***Comprehensive Site Assessment Report*** described below, the NAPL recovery efforts should be incorporated within the appropriate sections of those reports. If the schedule for a recovery event does not line up with one of these reports, or with either a ***Monitoring Report*** or a ***Corrective Action Performance Report*** for any site that is operating under a ***Corrective Action Plan***, then a stand-alone ***Free Product Recovery Report,*** built around the template provided in Appendix A, should be submitted.

NAPL recovery in response to a petroleum release from a noncommercial UST must be reported in a format defined by the Department during the responsible party's initial 24-hour notification.

2.2.3 Free Product Recovery System Specification

If long-term NAPL recovery efforts are expected based upon NAPL investigations conducted early in the life-cycle of a release, the responsible party should investigate the type of NAPL present, measure the approximate thickness of NAPL, determine an estimated rate of NAPL recovery, assess the vertical and horizontal extent of the NAPL body, evaluate other relevant hydrogeological factors and potential receptors, and submit the results to the appropriate UST Section regional office in a *Free Product Recovery System Specification Report* (See Appendix A).

This *Free Product Recovery System Specification Report* acts as a formal recovery plan for the remaining NAPL. In it, NAPL recovery system options are evaluated (e.g., excavation, MMPE, AFVR, SVE, etc.) and a NAPL recovery strategy is presented which incorporates the most appropriate option. The plan should be designed to minimize the spread of contamination and treat, discharge, and dispose of any recovered NAPL or water/NAPL mixture in compliance with all applicable regulations. The objectives of the plan should be to halt any migration of NAPL and to remove NAPL to the maximum extent practicable, usually to a thickness of less than 0.01 foot (~1/8 inch). The specification report must conclude with a projected schedule for NAPL recovery which includes a timeline for implementation, recovery progress milestones, a schedule for the submittal of progress reports, and a detailed cost estimate.

Once the NAPL recovery plan is approved by the Department, the responsible party must implement the plan in strict accordance with the proposed schedule. The responsible party must continue to execute the plan, while also continuing with any and all other required abatement, assessment, cleanup, and reporting activities, until NAPL has been removed or until the NAPL recovery plan is superseded by a *Corrective Action Plan*.

If State Trust Fund reimbursement is anticipated, please refer to the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for information about reimbursement.

Please note that an initial NAPL recovery event may qualify as an emergency response that is exempt from the preapproval requirements, where following the procedures described above. However, subsequent events will require preapproval as corrective actions to remain conditionally eligible for reimbursement.

2.3 NAPL Requirements for Petroleum Releases from Noncommercial USTs

2.3.1 NAPL Emergency Response for Noncommercial Petroleum USTs

For a petroleum release from a noncommercial UST, **Title 15A NCAC 02L .0404(b)** the responsible party must act to control and recover any NAPL causing an emergency condition (including ponding or running across the ground surface, impacting a surface water body, or weeping from a vertical wall) and notify the Department within 24 hours of discovery. If measurable NAPL greater than 1/8 of an inch in thickness is found in any existing monitoring well or in an excavation below the water table, and the location of that discovery is within 30 feet of the boundary with an adjacent property owned by someone other than the responsible party, an emergency response to the NAPL is required to protect the neighboring third-party property owner.

> **NOTE**: *Any impact to a water supply well from a noncommercial UST release constitutes an emergency that must be addressed immediately, whether it results from the presence of NAPL or dissolved-phase contamination.*

2.3.2 Other NAPL Investigations for Noncommercial USTs

Additional NAPL assessment and recovery efforts, similar to those described for commercial UST and non-UST releases in the section above, may be directed by the Department as needed, based upon the risk posed by the NAPL and/or the noncommercial UST release. Except for these cases where directed by the Department based upon other evidence related to incident risk, there is no requirement for the responsible party for a noncommercial UST release to install wells or otherwise investigate for the presence of NAPL below the ground surface.

3.0 Limited Site Assessments (LSA)

For a petroleum release where the responsible party cannot demonstrate that soil contamination has been cleaned up as required under **15A NCAC 02L .0404(a)(3)** for commercial USTs or **15A NCAC 02L. 0504(5)** for non-USTs, or for a noncommercial UST release that continues to represent an unacceptable risk following any necessary initial abatement or risk-reductions efforts as described in the **STIRA Guidelines**, as determined by the Department under **15A NCAC 02L .0404(c)**, a ***Limited Site Assessment*** (***LSA***) must be conducted and a report on the findings submitted to the Department **within 120 days** of the discovery of the release.

The responsible party must obtain all of the information required by **15A NCAC 02L .0405** or **.0505**, whichever is applicable, to enable the Department to classify the level of risk posed to human health and the environment, and assign a land use classification. In addition, the ***LSA Report*** should contain a discussion of site-specific conditions and/or possible actions that might lower the risk classification assigned to the release.

This information should include identification of the source, contaminant migration pathways, and potential receptors. This report must also include assessing the maximum concentrations of the site contaminants. To obtain this information, a responsible party must collect and analyze soil and groundwater samples and must perform a receptor survey, as discussed below. Specific reporting requirements for the ***LSA Report*** are provided in Appendix A.

For a hazardous substance UST, where the release results in the increase of the concentrations of a regulated substance as described in **15A NCAC 02L .0106(c),** the responsible party must delineate the soil and groundwater contamination through the completion of a ***Comprehensive Site Assessment,*** per **15A NCAC 02L .0106(g),** as described in Section 4.3 below.

3.1 LSA Soil and Groundwater Sampling

For releases from commercial and non-commercial USTs, the LSA includes sampling activities as described in **15A NCAC 02L .0405.** For a petroleum release from a non-UST source, the soil and groundwater sampling requirements are defined in **15A NCAC 02L .0505.**

3.1.1 Commercial and Noncommercial UST LSA Monitoring Well(s)

For commercial and noncommercial UST releases, the responsible party is required to install one monitoring well (constructed in accordance with **15A NCAC 02C .0100**) in each release source area. The well should be installed as close to the point of release or location of the highest contamination when possible. For example, highest concentrations are often found at the base of the excavation when a tank has been removed. However, when the tank has not been removed, the source area represents the area within five feet of the point of release. More than one LSA monitoring well may be required if multiple, isolated source areas are identified. Alternatively, if multiple source areas are located in close proximity to one another, or if the points of release are not known for a contiguous plume of soil contamination, then a single properly-located monitoring well may be installed.

Drilling should not exceed more than 30 feet below the bottom of the source area or area of over-excavation (whichever is deeper) without evidence of unsaturated zone soil contamination (e.g., 30 feet below the deepest unsaturated soil contamination) with no more than 20 foot screen into the water table. If groundwater is not encountered 30 feet below the deepest unsaturated soil contamination, then a groundwater sample may not be necessary. Contact the regional office incident manager for site specific guidance on further actions.

Evidence of soil contamination during drilling may include one or more of the following; observation, UVF, PID, and/or olfactory.

During the construction of each source area monitoring well, soil samples should be collected for laboratory analysis at five-foot intervals between the land surface and the water table. If the water table is encountered at a depth greater than 25 feet below the land surface, the soil samples should be collected instead at ten-foot intervals between the land surface and the water table. Soil samples should not be collected from any clean fill placed following the completion of abatement activities. The soils samples must be analyzed in accordance with the methods and procedures specified in Section 5.0. Approved methods for soil contamination determination are listed in Table 4.

A groundwater sample must be collected from each source area monitoring well and analyzed in accordance with the methods and procedures specified in Section 5.0. In this case, the monitoring well should be installed within 5 feet of the location of the largest known release by volume, or at the location of the highest detection of soil contamination remaining onsite following initial abatement or other assessment activities, whichever is applicable.

If NAPL is determined to be present before or during preparation of the ***LSA Report***, all NAPL assessment and recovery information obtained to that point should be included in the report. If NAPL is found within a monitoring well, the responsible party should not collect a groundwater sample but instead should measure the thickness of the NAPL in the monitoring well using either an oil-water interface probe or product paste and record the assessment and any recovery information in the ***LSA Report***. The ***LSA Report*** format incorporates the requirements of a ***Free Product Recovery Report*** (See Appendix A).

NOTE: *Only one LSA Report should be generated to present the information required by 15A NCAC 02L .0405 even if additional sampling is required based on the risk classification and the receipt of the source area groundwater analytical results.*

3.1.2 Commercial UST Additional Monitoring Wells Required for Sites with High Risk and 10x Concentrations

For a commercial UST release that, following the efforts described in the initial LSA above:

1. meets the criteria for High-risk defined in **15A NCAC 02L .0406**, *and*

2. demonstrates contaminant concentrations in excess of the groundwater standards or interim standards established under **15A NCAC 02L .0202** by a factor of 10 in the groundwater sample collected from the source area monitoring well.

The responsible party is required to install three additional monitoring wells (resulting in four total monitoring wells). As best as can be determined, one well must be located upgradient of the source area, and two wells must be located downgradient of the source area, in locations that allow groundwater flow direction to be more accurately determined.

For sites with multiple source areas, the number of wells installed to fulfill the "one well upgradient/two wells downgradient" requirement for each source should be selected to address site-specific conditions. For example, if two distinct source areas exist but one source clearly is located downgradient of the second, then adequate assessment might be achieved by installing a single well upgradient of both source areas and a single additional well downgradient of both source areas. **Justification for the distribution of the additional wells should be clearly explained in the *LSA Report***.

After the additional monitoring wells have been installed, the responsible party must measure the elevations of the water table in each well to determine groundwater flow direction. The responsible party must collect a groundwater sample from each monitoring well and analyze the sample in accordance with the methods and procedures specified in Section 5.2. If NAPL is present in a monitoring well, the responsible party must measure the thickness using either an oil-water interface probe or product paste. **Do not collect groundwater samples from monitoring wells in which NAPL is present**. The responsible party must record the NAPL assessment and any recovery information in the ***LSA Report***. Soil samples must be collected to describe lithology only.

NOTES: *Only one LSA Report should be generated to present the information required by **15A NCAC 02L .0405** for both phases of work. All monitoring wells installed for assessment and corrective action must be constructed according to the standards in 15A NCAC 02C .0108(c).*

3.1.3 Non-UST Petroleum Release LSA Monitoring Wells

The responsible party for a petroleum release from a non-UST source is required to install up to three monitoring wells (constructed in accordance with **15A NCAC 02C .0100**) within and around the source area(s) to determine the area of maximum soil and/or groundwater contamination and to determine the direction of groundwater flow. At least one monitoring well should be installed in the source area(s) **OR** at the location of the highest detection of soil contamination following initial abatement. If the monitoring well cannot be installed in the source area(s), it should be installed within five feet of the source area(s). Two monitoring wells should be installed downgradient of the source area(s) in order to determine groundwater flow direction. A groundwater sample should be collected from each monitoring well and analyzed in accordance with the methods and procedures specified in Section 5.0.

During the construction of each source area monitoring well, soil samples should be collected for laboratory analysis at five-foot intervals between the land surface and the water table. If the water table is encountered at a depth greater than 25 feet below the land surface, the soil samples should

be collected at ten-foot intervals between the land surface and the water table. Soil samples should not be collected from any clean fill placed following the completion of abatement activities. The soils samples should be analyzed in accordance with the methods and procedures specified in Section 5.0. Approved methods for soil contamination determination are listed in Table 4.

3.2 Receptor Information

The responsible party must obtain information on potential receptors. A receptor map showing all public and private water supply wells, public water supply lines, reservoirs, surface water intakes, surface waters, recharge areas, subsurface structures and designated wellhead protection areas within a 1,500-foot radius of the source area is required. The scale of the map should be 1" = 400' or larger (e.g., 1" = 200'). A table (Table B-5 in Appendix B) listing the potential receptors must be compiled; these receptors must be keyed to their locations on the receptor map.

3.2.1 Water Supply Wells

In accordance with **15A NCAC 02L .0405(c)(1)**, the responsible party is required to identify **all** water supply wells **within 1,500 feet** of the source area of the release (except those that have been properly abandoned in accordance with **15A NCAC 2C**). The responsible party must list the well identification number (or tax map number), well owner and user names, addresses and telephone numbers (optional), use of the well, well depth, type of well (e.g., drilled or bored), well casing depth, well screen interval, **distance from the source area of the release**, position relative to the source area (e.g., upgradient or downgradient), and geographic location (**latitude/longitude in decimal degrees)**.

To ensure reliability in a water supply well survey, the responsible party must perform the following actions:

- determine if each property is connected to public water by locating water meters and calling the city/county water department to inquire about individual property water connections;
- walk all properties **within a minimum 500-foot radius** of the source area of the release to locate water supply wells;
- distribute to all property occupants/managers, **within a minimum 500-foot radius** of the source area of the release a "Request for Water Supply Well Information" form (See Appendix A); and
- identify all water supply wells **within the remaining 1,000 feet of the 1,500-foot radius** of the source area of the release.

A more detailed survey may be required by the Regional Office based on site-specific conditions.

3.2.2 Public Water Supplies

In accordance with **15A NCAC 02L .0405(c)(1), t**he responsible party must determine availability of public water supply to all properties **within a 1,500-foot radius** of the source area of the release. In addition, the responsible party must locate the nearest public water supply lines, provide the

distances from properties with impacts or potential impacts to these lines, and provide information on the source(s) of the public water supply.

3.2.3 Surface Water

In accordance with **15A NCAC 02L .0405**, the responsible party must identify all surface water features **within a 1,500-foot radius** of the source area of the release. These features include, but are not limited to, wetlands, ponds, lakes, intermittent and perennial streams, rivers and ditches.

3.2.4 Wellhead Protection Areas

The responsible party must indicate whether the UST release source area is located within an approved wellhead protection area or not, as defined in **42 USC 300h-7(e)**. A list of approved wellhead protection plans, each of which may include several wellhead protection areas with one or more community wells, and "NCSWAP Info 2.0", an ArcGIS Viewer map on which the locations of wellhead protection areas are shown, are maintained by the Division of Water Resources (DWR), Public Water Supply (PWS) Section. The list and the NCSWAP Info map can be accessed on the PWS Section web page at https://deq.nc.gov/node/83027, under "Program Info", with links provided for "Approved Wellhead Protection Plans" and "View WHP Areas in NCSWAP Info", respectively.

The responsible party must list the identified wellhead protection area in Table B-5 by PWS ID number and PWS system name. The responsible party must show the location and extent of the wellhead protection area on the potential receptor map. Finally, the responsible party must append a copy of the map generated using the ArcGIS Viewer showing: 1) the UST facility, 2) the wellhead protection area (if applicable), and 3) community wells within the wellhead protection area (if applicable) to document the performance of the wellhead protection area investigation. This can be achieved in the NCSWAP Info viewer by selecting the layer for "Underground Storage Tanks" for any release from a registered commercial UST, as well as the layers for "Wellhead Protection Area" and "Ground Water Sources", and adjusting the scale appropriately to provide the necessary information on a printout of the map.

If the release is located within a wellhead protection area, the responsible party must also provide the name and address of the well owner, the well construction specifications (including screened intervals), and information on the pumping rate and pumping schedule, as obtained from the well owner or PWS Section.

3.2.5 Deep Aquifers in the Coastal Plain Physiographic Region

This criterion pertains only to releases in the Coastal Plain physiographic region as designated on a map entitled "*Geologic Map of North Carolina*" published by the Department in 1985. A hard copy of this map can be obtained for a fee from the North Carolina Geologic Survey, 1612 MSC, Raleigh, NC 27699-1612 or at https://www.nc-maps.com/19gemapofnoc1.html, or downloaded in several digital formats for free at https://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/ncgs-maps/1985-geologic-map-of-nc.

In the Coastal Plain physiographic region of North Carolina, deep aquifers are recharged by percolating surficial groundwater and by infiltrating stream water and rainwater. In many areas, this process involves long time frames due to the very slow vertical movement of water. However, certain areas of the Coastal Plain are known to have bedrock aquifers near the land surface that lie beneath discontinuous confining layers or beneath no confining layers at all. These conditions can allow early unobstructed movement of contamination from a shallow aquifer to a deeper aquifer. In many cases, the deeper aquifers are being used or could be used as a source for drinking water.

The responsible party must establish whether the source area of a release is in an area where there is recharge to a deep aquifer. The responsible party should make this determination based on a review of the scientific literature that discusses the regional hydrogeology, well construction records, and lithologic logs for deep wells in the area. The responsible party should also consult with regional office personnel in making this determination. If the source area of the release is in an area where there is recharge to a deep aquifer, the responsible party must identify and describe the underlying deep aquifer and must obtain the following information:

- the depth of the deep aquifer in relation to the surficial saturated zone,
- the lithology and hydraulic conductivity of the strata between the surficial aquifer and the deeper aquifer,
- the difference in groundwater head between the surficial aquifer and the deeper aquifer, and
- the local and regional use of the deep aquifer, including the drawdown resulting from major pumping conditions.

The North Carolina Division of Water Resources maintains a source for this information at https://deq.nc.gov/about/divisions/water-resources/water-planning/ground-water-management-branch .

A key source of information on the hydrogeology of the Coastal Plain is the USGS Professional Paper 1404-I, *Hydrogeologic Framework of the North Carolina Coastal Plain,* 1996. It is available from the U.S. Geological Survey at https://nc.water.usgs.gov/reports/abstracts/pp1404i.html. Updated hydrogeologic frameworks focusing on specific regions within the Coastal Plain are also available via a search of ground water publications in hard copy at the State Library of North Carolina, or in digital formats from DWR at https://www.ncwater.org/?page=196.

3.2.6 Subsurface Structures

The responsible party must locate all subsurface structures present on and adjacent to the site. These structures include, but are not limited to, sewers, utility lines, conduits, basements, septic tanks, leach fields, confined spaces and floor and storm drains. The responsible party must also assess the threat of explosion that may result from the accumulation of vapors in confined spaces, as well as all other threats to public health, public safety and the environment. The subsurface structure locations on or adjacent to the site must be presented on a larger scale receptor map.

3.3 Land Use Survey

The responsible party must gather, evaluate, and present information on the land use and any activities involving possible human exposure to contamination that could occur, both at the site and in the area within a 1,500-foot radius of the source area of the release. Examples of such land use and activities include, but are not limited to, an office, a manufacturing operation, a residence, a store, a school, gardening or farming, recreation, or undeveloped land. This evaluation must consider land use and activities which may not be occurring at the time of evaluation, but which are consistent with the current or projected future use of the site and area surrounding the site.

When performing a land use survey, it is necessary that the responsible party make the following determinations:

- whether or not children and/or adults live at, work at, or visit the site;
- the potential for exposure to the contaminated soil (e.g., Is the contaminated soil capped by pavement or a building? Is access to the site reliably restricted?);
- the distance from the source area to the nearest residence (primary or secondary), school, daycare center, hospital, park recreation area, house of worship, assisted-living facility, or other place of public assembly;
- the zoning status of the site and the surrounding area within a 1,500-foot radius of the source area of the release; and
- the projected future use of the site and surrounding properties by consulting with the local county or municipal planning office, zoning board or utility commission.

The Department will use the land use survey to determine the land use classification of the site.

3.4 Identification of Property Owners and Occupants

The responsible party must identify all property owners and occupants of properties within or contiguous to the area containing contamination. The responsible party must also identify all property owners and occupants of properties within or contiguous to the area where the contamination is expected to migrate. The responsible party must provide the names and addresses of these owners and occupants.

3.5 Assignment of Land Use and Risk Classification

Based on a review of the ***LSA Report***, the Department will assign a land use classification to the site. It will also classify the site risk and notify the responsible party of these classifications.

3.5.1 Land Use Classification

In accordance with **15A NCAC 02L .0408(1)** or **.0508(1)**, whichever applies, the Department will assign a land use classification (residential or industrial/commercial) to a site. The rule states that "a site is presumed residential, but may be classified as industrial/commercial if the Department determines based on site-specific information that exposure to the soil contamination is limited in

time due to the use of the site and does not involve exposure to children" and that site "means both the property upon which the discharge or release has occurred and any property upon which soil has been affected by the discharge or release". Thus, the Department will assign land use classifications to the property upon which the release has occurred and to any other property where the release caused soil to become contaminated.

In assigning a land use classification, the Department will assume that a property is residential. The responsible party may request an industrial/commercial classification by submitting site-specific information sufficient to demonstrate that people will not be exposed to the contaminated soil for long periods of time and that children will not be exposed at all. If this can be shown, the site may be classified as industrial/commercial.

The Department is not required to reclassify a site as industrial/commercial. The Department can consider any factors necessary when determining an industrial/commercial land use designation. These factors include the current and potential future use of land surrounding the contaminated property, and any other information available to assess the potential for human exposure to contamination. The ***LSA Report*** data will be used to assign an initial land use classification. If additional information becomes available that might change the land use classification after the responsible party submits the ***LSA Report***, the responsible party must forward the information to the appropriate regional office.

3.5.2 Risk Classifications

The Department will also assign an initial risk classification to each site per **15A NCAC 02L .0406** or **.0506**, for UST or non-UST petroleum releases, respectively. The criteria used to determine the risk posed by a release are listed below. If criteria for more than one risk classification apply to a given site, the highest applicable risk classification will be assigned.

Risk classification of a release is an on-going process. Where new information concerning the potential exposure of receptors becomes known, or if site conditions change, the Department may review the risk classification. As described in **15A NCAC 02L .0407** and **.0507**, the responsible party for a UST or non-UST petroleum release, respectively, has a continuing obligation to notify the Department of any changes that might affect the assigned level of risk, where the new information is known or *should be* known by the responsible party.

3.5.3 High Risk

For a commercial UST, noncommercial UST and non-UST petroleum release, as described in **15A NCAC 02L .0406(1) and 15A NCAC 02L .0506(1),** a High-risk classification means that any of the following apply:

a) A water supply well, including one used for non-drinking purposes, has been contaminated by the release,
b) A water supply well used for drinking water is located within 1,000 feet of the source area of a confirmed release from a commercial UST or a noncommercial petroleum products UST,

c) A water supply well not used for drinking water is located within 250 feet of the source area of a confirmed release from a commercial UST or a noncommercial petroleum products UST,
d) The groundwater within 500 feet of the source area of a confirmed release from a commercial UST or a noncommercial UST storing petroleum products has the potential for future use in that there is no source of water supply other than the groundwater,
e) A water supply well, including one used for non-drinking purposes, is located within 150 feet of the source area of a confirmed release from a noncommercial UST storing heating oil for consumptive use on the premises,
f) The vapors from the release pose a serious threat of explosion due to accumulation of the vapors in a confined space, or
g) The release poses an imminent danger to public health, public safety or the environment.

(For the purposes of this section, imminent danger includes fire, vapor intrusion, fish/wildlife kills, compromised traction on driving surfaces, and any other unique circumstance that warrants response to protect public health, public safety, or the environment.)

3.5.4 Intermediate Risk

For commercial UST and non-UST petroleum releases only, an Intermediate risk classification, as described in 15A NCAC 02L .0406(2) and .0506(2) indicates that the High-risk criteria do not apply and that one or more of the following criteria do apply:

a) Surface water is located within 500 feet of the source area of a confirmed release and the maximum groundwater contaminant concentration exceeds the applicable surface water quality standards in **15A NCAC 02B .0200** or US EPA National Criteria by a factor of 10,
b) In the Coastal Plain physiographic region (as designated on a map entitled *Geologic Map of North Carolina* published by the Department in 1985, as described in Section 2.5.B, above,) the source area of a confirmed release is located in an area in which there is recharge to an unconfined or semi-confined deeper aquifer which the Department determines is being used or may be used as a source of drinking water,
c) The source area of a confirmed release is within a designated wellhead protection area, as defined in **42 USC 300h-7(e)**,
d) The levels of groundwater contamination for any contaminant (except ethylene dibromide, benzene and the aliphatic and aromatic carbon fraction classes) exceed 50 percent of the solubility of the contaminant at 25 degrees Celsius or 1,000 times the groundwater quality standard or interim standard established in **15A NCAC 2L .0202**, whichever is lower, or
e) The levels of groundwater contamination for ethylene dibromide or benzene exceed 1,000 times the federal drinking water standard set out in **40 CFR 141.**

Under **Session Law 2015-241**, non-commercial UST petroleum releases no longer have an Intermediate risk classification.

***NOTES**: If the deeper aquifer is impacted by the release, the deeper aquifer must be remediated to the groundwater quality standards and interim standards contained in 15A NCAC 02L .0202.*

The levels of groundwater contamination for Intermediate risk described in (d) and (e) above have been termed Gross Contamination Levels (or GCLs).

If NAPL is present, a site will be assigned, at a minimum, a risk classification of Intermediate due to exceeding solubility for multiple contaminants under (d) above.

Although groundwater quality standards have been established for the aliphatic and aromatic carbon fraction classes, 15A NCAC 02L .0406(2) excludes these constituents in the GCLs set under the Intermediate risk criteria and cleanup goals. Accordingly, no GCL levels for aliphatic and aromatic carbon fraction classes have been established. Therefore, these constituents will not be considered in classifying risk.

3.5.5 Low Risk

A Low risk classification means that the risk posed by a release does not meet any of the High or Intermediate risk criteria described above, or, despite meeting one or more of the criteria, the Department determines, based on all available site-specific information, that the release does not pose a significant risk.

4.0 Site Assessment

4.1 Additional Risk Assessment (High or Intermediate Commercial USTs)

Some petroleum releases from commercial USTs, where the site meets the High Risk classifications defined in Title 15A NCAC 02L .0406, may have contaminant concentrations detected in ground water during Phase I of the LSA that are above the 15A NCAC 02L .0202 standard for one or more petroleum compounds but are below the levels that would transition the LSA scope to Phase II, or the site may only meet the Intermediate Risk classification. For these sites, Title 15A NCAC 02L .0407 requires horizontal and vertical plume delineation, as defined in Title 15A NCAC 02L .0106(c) through completion of a Comprehensive Site Assessment (or CSA), as described in Section 4.3 below.

4.1.1 Additional Risk Assessment Schedule (prior to the CSA)

However, in lieu of complete delineation, a responsible party for one of the sites that meets the above conditions may potentially obtain risk-based closure of the release under Title 15A NCAC 02L .0407 by providing an ***Additional Risk Assessment (ARA) Report*** within 60 days of receiving the ***Notice of Regulatory Requirement*** (or ***NORR***) from the Department directing the ***CSA (***and acknowledging the potential alternate submittal of the ***ARA***.)

4.1.2 Additional Risk Assessment Scope of Work

The scope of this ***ARA*** phase closely resembles the additional information that would be obtained during the Phase II ***LSA***, and is intended to help determine the potential risk of exposure to sensitive receptors for an evaluation of risk-based closure pursuant to Title 15A NCAC 02L .0407. The scope of the ***ARA*** is as follows:

- Install three horizontal extent monitoring wells and one vertical extent monitoring well (Type II or Type III).
    - The three shallow horizontal extent monitoring wells should be triangulated with one well installed upgradient and two shallow monitoring wells installed downgradient of the source area to accurately determine groundwater flow direction and potentially the horizontal extent of contamination.
    - Install the vertical extent monitoring well directly downgradient of the source area to the top of the bedrock or below the first encountered confining or semi-confining layer, **not to exceed** 75 feet without authorization from the regional office incident manager. The type of vertical extent monitoring well will be determined by the lithology and geology beneath the site during drilling activities. In accordance with 15A NCAC 02C .0401(e), a monitoring well **shall not** be constructed such that it will hydraulically connect separate aquifers or those portions of a single aquifer where contamination occurs in separate and definable layers within the aquifer.
- Analyze groundwater samples from the newly constructed monitoring wells for the appropriate methods relevant to the release.
- Survey the monitoring well network, measure the potentiometric surface/groundwater elevations and provide a groundwater flow map.
- Collect two soil samples in each monitoring well boring during drilling activities.
    - Collect one soil sample in the unsaturated zone and from the vadose/saturated zone from suspected areas of contamination. The soil samples submitted for analysis should be collected from the suspected worst case locations which exhibit visible contamination or demonstrate the highest VOC concentrations measured by on-site screening tools.
    - Analyze soil samples for TPH (USEPA Method 8015M or its equivalent)
    - Soil samples should not be collected if no contamination is present in the monitoring well boring during drilling activities.
- Collect groundwater samples from any on-site wells and any water supply wells within 250 feet of the source area for the appropriate methods relevant to the release.
- Conduct one slug test to provide hydraulic conductivity, estimated transmissivity, and the linear groundwater velocity.
- Submit an ***ARA Report*** to the appropriate regional office incident manager prior to the regulatory deadline described in the Department's ***NORR*** directing the ***CSA***.

Upon review of the ***ARA***, the Department will re-evaluate the site risk based on the new information, and either direct steps necessary for obtaining risk-based closure, or direct continued horizontal and vertical plume delineation through completion of the ***CSA***, with a new deadline set for the ***CSA Report***.

4.2 Accelerated Site Characterization

For sites that have significant health and/or environmental risks (e.g. vapor intrusion or LNAPL presence), sites where an accelerated site assessment and remediation schedule may be beneficial,

or sites where the existing remedial strategies have not been as successful as anticipated, real-time assessment of site conditions utilizing high-resolution site characterization technologies may be warranted.

4.2.1 Accelerated Site Characterization Purpose

Accelerated Site Characterization (ASC) is a framework for rapidly evaluating site conditions. The primary benefit provided by this approach is that the sampling and analysis plan is dynamic and will be modified in the field as new site information is generated, updating and refining the conceptual site model as the assessment proceeds in real-time. In this way data gaps are discovered and then quickly filled, and any anomalies are able to be directly addressed and resolved.

The ASC scope is relevant at multiple stages during a site's lifespan, and may be conducted more than once, if needed.

Pre-defined Initial Abatement Action Excavation Boundaries

For instance, prior to removing a UST system, a responsible party may want to investigate for the presence of contaminated soil and/or any NAPL trapped beneath the water table, which could help define the extent of any excavation necessary to reach clean closure during the initial abatement action phase (see the *STIRA Guidelines* for details).

If State Trust Fund reimbursement is anticipated, please refer to the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for information about reimbursement. Please note that proper initial abatement efforts associated with a new release are exempted from preapproval as an emergency response action under 15A NCAC 02P .0402(b)(9). However, this scope is limited as described in the* **STIRA Guidelines,** *and any excavation exceeding those limits, or any efforts associated with a pre-existing release are considered to be corrective actions outside of the emergency response exemption. Therefore, obtaining a pre-defined excavation scope using ASC can allow for preapproval of an excavation outside of these limitations as representing a necessary, cost-effective cleanup strategy.

Pre-CSA Plume Delineation

Similarly, a responsible party may want to conduct an ***ASC*** to delineate soil and groundwater contamination prior to investing the time and money necessary complete a ***CSA***. This information could then be used to more strategically position the permanent monitoring well network that will be necessary to evaluate the progress of any future corrective action efforts onsite. By pre-assessing with an ***ASC***, the network can be optimized to reduce the number of wells that need to be installed and reduce the routine monitoring costs over time from a more efficient and effective well network.

As with the ***ARA*** above, the responsible party may submit an ***ASC Report*** within 60 days of receiving the ***NORR*** from the Department directing the ***CSA (***and acknowledging the potential alternate submittal of the ***ASC***.) If a valid ***ASC Report*** is received within this timeframe, the Department will extend the deadline for the ***CSA Report*** appropriately to account for the updated scope of the ***CSA*** defined by the ***ASC*** results.

Ineffective Corrective Action Evaluation

Where a remediation strategy has not or is not achieving the anticipated schedule presented in the ***Corrective Action Plan***, the responsible party may elect to conduct an ***ASC*** to evaluate whether there are any potential contaminant mass contributions from areas that were not known to be contaminated, horizontally or vertically, or to investigate for hydrogeological inconsistencies that could cause anomalous results from the projected trends. In this case, the ***ASC Report*** would replace the ***Monitoring Report*** for that sampling period and would provide a basis for either requesting a ***System Enhancement Report*** or a ***New Technology Cleanup Plan***, depending on the outcome of the investigation (see the *Guidelines for Corrective Action* for additional details on these corrective action report formats.)

4.2.2 Accelerated Site Characterization Scope

The scope of an ***ASC*** is highly variable and will be driven by the focus of the event (as described above) and the information that is discovered in the field. For a more comprehensive guide to conducting an ***ASC***, please refer to the EPA *Expedited Site Assessment Tools for Underground Storage Tank Sites Guidance Document* which can be found here: https://www.epa.gov/ust/expedited-site-assessment-tools-underground-storage-tank-sites-guide-regulators.

Ideally, the work is conducted in a single mobilization that can last several days, and may include one or more of the following:

- Using real-time or near-real-time high-resolution site characterization techniques such as MIP, LIF, UVF, HPT, or other comparable field screening tools to evaluate impacts to soil and/or groundwater, and/or to determine subsurface geologic/ hydrogeologic conditions.
- Investigate for the presence of and potentially determine the type and age of any NAPL remaining trapped in the subsurface. This information could be used to predict an approximate thickness of the NAPL column and an estimated rate of NAPL recovery to help target NAPL response efforts.
- Collection of confirmatory soil and/or groundwater samples from temporary monitoring wells or directly from the high-resolution tooling (where applicable) based on data obtained from the techniques described above.
- Screening and testing for petroleum vapor intrusion (PVI) risk in adjacent structures may be addressed as presented the Interstate Technology and Regulatory Council (ITRC) guidance on the topic entitled: Petroleum Vapor Intrusion: Fundamentals of

Screening, Investigation, and Management, dated October 2014 (available at http://www.itrcweb.org/PetroleumVI-Guidance/).

4.3 High/Intermediate Risk Sites - Comprehensive Site Assessment

A comprehensive site assessment must be performed by the responsible party for releases that the Department classifies as High or Intermediate risk to human health and the environment based on a review of the LSA Report or the Additional Risk Assessment Report.

The primary objectives of the comprehensive site assessment are to characterize the full extent of contamination resulting from a release, determine the chemical and physical characteristics of the contaminants, investigate the geology and hydrogeology of the site including all factors relating to contaminant transport, and examine exposure pathways and risk to potential receptors. In characterizing the extent of contamination, the responsible party must define and document the vertical and horizontal extent of contamination in both soil and groundwater (15A NCAC 02L .0106(g)).

If a release is classified as High or Intermediate risk, but groundwater is not contaminated, the responsible party should only conduct and report assessment and other required investigations related to the soil contamination (15A NCAC 02L .0408(2)).

The results of the comprehensive site assessment must be submitted in a CSA Report to the appropriate regional office within 90 days of the date of the notice requesting the comprehensive site assessment. The CSA Report must follow the format presented in Appendix A. Guidelines for conducting a comprehensive site assessment and completing a CSA Report are presented below.

High Risk Release Remediation Goals

For a High risk release, the responsible party must perform a comprehensive site assessment and submit a ***CSA Report*** documenting the results. For a release which the Department determines to be High risk, soil contamination must be remediated to concentrations levels equal to or less than the lowest MSCCs (**15A NCAC 02L .0408(4)**), and groundwater contamination must be remediated to levels equal to or less than the groundwater quality standards in **15A NCAC 02L .0202** (called the '2L Standards').

> ***NOTE**: If the Department reclassifies the risk of a site from High to Low following review of the CSA Report, the responsible party must submit a Soil Cleanup Plan proposing appropriate remediation strategies for cleanup of the contaminated soil.*

Intermediate Risk Release Remediation Goals

For an Intermediate risk release, a responsible party must perform a comprehensive site assessment and submit a ***CSA Report*** documenting the results. For a release which the Department determines to be Intermediate risk, soil contamination must be remediated to concentration levels equal to or

less than the lowest MSCCs, and groundwater contamination must be remediated to concentration levels equal to or less than the 02L Standards or to alternate standards as established by rule in **15A NCAC 02L .0406** before the Department can reclassify the risk to 'low' and approve *No Further Action* status.

If the release is in a wellhead protection area in which a well is threatened, or an area of recharge in which a well taps an aquifer which is used as a source of drinking water, groundwater contamination must be remediated to levels equal to or less than the 2L Standards before risk is reclassified as 'low'. However, if the release is not located in either of these areas, the groundwater contamination may be remediated to the following alternate standard levels to achieve risk reduction:

a) levels equal to or less than the Gross Contaminant Levels (GCLs) established in 15A NCAC 02L .0406, and
b) levels equal to or less than the surface water quality standards multiplied by a factor of 10 established under 15A NCAC 2B .0200 and by national criteria.

NOTE: *If the Department reclassifies the risk of an Intermediate risk release to Low risk following review of the* ***CSA Report****, the responsible party must submit a* ***Soil Cleanup Plan*** *proposing appropriate remediation strategies for cleanup of the contaminated soil*

CSA Reporting Requirements

Requirements for CSA and the subsequent ***CSA Report*** include, but may not be limited to, the following items:

a) an update of the site history, source determination, and potential receptor information provided in the ***LSA Report*** (The responsible party must provide a history of the UST/AST systems and releases at the site using the Tables B-1 "UST/AST System and Other Release Information" and B-2 "UST/AST Owner/Operator and Other Responsible Party Information" provided in Appendix B. These tables must describe the location, use, and all owners and operators of all current and previous UST and AST systems at the site. The responsible party must describe all sources of petroleum non-UST releases (spills, AST system releases) and all sources of UST releases on the site.);
b) collect soil and groundwater samples that delineate the horizontal and vertical extent of contamination. The term 'contaminant' is as defined in **15A NCAC 02L .0102**. Samples must be collected and analyzed in accordance with methods and procedures specified in Section 4. A comparison of the sample results must be made to the applicable cleanup standards;
c) a determination of the extent and thickness of NAPL, if present;
d) copies verifying proper public notice was completed (Refer to Section 2.10.);
e) a hydrogeologic investigation that should include:

    i. complete characterization of the site geology based on the information obtained during the advancement of soil borings and construction of monitoring wells;

ii. collection of groundwater elevation data and calculation of hydraulic gradient and determination of groundwater flow direction;
iii. performance of aquifer slug tests (or an aquifer pump test if approved by the regional office) to provide a calculation of hydraulic conductivity, transmissivity, and linear groundwater velocity; and
iv. determination of rate of contaminant transport and the potential for contaminants to affect receptors.

f) Provide a brief discussion regarding remediation goals and a selected cleanup technology including mass contaminant calculations to provide a baseline for cleanup goals and milestones.

Evaluation of Potential for Contamination to Impact Receptors

The responsible party must evaluate the potential for contaminants in soil and groundwater to affect receptors, including, but not be limited to:

- water supply wells;
- subsurface features (e.g. utility lines, septic systems, basements, foundations);
- surface water bodies;
- groundwater in wellhead protection areas; and
- groundwater in areas of recharge to deep unconfined or semi-confined aquifers.

If a receptor is determined to be at risk from soil or groundwater contamination from a release, the responsible party must evaluate all actions to reduce the risk-level of the site. Such actions may include the re-evaluation of site specific conditions relative to a receptor (e.g., supply wells that are located upgradient of a source), abandonment of water supply wells, and the extension and connection to public water supply lines.

If the risk of the site is classified as Intermediate, groundwater modeling may be required to evaluate potential of groundwater contamination to impact receptors. If the source area of an Intermediate risk release is located within 500 feet of a surface water body, within a designated wellhead protection area or within an area of recharge to a deeper Coastal Plain aquifer, the responsible party must evaluate whether groundwater contamination will violate the following Intermediate risk criteria:

- surface water standards;
- groundwater quality standards and interim standards at a location no closer than one-year time of travel upgradient of a well within a designated wellhead protection area; and
- groundwater quality standards and interim standards in a deep Coastal Plain aquifer that is, or could be, used as a source for drinking water.

The responsible party should perform predictive calculations and/or modeling, or use empirical site monitoring data and/or knowledge of the timing of the release, to determine contaminant transport rates. Modeling/calculations must be based on site-specific conditions. If

modeling/calculation indicates that any of the above standards might be exceeded, the responsible party must propose a cleanup level that will prevent such an exceedance.

Sites with uniform groundwater flow conditions should use analytical transport models (usually one-dimensional). Sites having complex flow conditions (e.g., multi-aquifer system) where uniform groundwater flow cannot be assumed may require multi-layer numerical models. Before performing a numerical model, the responsible party should discuss site conditions with the regional office personnel to evaluate whether the modeling effort is warranted. The modeling results should always be compared and calibrated with empirical (monitoring) data obtained from the site. Site-specific data should be incorporated into the models whenever possible.

When selecting a model, the user should consider the model's performance history and applicability to the site. The model should have been field tested by a number of studies and should be well documented in the literature. Users should select a model with inherent assumptions that are appropriate for the site conditions. All assumptions and estimated values, including biodegradation rates, must be conservative (i.e., predict reasonable worst-case scenarios) and thoroughly documented. At a minimum, a user must provide the following information when submitting modeling results:

- name, version and developer of the model;
- the type of site for which the model is applicable;
- the critical conceptual assumptions and estimates of input values;
- the calibration procedures;
- the range of values used and the results of sensitivity analyses on critical data inputs; and
- a graphical representation and narrative explanation of the modeling results.

Sites characterized by migration of contamination through a surficial unconsolidated aquifer toward surface water should use simple predictive calculations and/or modeling and/or analytical transport models to evaluate potential for a surface water standard exceedance and to establish a groundwater cleanup level. Analytical transport models, simple predictive calculations for estimating retardation factors and contaminant transport rates, should be obtained from the literature.

A surface water body may have several different classifications depending on its use and the type of aquatic life present. Each classification has a set of surface water quality standards or criteria. The surface water standards and the criteria for each classification must be reviewed. The most stringent of the standards and the criteria assigned to the surface water should be used in identifying a possible surface water violation. North Carolina surface water classifications and standards (**15A NCAC 2B**) and US EPA National Criteria are listed by DWR in the NC Surface Water Quality Standards Table at https://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/surface-water-standards. If a standard cannot be found for a particular contaminant, the responsible party should call the DWR's Water Quality Standards Coordinator at (919) 707-9000 for more information.

Sampling a surface water body to demonstrate that surface water standards have not been violated will not be acceptable unless the responsible party can also demonstrate that the maximum

groundwater contamination concentrations at the site are discharging to surface water at the time of sampling. If this demonstration can be made, surface water samples should be obtained from the discharge area, as well as upstream and downstream of the discharge area.

The Trust Fund requires that all work must be claimed for reimbursement within 12 months of completion of the activity/task. If the RP or their designee determine that a CSA cannot be completed within this time period due to of off-site access challenges or issues as supported by analytical information collected to date and agreed upon by the UST regional office incident manager and TF auditor. Additionally, the RP or their designee must coordinate with UST regional office staff to ensure that UST staff are available during the active portion of the field activity to approve and coordinate changes in the scope of work.

4.3.1 Low Risk Sites - Soil Assessment Report

A soil assessment must be performed and presented in a ***Soil Assessment Report*** (SAR) by the responsible party for releases that the Department classifies as a Low risk to human health and the environment, based on a review of the **LSA Report**. The objective in performing this soil assessment is to characterize the extent of soil contamination resulting from a Low risk petroleum UST system release. The responsible party must document both the vertical and horizontal extent of soil contamination that exceeds the applicable MSCCs (**15A NCAC 02L .0408**).

The ***Soil Assessment Report*** includes two distinct phases: soil assessment and corrective action. Guidelines for performing the soil assessment and preparing the assessment phase of the ***SAR*** are presented below; the corrective action phase is presented in 2.8.B. "Corrective Action for Low Risk Sites". Specific reporting requirements for the ***SAR*** are provided in Appendix A.

Low Risk Remediation Goals

For a Low risk release, a responsible party must perform a soil assessment and submit a ***SAR*** documenting the results. For a release that the Department determines to be Low risk, soil contamination must be delineated and remediated to either the residential MSCCs or the industrial/commercial MSCCs, based on the land use classification. For example, if the land use at a site has been classified as industrial/commercial, the responsible party will only be required to delineate and remediate soil to the industrial/commercial MSCCs before the Department can approve *No Further Action* status.

Soil Assessment Report Investigative Activities

The soil investigation portion of the ***SAR*** includes, but may not be limited to, the following:

a) an update of the site history, source determination, and potential receptor information provided in the ***LSA Report*** (The responsible party must provide a history of the UST/AST systems and releases at the site using the Tables B-1 "UST/AST System and Other Release Information" and B-2 "UST/AST Owner/Operator and Other Responsible Party Information" provided in Appendix B. These tables must describe the location, use, and all owners and operators of all current and previous UST and AST systems at the site. The

responsible party must describe all sources of petroleum non-UST releases (spills, AST system releases) and all sources of UST releases on the site.);

b) collect soil samples from the vadose zone that delineate the horizontal and vertical extent of contamination (The term 'contaminant' is as defined in **15A NCAC 02L .0102**. Samples must be collected and analyzed in accordance with methods and procedures specified in Section 4. A comparison of the sample results must be made to the applicable cleanup standards.);
c) characterize the geology at the site based on the samples collected from the boring in the vadose zone;
d) evaluate the options for remediation of soil contamination. (See 2.8.B. "Corrective Action for Low Risk Sites.")

Groundwater Assessment

For petroleum UST releases classified as Low risk, no further action is required to assess or remediate groundwater.

Evaluation and Selection of an Option for Soil Remediation

The ***SAR*** must provide a detailed proposal for remediating contaminated soil including mass contaminant calculations to provide a baseline for cleanup goals and milestones. An evaluation of remedial options must be included in this report, generally describing the feasibility, limitations, and costs from initial implementation until the conditions for *No Further Action* status are reached for each option.

The ***SAR*** must present the basis for selecting one of the presented options as the proposed remedy (See Appendix A). The proposal must include detailed specifications of the proposed remedy, a plan for post-remediation sampling, a detailed cost estimate (based on bids), and a schedule of actions to be performed by the responsible party from ***SAR*** approval until site closure. For a Low risk site, the ***SAR*** should satisfy any applicable remedial plan requirements. Approval of the ***SAR*** is required prior to implementation of the remedial plan.

4.4 Public Notice Requirements and Format

4.4.1 Public Notice for Comprehensive Site Assessment

Pursuant to 15A NCAC 02L .0114, the responsible party must provide a summary of the CSA Report for High and Intermediate risk releases to the local health director and the chief administrative officer of the political jurisdiction in which the contamination occurs. This report must include a map of the contaminant plume with the location of all monitoring wells identified, the frequency of monitoring, a table of the constituents exceeding the groundwater quality standards and interim standards, and any actions taken to mitigate threats to human health. This

summary report must be submitted by certified mail to the parties specified above no later than five working days after the CSA Report is submitted to the Department.

Formats for public notice are provided in Appendix A.

4.4.2 Public Notice Following NFA Notification

After the Department has issued a Notice of No Further Action letter to the responsible party stating that no further action is required, the responsible party must provide public notice in accordance with 15A NCAC 02L .0409(b) if the following conditions exist:

1. groundwater has not been restored to the standards, or interim standards established under 15A NCAC 02L .0202; and/or

2. soil has not been remediated to the lower of the soil-to-groundwater or the residential Maximum Soil Contaminant Concentrations (MSCCs).

3. Pursuant to 15A NCAC 02L .0409(b), the responsible party must provide a copy of the Notice of No Further Action letter to the following individuals within 30 days of receiving the letter:

4. the local health director;

5. the chief administrative officer (*Mayor, Chairman of the County Commissioners, County Manager, City Manager, or other official of equal or similar position)* of each political jurisdiction in which the contamination occurs;

6. all property owners and occupants residing within or contiguous to the area containing contamination; and

7. all property owners and occupants residing within or contiguous to the area where the contamination is expected to migrate.

The Notice of No Further Action letter is considered the public notice. Therefore, a copy of the Notice of No Further Action letter must be provided to the above referenced parties by certified mail. An explanatory cover letter or other document, which contains an explanation indicating that the referenced property has been granted a No Further Action determination with soil and/or groundwater contamination levels above either the soil-to-groundwater or residential soil levels or the 15A NCAC 02L standards for groundwater, should be included with the public notice. The cover document should provide a contact (either the responsible party or the consultant) to answer questions concerning the referenced property. Within 60 days of receiving the Notice of No Further Action letter, the responsible party must provide the appropriate regional office with proof of receipt of the copy of the notice or of refusal by the addressee to accept delivery of the copy of the notice. If notice is posted, the responsible party must provide the regional office with a description of the manner in which the notice was posted.

4.5 Notice of Residual Petroleum and Land Use Restrictions

North Carolina General Statute (NCGS) 143B-279.9 and 143B-279.11 require a Notice of Residual Petroleum (NRP) to be filed with the Register of Deeds in the county where the release is located when a release from a petroleum underground storage tank has not been remediated to below "unrestricted use standards." The NRP is required prior to conveyance of a contaminated property or, for suitable Low risk sites, prior to receiving a Notice of No Further Action. "Unrestricted use standards" for groundwater are the groundwater quality standards and interim standards contained in 15A NCAC 02L .0202, and "unrestricted use standards" for soil are the residential MSCCs established in 15A NCAC 02L .0411.

The NRP must be prepared in accordance with the instructions and format (see UST Section web site at https://deq.nc.gov/about/divisions/waste-management/ust/forms.) The NRP must contain a legal description of the property containing the source of contamination and legal descriptions of any other properties which are contaminated by the release and are owned (or controlled) by the person who owns or controls the contaminated property. The NRP must also include appropriate land use restrictions for these properties. In addition, the NRP must identify all other properties (adjacent, adjoining, downgradient, etc.) on which contamination is known to exist at the time the NRP is prepared.

The NRP must be sent to the appropriate regional office of the UST Section within 30 days of the date of receipt of a letter requesting its submittal or prior to a property transaction, for approval and notarization. The approved and notarized NRP must then be filed with the Register of Deeds, and a certified copy of the filed NRP must be submitted to the regional office within 30 days of its return.

5.0 Sampling and Analysis Guidance for Release Response and Assessment

This section presents guidance on field screening, sampling, and laboratory analysis for the assessment and corrective action stages. Analysis of soil and groundwater samples collected in order to investigate, assess, and monitor the concentration of contaminants related to the release must be performed using approved analytical methods to provide reliable results. If proper sampling and Quality Assurance/ Quality Control (QA/QC) protocols are not followed, the DWM will not accept the analytical results.

Laboratories used must be NC DWR certified to run the approved laboratory analytical methods. The NC DWR Laboratory Certification Program maintains a list of certified commercial laboratories. The list includes laboratory contact information and the analytical methods that each laboratory is certified to perform. The list is available from the NC DWR Chemistry Laboratory at 4405 Reedy Creek Road, Raleigh, NC 27607 or by calling (919) 733-3908. The Laboratory Certification Program has a list of laboratory contact information on their web page at https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch. Tables 8 and 9 present the collection requirements for the

specified analytical methods; however, the selected laboratory should be consulted for their specific requirements prior to sample collection.

Sample collection and analysis are discussed fully in the Guidelines for Sampling.

5.1 Use and Limitations of Field Screening

To establish the extent of contamination, soil and groundwater must be sampled and analyzed. Successful delineation of soil and groundwater contamination usually requires an iterative approach, in which intensive sampling with subsequent qualitative or semi-quantitative analysis using field-based technology to locate and identify contamination is followed up by more rigorous quantitative analysis of a smaller set of samples by approved laboratory methods.

Acceptable field-analytical methods include visual and olfactory observations and the use of a portable photoionization detector (PID), a flame ionization detector (FID), or an ultraviolet fluorescence (UVF) instrument. When selected and utilized correctly, the field-based screening method should function to minimize the area and quantity of soil subjected to removal or treatment and/or to facilitate optimal placement of groundwater monitoring wells, thus minimizing and improving the quality and cost-effectiveness of assessment actions. Unfortunately, data obtained by most field-screening methods cannot be relied upon to indicate the presence, nature, and extent of contamination due to lack of specificity, accuracy, reproducibility, quality assurance/quality control, etc.

For example, the use of a carefully calibrated PID unit for screening is acceptable only for qualitative assessment of soil for fresh gasoline. The use of a carefully calibrated FID unit for screening is acceptable only for qualitative assessment of soil for fresh gasoline or diesel and not for degraded or heavier fuels. The utilization of a semi-quantitative field technology, such as UVF, which allows on-site confirmation of the presence and lateral and vertical extent of soil and groundwater contamination for a wide range of specific petroleum products (i.e., not only gasoline and diesel, but also degraded fuels and waste oil), is preferable.

Field-screening data should be evaluated to determine where a minimal number of final soil or groundwater samples should be collected (or which previously collected, split samples should be selected) for analysis in the laboratory. Final determination of soil and groundwater contamination must be made by the laboratory analytical methods as specified in Tables 3 through 7.

5.2 Sampling and Analysis for Different Phases of Release Response, Assessment and Corrective Action

This section presents the specifications for collection and analysis of samples during assessment and correction action, beginning with an overview of sampling during release response. The quantities, locations, and methods of collection and analysis are specified for sampling during each phase of action.

Tables 3 through 7 present the current approved analytical requirements for all phases of action. All analysis methods used must be acceptable to the US EPA and approved by the UST Section.

The appropriate number and location of samples and the appropriate analytical methods may vary from those specified by this guidance at some sites. At these sites, the licensed geologist or professional engineer should modify sampling or analysis accordingly; however, variations from the specifications for sampling and analysis presented in this document must be acceptable to the UST Section. The general directive is to collect the most informative but cost-efficient combination of samples to be analyzed by field-based screening methods and by approved analytical laboratory methods. If the results of previous analyses indicate that an individual constituent is not present at a site, then analysis of that constituent may no longer be required and the scope of the analytical method may be reduced if approved by the appropriate regional office.

5.2.1 Review of Initial Response and Abatement Sampling.

More detailed sampling guidance for this initial investigation phase is presented in the *Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases.*

UST-61/62 – 24-Hour Release and UST Leak Reporting Form

The report informs the Department of the discovery of a release. The discovery of a release can involve actual observation of a release or evidence that a release has occurred. Evidence of a release can consist of various signs of soil or groundwater contamination (e.g., staining, odor, product sheen, or sampling results) and is supported by the proximity of the contamination to a UST system or by confirmed compliance failure.

If the responsible party elects to collect and analyze soil and or groundwater samples to confirm contamination at this stage, field-based qualitative or semi-quantitative analytical methods should be used to screen for contamination, but final sampling and analysis to confirm contamination should be conducted using the approved analytical methods for soil samples from preliminary investigations which are listed in Table 3 and/or the approved analytical methods for groundwater samples which are listed in Table 5. Submittal of this report (by telephone, electronic mail, or other means) is required within 24 hours of discovery of release and must not be delayed in order to include analytical results.

20-Day Report

The function of this report is to indicate the progress of initial response and abatement. This report is required for petroleum and regulated (hazardous substances) UST releases; it is requested for non-petroleum non-regulated UST releases to facilitate direction of the investigation. The report should include any results from initial soil or groundwater sampling and any free product assessment and removal data that are available within 20 days of confirmation of a release. However, submittal of the report is required within 20 days of confirmation of release and must not be delayed for sample results. Approved analytical methods for soil samples from preliminary investigations and over-excavations are listed in Table 3. Approved analytical methods for groundwater samples are listed in Table 5.

Initial Abatement Action Report (for petroleum UST releases only)

The function of the report is to present the results of the initial response and abatement actions, including all analytical data produced in the preliminary stages of assessment and following over-excavation of contaminated soil. Approved analytical methods for soil samples from preliminary investigations and over-excavations are listed in Table 3. Approved analytical methods for groundwater samples are listed in Table 5. Submittal of the report is required within 90 days of discovery of release.

For non-regulated non-petroleum UST releases, the equivalent report is the ***Initial Site Assessment Report*** (See Appendix A). Submittal of this report for non-regulated non-petroleum UST releases is recommended to facilitate direction of the investigation but not required. Approved analytical methods for soil samples from preliminary investigations and over-excavations are listed in Table 6. Approved analytical methods for groundwater samples are listed in Table 7.

5.2.2 Assessment Reporting

45- Day Report (for regulated non-petroleum UST releases only)

The function of this report is to present site assessment and characterization information. This report is required for regulated non-petroleum (hazardous substances) UST releases. Sampling and analysis are site specific for non-petroleum releases so the investigator should contact the incident manager for guidance. Approved analytical methods for soil samples are listed in Table 6. Approved analytical methods for groundwater samples are listed in Table 7. Submittal of this report is required within 45 days of confirmation of release unless the Division has approved an alternate submittal date.

Limited Site Assessment (for petroleum UST releases only)

The function of this report is to present the information necessary for the Department to classify the risk level of the release. It presents an assessment of the nature and maximum concentration of the release contaminants in soil and groundwater and provides an evaluation of the risk to potential receptors. Approved analytical methods for soil samples required in the LSA are specified in Table 4. Approved analytical methods for groundwater samples are listed in Table 5. The report should include the results from preceding investigations and from the following samples or measurement:

a) Groundwater samples collected from each source area monitoring well or if free product is present in the well, the measurement (in feet) of free product;
b) Soil samples collected during construction of the monitoring well installed in the source area of each release at the following locations:
    1) immediately below the surface (or the bottom of excavation) in the source area;
    2) immediately above the water table;
    3) at five feet intervals vertically from immediately below The surface (or the bottom of excavation) until the water table (or bedrock) is encountered, if the water table

is encountered at a depth of less than or equal to 25 feet, or at ten foot intervals vertically from immediately below the surface (or the bottom of excavation) until the water table (or bedrock) is encountered, if the water table is encountered at a depth of greater than 25 feet;

(The samples should be collected from locations in native soil suspected of the highest levels of contamination. ***Clean backfill should not be sampled.*** *Modifications to the sampling interval can be made depending on the site circumstances.)*

c) For High risk, regulated UST sites where any constituent in the sample from the source area monitoring well results well exceeds the 2L standards by a factor of ten, groundwater samples collected from three additional monitoring wells (one well located upgradient and two wells downgradient of the source area). (If no metals are determined in the source area well, metal analyses are not required from the additional monitoring wells.

Submittal of the LSA Report is required within 120 days of the date of the discovery of the release.

Comprehensive Site Assessment

The principal function of this report is to delineate soil and groundwater contamination to the applicable standard limits (i.e., to the lower of the **15A NCAC 02L .0411** soil-to-groundwater or residential MSCCs for soil and to the **15A NCAC 02L .0202** groundwater quality standards for groundwater). In addition, the report should indicate the locations of highest contaminant concentrations in soil and groundwater. Although intensive preliminary delineation of soil contamination should be accomplished using field-based semi-quantitative analytical methods, final delineation of the vertical and horizontal extent of soil contamination should be confirmed for a minimal number of samples by the approved quantitative methods stipulated in Tables 4 or 6 for the comprehensive site assessment. (See Section 5.0.)

Preliminary delineation of groundwater contamination should be accomplished prior to installation of permanent monitoring wells using field-based semi-quantitative analytical methods or high resolution field assessment techniques to achieve the optimal placement and construction of a minimal number of monitoring wells, but final delineation of the vertical and horizontal extent of contamination should be confirmed from the permanent monitoring wells by the approved quantitative methods for groundwater monitoring specified in Tables 5 or 7. (See Section 5.0.)

Additional analytical methods may be required, with the approval of the incident manager, to provide information relevant to natural attenuation or modeling. Submittal of this report is required within 90 days of the date of the notice requesting the ***CSA***.

Soil Assessment Report (for Low risk petroleum UST releases only)

The function of this report is to delineate soil contamination to the applicable standard limits (to the residential or the industrial/commercial MSCCs). Although initial delineation of soil contamination should be accomplished using screening methods, final delineation of the vertical and horizontal extent of soil contamination should be determined by the methods stipulated in

Table 4 for the Soil Assessment Report. Submittal of this report is required within 90 days of the date of the notice requesting the SAR.

5.3 Reference for Collection, Transport and Analysis of Samples: "UST Section Guidelines for Sampling"

Soil and groundwater samples required for UST assessment and corrective action must be collected, transported, and analyzed in accordance with the Guidelines for Sampling, current version, which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/ust. (See also Tables 1-11.)

6.0 Water Supply Wells

If a release from a UST system has occurred, water supply wells (residential and public water supply wells) should be sampled by the responsible party to ensure that groundwater used for human consumption is not contaminated. Refer to the Guidelines for Sampling for sampling and analysis procedures and methods.

The responsible party must not use a water supply well as a substitute for a monitoring well for contaminant plume monitoring.

6.1 Sampling of Water Supply Wells

If a release from a UST system has occurred, the responsible party must first sample the wells which are closest to the source within a 500-foot radius. If the closest wells are impacted by the release, then the next closest wells should be sampled and so forth until contamination is no longer found.

If the sample results indicate the presence of contaminants (at or above the detection limit), the responsible party must immediately send the results to the UST Section regional office, the well owner, and all well users in order to mitigate the hazard of exposure to contaminants. The responsible party should send the results to the water supply well owner and all users even if analysis shows no contamination. The Department will evaluate the health risk of the water supply by comparing the contaminant concentration levels to acceptable concentration levels and will make a recommendation for safe use of the water supply to the water supply well owner and all users.

If analysis of samples indicates contamination, subsequent samples should be collected at the frequency advised by the Department.

6.2 Provision of Alternate Water

Alternate water must be provided by the responsible party to the users of water supply wells contaminated by releases of petroleum or non-petroleum (including hazardous substances and waste) UST systems.

Pursuant to **15A NCAC 02L .0106(b),** any person conducting or controlling an activity which results in the discharge of a waste or hazardous substance or oil to the groundwaters of the State, or in proximity thereto, shall take immediate action to terminate and control the discharge, mitigate any hazards resulting from exposure to the pollutants, and notify the Department of the discharge. This action includes providing alternate water to households with contaminated water supplies. The responsible party must supply alternate water, if the Department, on evaluation of the health risk of the water supply, determines that water from the well is not safe for specific uses. Depending on the level of contamination present, bottled water, a point-of-entry carbon filtration system, connection to municipal water supplies, or other alternatives may be required. The responsible party should coordinate the provision of alternate water with the appropriate regional office.

If a permanent water supply cannot be provided immediately, a temporary source of alternate water must be supplied.

If the responsible party does not immediately provide alternate water to the well owners, the UST Section must be notified. For petroleum UST releases, the UST Section staff then may initiate the process of supplying alternate water for each affected household. The State must recover costs expended for such activities from the person(s) identified as the responsible party.

7.0 Disposal of Contaminated Soil and Groundwater

7.1 Disposal of Contaminated Soil

Pursuant to **15A NCAC 02T .1502(4),** soil is contaminated if analytical results from samples collected during the assessment or from the stockpile show the presence of contaminants at concentrations above the lesser of the **15A NCAC 02L .0411** soil-to-groundwater or residential MSCCs for soil. Once contaminated soil is excavated, it is considered a waste and must be properly disposed of, even if the contaminant concentrations are below applicable cleanup levels for the site based on the applicable risk and land use classifications.

NC General Statute 143-215.1 requires that the storage, disposal, and/or ex situ treatment of contaminated soil be permitted by the DEQ. If the responsible party proposes that excavated petroleum contaminated soil is to be treated on site, a soil permit issued by the DWM is required. If soil is to be hauled offsite for treatment/disposal, then disposal manifests are required. Comprehensive guidance on the disposal of contaminated soil is presented in the *Guidelines for Ex Situ Petroleum Contaminated Soil Remediation*, current version.

Soil excavations must be filled with clean compacted fill that is similar to the native soil removed from the excavation. If gravel or some other permeable material is to be used, then a low-permeability fill material must be used to cap the excavation. Excavations cannot be back-filled with contaminated soil.

7.1.1 Temporary Storage or Limited Land Application of Petroleum Contaminated Soil

Temporary Storage

On-site temporary storage must be for a period less than 45 days. Authorization for off-site temporary storage requires the approval (through issuance of a Form UST-71 – "Certificate of Approval for Disposal") from the appropriate regional office. Approval will not be given by the Department, unless:

a) there is a health-based emergency, fire or explosion hazard; or
b) the responsible party has an approved soil permit prior to excavating the soil. (Unauthorized storage of soil or storage in excess of 45 days may be considered a violation of NCGS 143-215.1.)

For temporary storage, contaminated soil must be placed on 10 mils-thick plastic sheeting and bermed. The contaminated soil must be covered by 10 mils-thick (at a minimum) plastic sheeting to prevent runoff and the generation of leachate. Any surface water runoff and/or leachate from the contaminated soil storage area must be collected and properly disposed to prevent leachate migration.

Limited Land Application.

Under **15A NCAC 02T** subject to approval (through issuance of a UST-71 – "Certificate of Approval for Disposal") by the regional office, the land application of less than or equal to 50 cubic yards of petroleum contaminated soils or 50 to 100 cubic yards of petroleum contaminated soils at a minimum rate application is deemed permitted in accordance with NCGS 143-215.1(b), and no individual Division permit need be issued.

> ***NOTE**: Applications for soil permits for petroleum contaminated soil originating from UST releases should be submitted to the UST Section regional office.*

7.1.2 Disposal of Drill Cuttings and Mud

Drill cuttings and mud produced during field environmental investigation activities such as borehole and well construction are deemed permitted under **15A NCAC 02T .0113** [Waste Not Discharged to Surface Waters - Permitting by Regulation], in accordance with NCGS 143-215.1(b). Thus, no individual or general permit must be issued by the DWM for the construction or operation of disposal systems for drill cuttings or mud, provided that the system does not result in violations of groundwater or surface water standards, there is no direct discharge to surface waters, and all criteria required for the specific system are met.

However, if the drill cuttings/mud have been contaminated by hazardous waste constituents, the DWM, Hazardous Waste Section, tel. (919) 707-8200, must be contacted to determine the regulatory status of the contaminated material.

The flow diagram Figure E-1 in Appendix E presents detailed guidance for the proper disposal of drill cuttings and mud.

7.2 Disposal of Groundwater

7.2.1 Purge Water and Well Water from Construction Activities

Disposal of purge water from groundwater monitoring wells and of wastewater from the development of wells or from other construction activities including directional boring (but not including dewatering activities) is deemed permitted under **15A NCAC 02T .0113** *Waste Not Discharged to Surface Waters – General Requirements – Permitting by Regulation*, in accordance with NCGS 143-215.1(b)**.** Thus, no individual or general permit must be issued by NCDEQ, DWR, for the construction or operation of disposal systems for purge water or well construction water, provided that the system does not result in violations of groundwater or surface water standards, there is no direct discharge to surface waters, and all criteria required for the specific system are met. The water may be discharged onto the ground in proximity to the well in a manner that will preclude runoff if the aquifer is contaminated with equal or higher concentrations than the wastewater; if the aquifer is less contaminated than the wastewater, then the waste water must be containerized and transported to permissible disposal facility.

However, if the purged well water may be contaminated by hazardous waste constituents, the contaminated water should be stored on the site in sealed containers, analyzed to confirm that hazardous waste constituents exceed the groundwater quality standards in **15A NCAC 02L .0202,** and, if exceedances are confirmed, the DWM, Hazardous Waste Section, contacted at (919) 707-8200 to determine the regulatory status of the contaminated material and the protocol for disposal.

The flow diagram in Figure E-2 in Appendix E, Disposal of Groundwater, presents detailed guidance for the proper disposal of groundwater from well purging or well construction.

7.2.2 Aquifer Test Water and Vapor Extraction System Water

Disposal by pumping and hauling of groundwater withdrawn from the ground during aquifer pump tests and condensate/water withdrawn by vapor extraction systems, which may be considered industrial wastewater, is deemed permitted under **15A NCAC 02T .0203** [Waste Not Discharged to Surface Waters - Wastewater Pump and Haul Systems - Permitting by Regulation], in accordance with **NCGS 143-215.1(b).** Thus, no individual permit must be issued by NC DEQ, DWR, for the operation of "pump and haul" disposal systems for aquifer test water and vapor extraction water, provided that the system does not result in violations of groundwater or surface water standards, that there is no direct discharge to surface waters, that all criteria required for the specific system are met, that the appropriate regional office of the DWR is notified, and that the other criteria of Paragraph **.0203** are met. The wastewater must be containerized and transported to a permissible disposal facility.

However, if this wastewater may be contaminated by hazardous waste constituents, the contaminated water should be stored on the site in sealed containers, analyzed to confirm that it is hazardous waste and that hazardous waste constituents exceed the groundwater quality standards in **15A NCAC 02L .0202**, and, if exceedances are confirmed, the DWM, Hazardous Waste Section, contacted at (919) 707-8200 to determine the regulatory status of the contaminated material and the protocol for disposal.

7.2.3 Remediation Treatment System Water

Remediation treatment system water (including any waters produced that have contact with any contaminated materials) is considered a wastewater and must be disposed of or treated under a permit. The permit may be an on-site or off-site permit.

The kinds of state permits required for the most commonly used types of groundwater remediation methods are described in Appendix E. In addition, descriptions of the major types of groundwater treatment methods and the permits and/or authorizations required for each treatment method are presented in Appendix E.

The disposal by pumping and hauling of condensate and groundwater drawn from the ground by the operation of vapor extraction systems is deemed permitted under **15A NCAC 02T .0203**, Disposal of Industrial Wastewater, as discussed in Section 7.2.B.

7.2.4 Tank Pit or Excavation Water

If a tank pit or an excavation at a contaminated site requires de-watering, the contaminated water must be properly treated to meet discharge levels allowed in a POTW or NPDES permit or must be properly disposed of at a permitted facility.

7.3 Reference for Sampling: "Guidelines for Sampling"

Soil and groundwater samples required for UST closures, site checks and over-excavation must be collected, transported and analyzed in accordance with the *Guidelines for Sampling*, current version (available in electronic format from the UST Section's web page at http://portal.ncDEQ.org/web/wm/ust/guidance-documents). See also Tables 1-11 and Appendix F - Collecting Soil Samples.

8.0 References

The following is a list of references that were used in the development of this document, and which may be consulted during the assessment and corrective action process. It is not intended to be all inclusive.

General Guidance

American Petroleum Institute Recommended Practice 1604, *Removal and Disposal of Used Underground Petroleum Storage Tanks*, third edition, March 1996. http://publications.api.org/publications-store.aspx

American Petroleum Institute Publication 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks. http://publications.api.org/publications-store.aspx

International Air Transport Association. *Dangerous Goods Regulations.* Issued annually. http://www.iata.org/publications/dgr/Pages/index.aspx

Leaking Underground Fuel Tank Guidance Manual. California State Water Resources Control Board, September 2012 (Updated December 2015). http://www.waterboards.ca.gov/ust/luft_manual.shtml

National Institute for Occupational Safety and Health *Criteria for a Recommended Standard: Working in Confined Spaces,* December 1979. https://www.cdc.gov/niosh/docs/80-106/

U.S. EPA *Expedited Site Assessment Tools for Underground Storage Tank Sites,* EPA510-B-16-004. October 2016. https://www.epa.gov/ust/expedited-site-assessment-tools-underground-storage-tank-sites-guide-regulators

U.S. EPA Region 4 Service and Ecosystem Support Division. *Design and Installation of Monitoring Wells.* SESDGUID-101-R1. January 2013. Available on the Internet at https://www.epa.gov/sites/production/files/2016-01/documents/design_and_installation_of_monitoring_wells.pdf

U.S. EPA Land and Emergency Management. *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites.* EPA 510-B-17-003. October 2017. Available on the Internet at https://www.epa.gov/ust/how-evaluate-alternative-cleanup-technologies-underground-storage-tank-sites-guide-corrective

USGS Professional Paper 1404-I, *Hydrogeologic Framework of the North Carolina Coastal Plain,* 1996. https://nc.water.usgs.gov/reports/abstracts/pp1404i.html.

Analytical Methods

American Public Health Association, American Water Works Association and Water Pollution Control Federation. 1992. *Methods for Determining Organic Compounds in Drinking Water*.

Massachusetts Department of Environmental Protection. *Method for the Determination of Volatile Petroleum Hydrocarbons.* May 2004. http://www.mass.gov/eea/agencies/massdep/cleanup/regulations/iv-petroleum-hydrocarbon-methods.html

Massachusetts Department of Environmental Protection. *WSC-99-415 – Preservation Techniques for Volatile Organic Compound (VOC) Soil Sample Analyses.* https://www.mass.gov/lists/policies-guidance-technical-support-for-site-cleanup

U.S. EPA Standard Methods for the Examination of Water and Wastewater. EPA-600/4-79-020 or the most recent edition.

U.S. EPA Standard Methods 6000 Series -*Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, American Water Works Association and Water Pollution Control Federation, 18th Edition, 1992 or latest EPA-approved edition.

U.S. EPA. 1999. *Test Procedures for the Analyses of Pollutants under the Clean Water Act.* Federal Register Vol. 49, No. 209, 40 CFR Part 136, October 26, 1984 or the most recent edition.

U.S. EPA 500 Series - *Methods for the Determination of Organic Compounds in Drinking Water*, U.S. EPA - 600/4-88/039.

U.S. EPA 600 Series -Federal Register, latest EPA approval edition of 40 CFR Part 136.

Copies available from: Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954, telephone (202) 512-1800.

U.S. EPA. *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods.* U.S. EPA publication number SW-846. Third Edition, June 1997. https://www.epa.gov/hw-sw846

U.S. EPA. *The SW-846 Compendium.* https://www.epa.gov/hw-sw846

U.S. EPA Office of Solid Waste. Memorandum. *Clarification Regarding Use of SW-846 Methods.* August 1998. https://www.epa.gov/hw-sw846/memorandum-clarification-regarding-use-sw-846-methods

Modeling

Connor, John A., et al, 2012, *GSI Mann-Kendall Toolkit for Constituent Trend Analysis, Version 1*. Groundwater Services, Inc. d/b/a/ GSI Environmental, Inc., Houston, TX https://www.gsi-net.com/en/software/free-software/gsi-mann-kendall-toolkit.html

Newell, C.J., R.K. McLeod, and J.R. Gonzales. 1996. *BIOSCREEN Intrinsic Remediation System Decision Support System, Version 1.2.* Air Force Center for Environmental Excellence, Technology Transfer Division, Brooks Air Force Base, San Antonio, Texas. https://www.epa.gov/water-research/bioscreen-natural-attenuation-decision-support-system

P.K.M. van der Heijde and M.S. Beljin. *SOLUTE*. Distributed by International Ground Water Modeling Center (IGWMC), Colorado School of Mines, Golden, Colorado. https://igwmc.mines.edu/

Yeh, G.T., et al. 1993. *AT123D, version 1.22.* Oak Ridge National Laboratories, Oak Ridge, Tennessee. Distributed by Pennsylvania State University, University Park, Pennsylvania. **NOTE**: *This software is available for sale at various internet sites.*

Monitored Natural Attenuation

Chappelle, Francis H. & Bradley, Paul M. *Selecting Remediation Goals by Assessing the Natural Attenuation Capacity of Groundwater Systems*. 1998. Battelle Memorial Institute.

McAllister, P.M. and C.Y. Chiang. 1994. *A practical approach to evaluating natural attenuation of contaminants.* Groundwater Monitoring Review. Spring 1994. Pp. 161-173.

U.S. EPA, 1999. *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective*

Action, and Underground Storage Tank Sites. U.S. Environmental Protection Agency, Directive no. 9200.4-17P, Washington DC.

U.S. EPA Land and Emergency Management. *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites.* EPA 510-B-17-003. October 2017. Available on the Internet at https://www.epa.gov/ust/how-evaluate-alternative-cleanup-technologies-underground-storage-tank-sites-guide-corrective

Chapter IX: Monitored Natural Attenuation
https://www.epa.gov/sites/production/files/2014-03/documents/tum_ch9.pdf

Wiedemeir, T.H., J.T. Wilson, D.H. Kampbell, R.N. Miller and J.E. Hansen. 1995. *Technical Protocol for Implementing Intrinsic Remediation with Long-Term Monitoring for Natural Attenuation of Fuel Contamination Dissolved in Groundwater.* Air Force Center for Environmental Excellence, Technology Transfer Division, Brooks Air Force Base, San Antonio, Texas. https://www.lm.doe.gov/cercla/documents/rockyflats_docs/sw/sw-a-005904.pdf

9.0 Figures

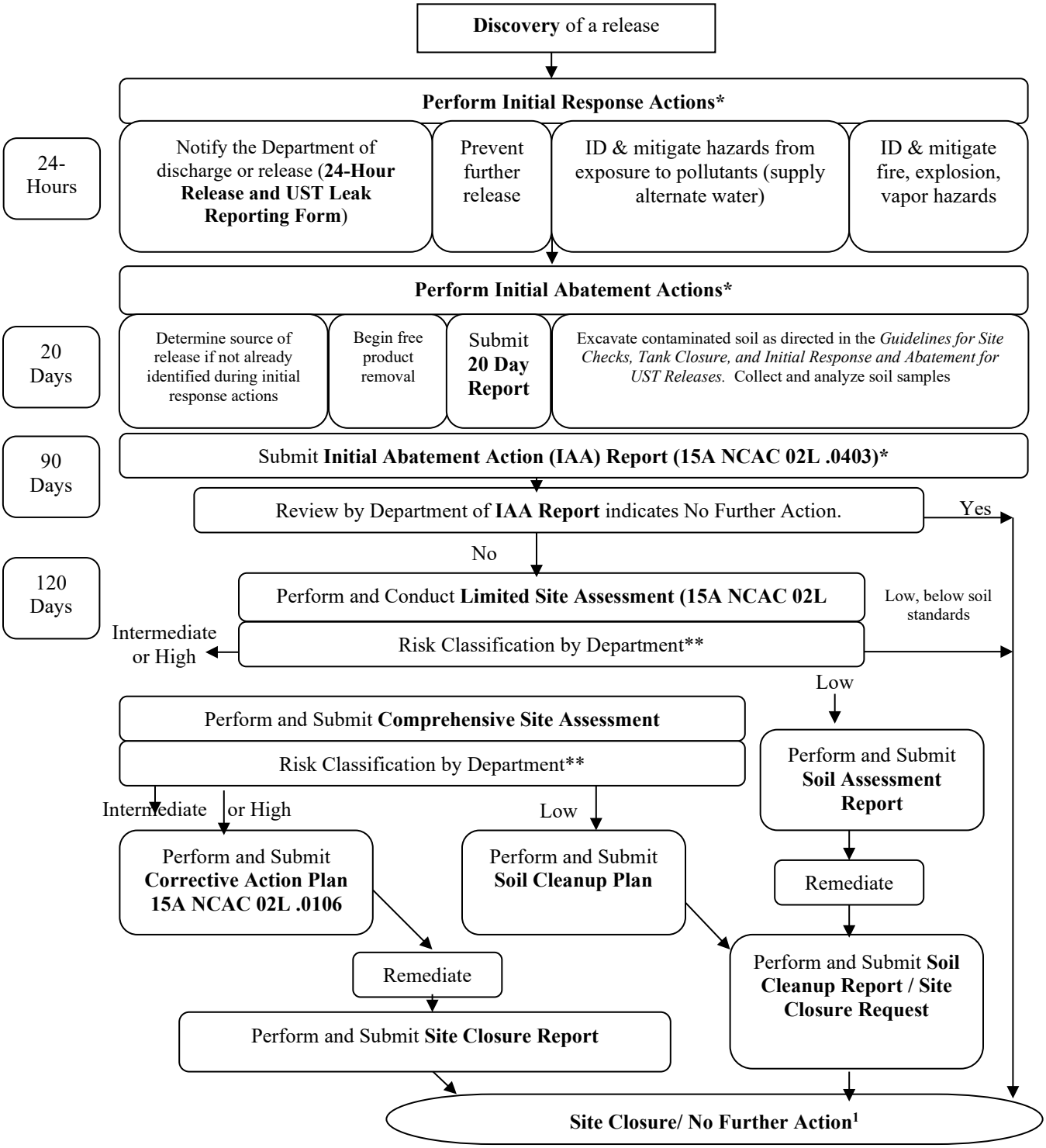
Figure 1 - Flowchart of Requirements for UST Petroleum Releases

Figure 2 - Flowchart of Requirements for Non-UST Releases of Petroleum

Figure 3 - Flowchart of Requirements for Regulated Non-Petroleum and Non-Regulated Non-Petroleum UST Releases

Figure 1 - Flowchart of Requirements for UST Petroleum Releases

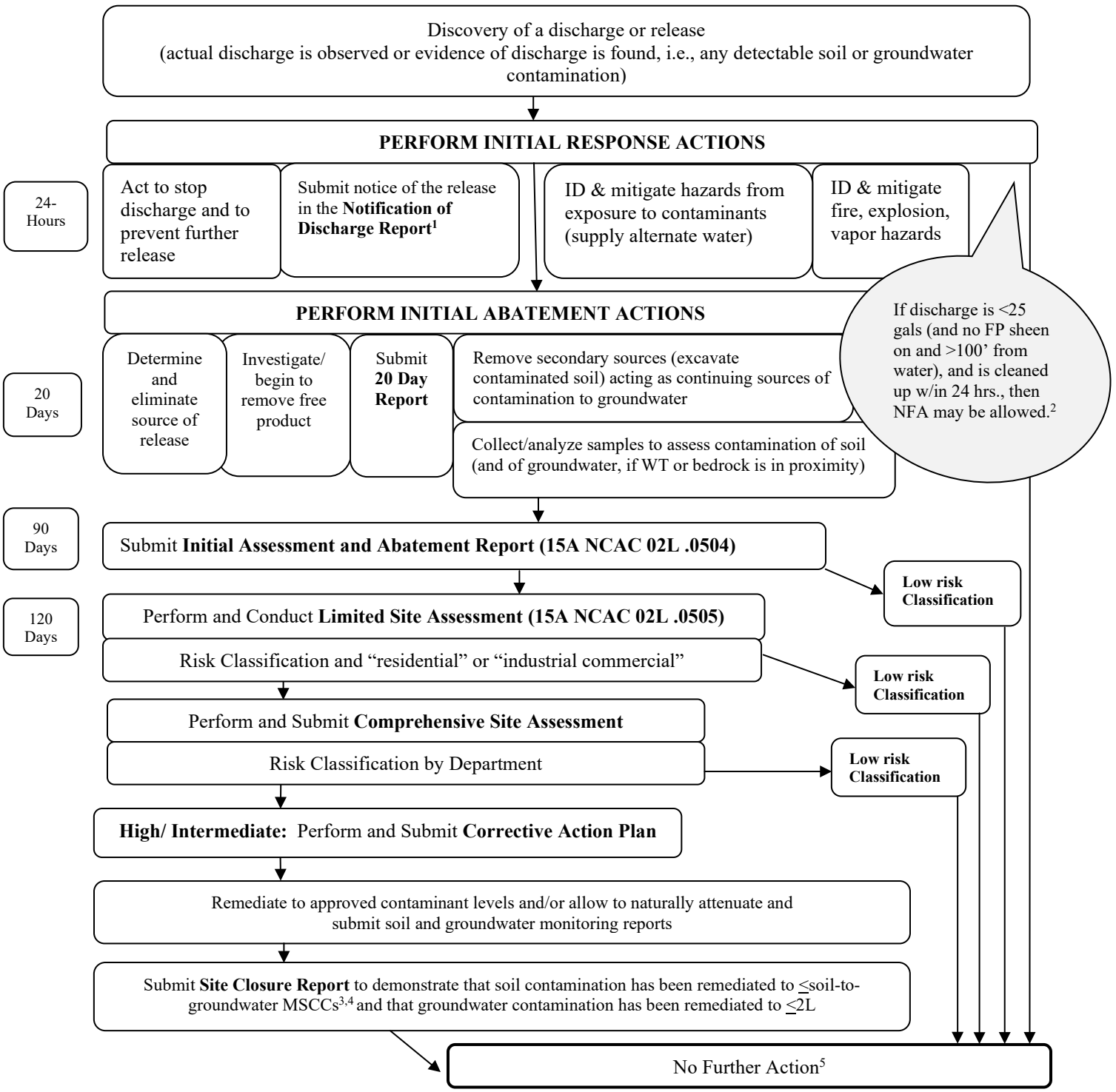
*For guidance on initial actions, see the *Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases*.



**Note: Risk Classification may change at any time due to changes in site conditions or corrective or interim actions.

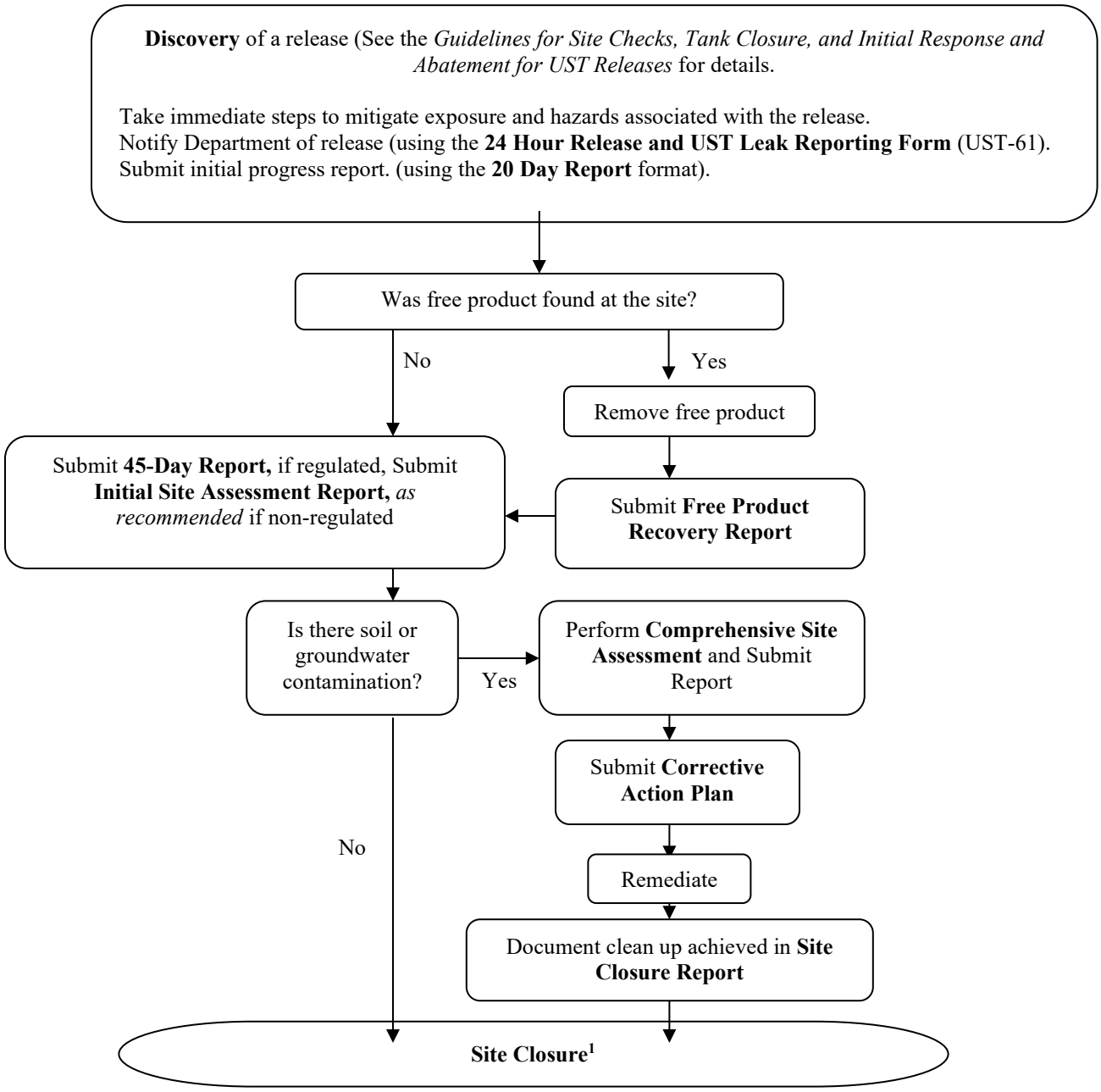
1 - A NFA designation may require land use restrictions (Notice of Residual Petroleum) under risk-based closure

Figure 2 - Flowchart of Requirements for Non-UST Releases of Petroleum



1. If the discharge is ≥25 gals (etc.), a Notification of Discharge is required, followed by initial abatement actions, etc.
2. If the discharge is≤25 gals (etc.), but is not cleaned up within 24 hours, a Notification of Discharge is required
3. Use the approved analytical methods listed in Table 6 - Approved Soil Analyses Methods for Non-Petroleum UST Closures and Release Investigations and Table 7 - Approved Groundwater Analyses Methods for Non-Petroleum UST Closures and Release Investigations.
4. If no established soil-to-groundwater MSCC exists for a contaminant in soil, then the default concentration limit is the PQL, contact the UST Section for further information.
5. A NFA designation may require land use restrictions (Notice of Residual Petroleum) under risk-based closure.

Figure 3 - Flowchart of Requirements for Regulated Non-Petroleum and Non-Regulated Non-Petroleum UST Releases



1 - A NFA designation may require land use restrictions under risk-based closure